SCALES OF AIRPORT EXPANSION: GLOBALIZATION, REGIONALIZATION, AND LOCAL LAND USE

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This study examines two main issues surrounding the increasing demand for airport capacity: the effects of globalization and transportation on each other as expressed through local land use, and the politics of scale in struggles over airport expansion. The study centers around three case studies to illustrate how globalization, air transportation, and local land use are connected at the municipal, metropolitan, and regional levels. Each case study investigates a specific issue. The Minneapolis-St. Paul (MSP) case investigates the geographical distribution of economic impacts of the airport. The Chicago (ORD) case documents the changing land uses over time around O'Hare, as well as a detailed investigation of the current land use controversy in the vicinity of an expanding airport. The Boston (BOS) case study examines the regionally-based solution to airport demand, specifically the attempts to encourage passengers to use smaller regional airports in the area instead of the crowded Logan Airport in Boston.

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EXECUTIVE SUMMARY

This study examines two main issues surrounding the increasing demand for airport capacity: the effects of globalization and transportation on each other as expressed through local land use, and the politics of scale in struggles over airport expansion. The study centers around three case studies to illustrate how globalization, air transportation, and local land use are connected at the municipal, metropolitan, and regional levels.

The report is divided into three main parts. The first section provides background to the issue by means of literature review, including technical information on federal legislation, economic development, and environmental effects of air transportation; and theoretical background on globalization and the construction of scale. The bulk of the report presents in-depth case studies of three airports with differing situations: Chicago, Minneapolis-St. Paul, and Boston. The final portion addresses the implications of airport expansion, including planning and public participation, the politics of scale, and globalization.

The first case study focuses on Chicago-O'Hare and local land use surrounding the airport. As a hub for two of the largest U.S. airlines, capacity issues are particularly critical at O'Hare. Additionally, since the airport is run by the City of Chicago, the airport-neighbor relationship is also a city-suburb relationship, one that has been notoriously tense over the years. This example exemplifies the difficulties involved in keeping local land use compatible with airport operations. Census housing data, zoning maps, and interviews revealed that land use compatibility around O'Hare has been influenced by region-wide geography rather than municipal-level planning. Many factors were given more consideration during planning than airport proximity, including municipal size and history, market forces, and distance from downtown. Furthermore, the places that actually did take the airport into account in their planning have sometimes had that planning overridden by unforeseen airport expansion.

The second case study, Minneapolis-St. Paul, examines the effects of the airport on economic development in the region. Based on analysis of Standard Industrial Classification, airport-related jobs have not been evenly distributed throughout the metro area. In fact, they are concentrated in parts of the region that are already the fastest growing. In addition, these economic benefits do not correspond equally with the negative environmental effects. Minneapolis-St. Paul Airport differs from O'Hare in that it is run by a regional commission, which has resulted in fewer airport-neighbor conflicts than in Chicago. However, other imbalances are still present; for example, the state claimed the authority to require expansion of the current airport without taking responsibility for the funding or completion of that task.

The final case study analyzes Logan Airport in the context of Boston's attempts to accommodate high demand by encouraging travelers to use nearby regional airports. For the most part, diversion of air traffic to smaller regional airports has reduced congestion at Logan while replicating the same airport-municipality conflicts at the smaller airports. The regional airports are increasingly being connected to major hubs, allowing greater access to and from these smaller metropolitan areas. However, it is unclear how long-term of a solution the regionalization of air traffic is. Opponents of airport expansion are

instead pushing the use of high-speed rail and teleconferencing to carry out the same functions as air transportation.

The relationship between public participation and the planning process proved to be a fundamental part of the connections between globalization, air transportation, and land use for all three case studies. Municipalities are influenced by their constituencies and their form of government in determining their best course of action with regards to airport expansion. Research revealed that citizens and municipalities *will* find a way to participate and have their voices be heard, no matter how much time that might add to the planning process. Furthermore, allowing more public participation appears to result in faster airport expansion, based on the seven airports that were part of the three case studies. This may also benefit neighboring municipalities, however, by removing some of the uncertainty that interferes with their internal planning and by providing more opportunities for compromise.

Scale is also an important part of airport expansion controversies, not only in terms of deciding who should make policy, but also as an explanation for why the expansion process can be so lengthy. The multiscalar nature of airport expansion issues has two consequences. First, because there is no means of adjudication between different scales, scale jumping is a necessary strategy on the part of the smaller scale involved. The City of Chicago's attempt to mandate the expansion of O'Hare through federal legislation is a prime example of scale jumping. Secondly, the structure of scale itself is also called into question by such issues. Additionally, the structure of scale has further implications when the concept of globalization also comes into play.

Globalization was shown to influence transportation by placing particular demands on the air transportation system through increased international trade, the growth of multinational corporations, technical improvements that have reduced transport costs, and deregulation. The three different experiences of the case studies with regard to the connections between air transportation and globalization reflect a previous argument that globalization is inherently localized in the power structures and practices of individual places. Because Chicago, Minneapolis-St. Paul, and Boston are all in different situations with regard to air transportation, it is misleading to speak of the impact of globalization on these places as if they were all reacting to the same set of forces, rather than playing a role in the production of those forces themselves. The role that a metropolitan area sees itself as playing in the global network determines its attitudes toward transportation infrastructure, as does the governance of the airport in combination with other power structures.

It should hardly be surprising that the major conclusion of this geographic study is that place matters. There are two ways in which this is true. First, the places that host air transportation infrastructure are not just nodes in a global network, whether a physical or symbolic network. These key places have the power to wield an impact on that network by providing more or less capacity, based on political, social, economic, and environmental characteristics of those particular places. Secondly, just as it is inaccurate to talk about globalization as a homogenizing force that equally affects different places, so it is also inaccurate to talk about the effects of globalization on transportation as if they were the same everywhere. The history, governance structures, airline service, and

regional economic situation of individual airports all play a role in mediating the effects of the processes of globalization on individual places, and in shaping those processes in turn. However, because air transportation is regulated at the international and national levels, conflict persists between airports as individual places with their unique situations, and the regulations and discourse that assume all places are the same.

CHAPTER 1

INTRODUCTION

> "To represent economic and social change as a consequence of 'global forces' and to justify development strategies with reference to the requirements of such forces […] is frequently to defer the understanding, explanation and meaning of socio-economic change to a scale that can not be easily grasped or held accountable" [1].
>
> "Questions of appropriate land use planning, environmental effects and local or regional economic development are fundamental to the debate [on airport impact], as are the distribution concerns of who actually bears the costs or receives the benefits from airport development" [2].

The recent and rapidly growing literature on globalization speaks of networks and flows, the death of distance, and transnational organizations superceding the nation-state. All of these processes require the use of transportation to get goods and people from one point to another. But there has been little discussion, both within the scholarly literature and the larger world, as to the implications of the increase in transportation demand due to globalization. Even less attention has been paid to air transportation, though this mode in particular is vital to the continuing growth of global transfers of people and goods. The few studies that have looked at air transportation and globalization have mostly focused on the globalization of the airline industry itself.

This study examines two main implications of the increasing demand for airport capacity: the effects of globalization and transportation on each other as expressed through local land use, and the politics of scale in struggles over airport expansion, with particular attention to the municipal level. Chicago, Minneapolis-St. Paul, and Boston are the three case studies, illustrating how globalization, air transportation, and local land use are connected at the municipal, metropolitan, and regional levels. Each case study is a unique situation that nevertheless has implications for airports across the U.S. and for the processes of globalization.

First, the City of Chicago has tried for over thirty years to expand O'Hare International Airport, always failing due to local opposition. In 2001, the city, as operator of the airport, went to the U.S. Congress seeking federal legislation that would mandate the expansion of O'Hare in order to reduce delays. Because Chicago saw its position in the global network of air transportation as under threat, the city had to argue that global economic processes make O'Hare important to the entire nation, not just to the Chicago metropolitan area. As the opening quote indicates, this argument "defer[s] the understanding, explanation and meaning of socio-economic change to a scale that can not be easily grasped or held accountable" despite the important local consequences of this socio-economic change.

One of these important local consequences of airport expansion has to do with land use, specifically with the distribution of residential land uses. O'Hare was sited in the 1950s in a location that was largely rural, yet today there is considerable conflict between Chicago and the municipalities that neighbor the airport because of incompatible land

uses, namely residential development in areas that experience aircraft noise. Chapter 4 shows that while municipalities have been guilty to some extent of failing to take the airport's presence into account in their land use planning, today's land use incompatibility is more a function of the size of the airport relative to its neighboring municipalities, and, most importantly, of past airport expansion.

Secondly, Minneapolis-St. Paul International Airport is in the middle of an expansion project that includes the construction of a runway, having gone through a planning process in the 1990s that considered expansion vs. the construction of a new facility. This case study explores the conflict between different scales over airport expansion, environmental effects, and economic growth, a conflict experienced at nearly all airports to one extent or another. As with Chicago, some of the incompatibility of land uses arises from development that took place before the jet age, as well as from the size of municipalities compared to the airport.

The MSP case study also questions the geographic distribution of economic benefits, particularly as compared to environmental effects. Based on previous studies identifying the economic sectors most reliant upon air transportation and most important to the region's economy, Chapter 5 shows that these sectors are concentrated in the parts of the metropolitan area that are already fast-growing, and are not located adjacent to the airport. Thus, I question arguments that airport expansion benefits the entire region, showing instead that expansion benefits a collection of places within that region.

Finally, Logan International Airport in Boston is the only U.S. airport that has actively worked to regionalize air travel by encouraging the use of regional airports and alternative modes such as high-speed rail. Determining how this regionalization came about, whether it has achieved its goals, and what its effects are on municipalities can help inform decisions made here and in other parts of the country with regards to expanding air transportation infrastructure. While regionalization was largely brought about by factors that are unique within the U.S. to New England, this does not mean the increased use of regional airports could not happen elsewhere. The dispersal of the negatives as well as the positives of air transportation access mean that regionalization is probably not a long-term solution to providing capacity for the region. Nevertheless, the increasing importance of regions as economic units means that the dispersal of air service to smaller regional airports will probably continue, while traffic simultaneously concentrates at major hubs. With demand continuing to grow, finding alternatives to air travel is perhaps the best means of counteracting the environmental effects of air travel.

I follow Kelly's definition of globalization as something more than internationalization: "the functional integration of activities across the globe through centralized co-ordination and control, as opposed to simple connections forged through flows of capital, people, images, commodities, etc." [3]. It is thus too simplistic to say merely that globalization has increased the demand for air travel. Globalization has increased the demand for air travel in particular ways, most notably for a greater frequency of flights along with more reliable service. If, as Kelly says, activities are being integrated across continents, part of that coordination and control means more frequent travel on the part of executives, who demand a higher frequency of service. Therefore, increased capacity needs to come from more flights rather than larger planes. Similarly, if production chains now stretch across

continents, firms need to be able to count on different components of that chain arriving at their destinations in a timely manner and with reliable schedules.

As the frequency of flights increases out of a particular airport, however, the chance that congestion will reduce the reliability of those flights increases as well. The hub-and-spoke system that dominates in the U.S. further amplifies delays, particularly at a hub such as O'Hare. In the year 2000, approximately one out of four flights in the U.S. were delayed, meaning they took at least fifteen minutes longer to leave their origin or arrive at their destination than scheduled. Furthermore, expansion of air transportation infrastructure is politically difficult if not impossible in certain places, whether the expansion is in terms of new runways or new airports. Thus, global demand intersects with local constraints, with national, state, and local governments mediating between the two.

Another way in which the study of air transportation has been neglected is in terms of land use. While connections between ground transportation, land use, and economic development have been explored at considerable length, relatively little attention has been paid to similar connections for air transportation. Airports attract certain land uses to their immediate vicinity and discourage others. At the same time, the pattern of existing neighboring land uses can have a significant effect on the ability of airports to expand, or for new airports to be built. Furthermore, while the regional economic development benefits of airports are widely touted as a reason for expanding infrastructure, it is unclear to whom those benefits accrue, and if there is another way of achieving them besides sacrificing municipalities adjacent to the airport.

Though the national media and the U.S. Congress have become concerned with solving the issue of airport capacity by reducing delays, there is little information available on the land use consequences of the proposed solutions. The literature on land use and airports has focused on either the regional economic impact of an airport, the land use planning process, the effects of airport noise on property values, or a detailed history of land use around one or two airports. Few of these studies connect local processes with national or international ones. However, the issues of land use and economic development, as well as the means of governance of the airport, feed back into the air transportation system with national and global implications.

One implication is that supply can not increase infinitely to match demand. While the processes that are indicative or even constitutive of globalization (e.g., international trade or the establishment and growth of transnational corporations) generally mean that goods or people are crossing international borders, there is little consideration of the departure and arrival points for those border crossings. As Smith has noted, the fluidity of the processes of globalization ironically depends upon infrastructure that is very much fixed in place [4]. As the demand for this infrastructure grows, there are consequences for the land uses around existing airports, roads, railways, etc., as well as in regions that might play host to future facilities. If actors at local scales are unwilling to cooperate with demands for increased capacity, the global networks that are possible because of this infrastructure may become constrained. Airports are thus a prime example of not only how the global can affect the local, but the converse as well.

Another implication concerns transportation and the politics of scale. While scale has long been one of the fundamental concepts of the discipline of geography, geographers and others have only recently begun to discuss and analyze the political meanings of scale. When social, economic, or even environmental processes are portrayed as taking place at certain scales, the political level at which policy is made concerning those processes is therefore determined as well. Examining how it is determined that a particular issue takes place at a certain scale gives us insight into the political conflicts that occur among actors at a variety of scales, and even into how scales such as "regional" or "national" are constructed.

Furthermore, when global-level processes such as air transportation come into conflict with local processes such as land use, existing scales of regulation and legislation are not equipped to handle the controversy. Because the main method of adjudication in multi-scalar conflicts is for the larger scale simply to win, conflict over who controls the scale of action often results in what is known as "scale jumping," as actors from smaller scales frame the issue as being of importance to a larger scale. Furthermore, the physical network structure of the global air transportation system affects certain places considerably more than others in both positive and negative ways. This leads to the question of what is meant by the terms "regional" or "national," and whether such scales are homogeneous territories or are simply networks of smaller-scaled territories.

This study is divided into three parts: background, case studies and implications. Chapter 2 provides technical and legislative background on airport expansion issues, as well as a review of the literatures on air transportation and economic development, the environmental effects of aviation, and theoretical literatures on globalization and the politics of scale. Chapter 3 discusses the qualitative and quantitative methods used in this study. Chapters 4 through 6 analyze the three case studies individually, giving a history of each place and answering the specific research questions posed for each. Chapter 7 describes the implications of this research for public participation and the planning process. While this was not one of the original subjects for research, it became apparent while conducting fieldwork that the concepts and structures of planning and public participation play a major role in both the feasibility of airport expansion and the ability of neighboring municipalities to deal with the consequences. Chapter 8 uses the literature on the politics of scale to analyze the implications of the case studies for multiscalar policy issues. Finally, Chapter 9 reviews each of the case studies with regards to the bi-directional connections between air transportation and globalization. The tensions between the economic and environmental aspects of globalization are key to this connection, both for local places and the world as a whole.

CHAPTER 2

LITERATURE REVIEW

> "The demand for airport capacity is not simply a function of the demand for air travel. Rather, the restructuring of the airline industry following deregulation has produced an unsustainable demand for airport capacity, the environmental and economic costs of which fall upon society as a whole […] Thus, the environmental costs of air transport do not merely represent externalities but rather political priorities about who gains and who loses"[5].
>
> "While the causes of traffic concentration are based upon transport system dynamics that are often global in scope, it is the locality of the terminal that bears the brunt of negative externalities" [6].

This chapter provides two kinds of background for the rest of the study: technical information regarding federal legislation, economic development, and environmental effects of air transportation; and theoretical background on globalization and the construction of scale. Both types of background are necessary for understanding the issues raised and conclusions drawn in the following chapters.

There are two main arguments to keep in mind. First, conflicts over airport expansion and land use are all about scale. There is a variety of parties responsible for these conflicts, from airlines that concentrate their global network of air traffic in particular places to municipalities that have not regulated their land uses in accordance with an airport's presence. The parties involved deliberately manipulate scales in order to get their way, from demanding legislation or regulation at a higher level, or by appealing to individuals to change their travel patterns. One of the reasons why airport conflicts can extend for decades is that there are no mechanisms in place for adjudicating between scales. In multiscalar disputes, larger scales generally simply overrule smaller ones. There is also the question of how scales are constructed in the first place, or how airport expansion becomes a state-wide or even national issue while opposition is limited to the local level.

Secondly, while globalization has put certain demands on transportation systems, the constraints on expanding air transportation infrastructure now have the potential to reshape globalization. Globalization processes have increased the pressure for reliable, frequent air service to as many destinations as possible. This pressure has put tremendous strain on existing airports to increase capacity, either by expanding their existing facilities or moving to new, "greenfields" sites. Environmental issues have restricted both kinds of growth in locations across the country, including the three case study sites, though such restrictions are often interpreted as "politics." Future expansion is likely to be even more difficult, forcing firms that rely on commercial transportation as part of their production process to seek alternative modes, other locations, or new means of doing business, perhaps even altering the processes of globalization.

This section begins with two short histories, one of federal aviation legislation concerning local land use, and one about airline operations in the United States. A

review of the literature on transportation and economic development follows, then a discussion of how this is balanced by the environmental effects of air transportation. These sections are followed by more theoretical reviews: first current research on the *nature of geographic scale*, and then a summary of the *globalization* literature, both being theoretical concepts that will be used to frame the results of the three case studies.

Federal aviation legislation

Federal legislation on aviation has covered a broad range of topics: certifying airworthiness, determining fares and later deregulating fares, funding airports, and in later years, dealing with some of the negative externalities of airports. The two issues that are most relevant to local land use and to different scales of regulation are funding mechanisms for air transportation and noise mitigation and compatibility planning. The former has been present throughout the history of legislation on aviation, the latter only since the 1960s. Both have changed over time, reflecting relative shifts in the balance of power between local airport authorities and the federal government.

The first piece of legislation that Congress passed regulating air travel was the Air Commerce Act of 1926 (44 Stat. 568). Because this act was intended to "encourage and regulate the use of aircraft in commerce," the Secretary of Commerce was made responsible for aviation. Among the provisions of this act was the requirement that the Secretary designate certain ports of entry for foreign aircraft, as was the case for maritime transport. Thus, right from the beginning, global air travel was tied to a particular network of places determined by the federal government. Paradoxically, federal funding for airports and terminals was forbidden; while the federal government could donate landing fields to local municipalities, cities and towns would not have any funds available other than those already appropriated for navigational aids. However, by 1946 federal funds were made available for airport projects, but only up to 50 percent of the project costs, and only if the project fit in with the federally approved list of airports, the newly developed National Airport Plan.

There were two events that acted as catalysts for the rapid growth of air traffic in the ensuing decades: the introduction of jet aircraft in the 1960s and deregulation in the 1970s. Jet aircraft made it possible to fly for longer distances with more passengers on board. The Airline Deregulation Act of 1978 (92 Stat. 1705) removed regulation of airfares and routes from the government's control. While the effects of deregulation are still hotly contested (see, e.g., [7]), its most important geographical effect was to establish the hub-and-spoke system that nearly all U.S. airlines use today.

With demand growing at the nation's airports, increasing federal funding was a way to speed up the rate of capacity increase. Eventually, airport operators, whether municipalities, counties, or port authorities, became dependent on federal funds because of the magnitude of their improvement projects. The Airport and Airway Trust Fund was established in 1970 to disburse funds for such projects from taxes on aviation fuel, aircraft and air transportation (84 Stat. 219). By 1973, the maximum percentage of federal funding for projects at small airports (those with fewer than 0.25 percent of total enplanements) was increased from 50 to 75 percent (87 Stat. 88). In 1982, this percentage was further increased to 90 percent (96 Stat. 671). At the same time, states or local units of government were prohibited from levying taxes or fees on passengers. This

restriction was lifted in 1990 with the establishment of Passenger Facility Charges (PFCs) (104 Stat. 1388-353). Funds raised through PFCs could be used for projects concerning capacity, safety, security, noise abatement, or price competition among air carriers.

After the introduction of jet aircraft to most major U.S. airports by the mid-1960s, noise became a problem for airport neighbors across the country. Congress passed legislation in 1968 requiring the FAA to establish standards for aircraft noise (82 Stat. 395). Proposed standards would have to meet standards of safety and be "economically reasonable" and "technologically practicable." Over time, these requirements have been taken seriously, resulting in minimal economic impact to airlines and slow or no relief to affected airport neighbors. For example, though noise standards were promulgated in 1969 for new aircraft, it took another seven years for those standards to apply to aircraft already in service. Furthermore, the Noise Control Act of 1972 (86 Stat. 1234), despite acknowledging that transportation vehicles were among the major sources of noise, exempted aircraft from the standards of noise that the act was meant to establish.

In 1979 federal, legislation made funds available for noise compatibility programs, rather than just for studying the effects of noise (94 Stat. 50). This legislation provided the authority for 14 CFR 150, or Part 150, the regulation that is followed by airport operators in noise compatibility planning. Airport operators wanting to use federal funds for mitigation have to submit a noise exposure map and noise compatibility program, known as a Part 150 study. To determine noise exposure, the FAA averages aircraft noise over a 24-hour period, resulting in a Day-Night Level (DNL). Part 150 studies require the airport operator to produce a map of these DNL levels, shown as noise contours, as in the example in Figure 1. The section below on noise pollution explains the DNL methodology in greater detail.

While Part 150 programs provided a means for collecting funds from airport users via PFCs to partially mitigate the negative impacts of the airport, many airport operators wanted to reduce noise at its source by banning louder aircraft or night flights. The Airport Noise and Capacity Act of 1990 (ANCA), as its name implies, tried to resolve the conflict between increasing capacity and increasing noise (104 Stat. 1388-378). This act banned aircraft that did not meet Stage 3 requirements as determined by the International Civil Aviation Authority (ICAO) from flying after December 31, 1999. Because of the international nature of air travel, uniform standards are needed for issues such as aircraft noise. If one country bans aircraft that are too noisy, airlines whose aircraft do not meet that requirement are unable to serve that country. The ICAO is the body under the United Nations that coordinates aviation issues such as noise standards. The terms "Stage 2" and "Stage 3" refer to the increasingly stringent noise standards of the ICAO. Stage 2 restrictions applied only to the manufacture of new aircraft, while Stage 3 applied to aircraft currently in service as well as newly manufactured ones. Under the ANCA, airlines had to choose to purchase and use new aircraft that met the Stage 3 requirements by the end of 1999 or attach "hush-kits" to their older, noisier aircraft.

While the ANCA legislation, which led to the regulations in 14 CFR 161, or Part 161, greatly reduced the amount of noise experienced by airport neighbors, it also essentially eliminated any further restrictions on aircraft that met Stage 3 requirements. If an airport operator (city, country, port authority, etc.) implements restrictions at the local level

deemed by the FAA as too strict from the perspective of the national aviation system (such as nighttime curfew), the operator forfeits the right to collect PFCs or to use money from the Airport and Airway Trust Fund. In other words, the airport loses its 75 percent or 90 percent federal funding for future airport improvements. Part 161 also requires a study of the economic effects that the proposed restrictions would have on the regional economy before implementing any such restrictions. The scope and cost of such a study has deterred all but a handful of airports from proposing further restrictions on Stage 3 aircraft. While municipalities and other airport operators therefore retain control over the operations of their airports, the scope of expansion projects means they are reliant on federal funding and therefore subject to restrictions in terms of their ability to control operations.

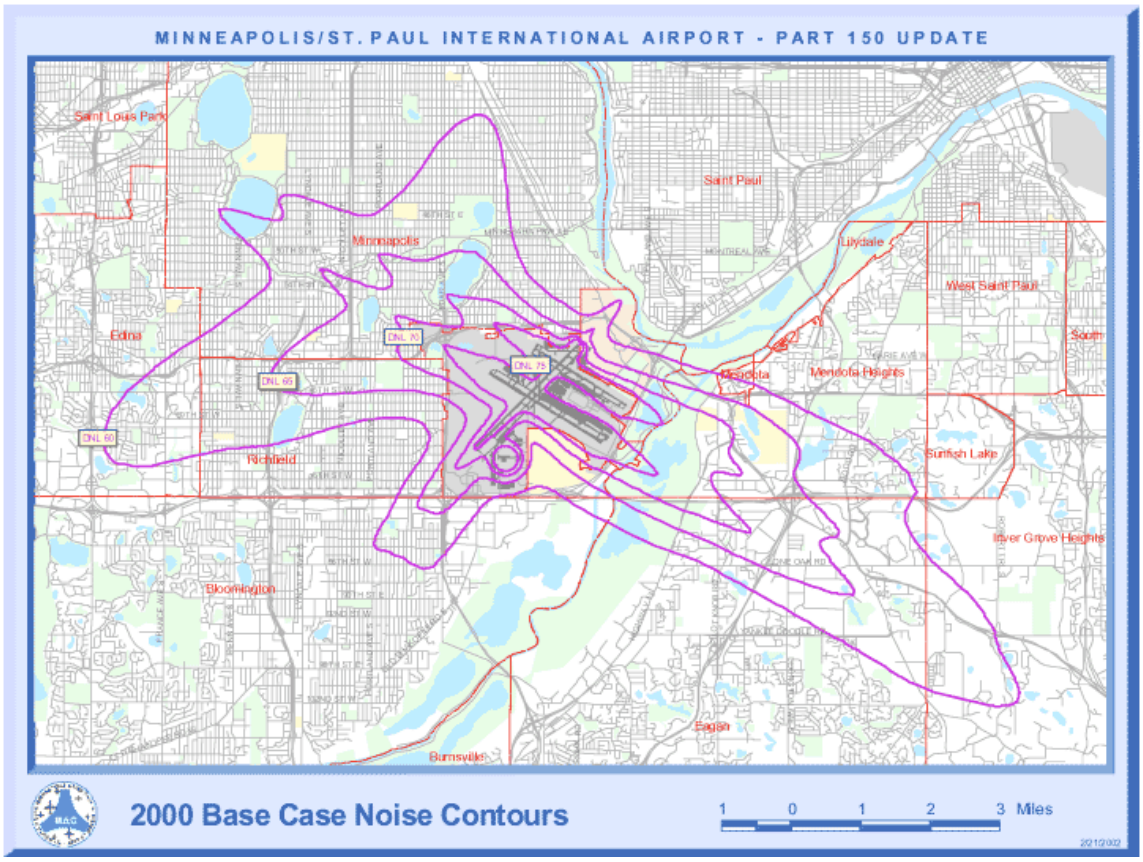

Fig. 1. Noise contours, Minneapolis-St. Paul International Airport. Metropolitan Airports Commission Aviation Noise and Satellite Programs Office Home Page. http://www.macavsat.org, viewed January 7, 2002.

History of national and global airline networks

The aviation industry has always had close ties with national governments. Graham notes that though passenger travel was not profitable in the early days of aviation, governments considered air transportation an important enough industry to develop that they subsidized it via airmail contracts [5]. The U.S. Post Office began using airmail contracts in 1919, and by 1925 it had turned specific routes over to certain carriers. The network that was developed in 1925 was the basis of today's hub-and-spoke system. Northwest Airways, for example, received the airmail contract between the Twin Cities and Chicago; that is still the busiest route from Minneapolis-St. Paul. Taaffe observed in the 1960s that the major airports of the country dominated air traffic, and that the hierarchy of inter-city linkages would likely only increase with time [8]. Indeed, since the hub-and-spoke system came into place in the late 1970s, this hierarchy has been even more firmly established.

World War II provided the first major boost for the aviation industry in terms of technological improvements and demand for air travel. More powerful engines that were developed for military aircraft were later put to use by civilian airlines. Trans-oceanic routes that were developed for military purposes were also later used for commercial flights. Additionally, the war solidified the position of the United States as the world's leading aviation power.

As aircraft grew bigger and more powerful, they needed more room to take off and land. This increase in runway length was gradual, until the introduction of jet aircraft in the late 1950s, and again with the introduction of the 747 in the late 1960s. Airports such as Logan in Boston or Midway in Chicago, built in the 1920s, were suddenly too small for these new aircraft. Some were able to extend their runways, like Logan, while other cities chose to build new airports, as in Chicago. At the same time, the longer range of jet aircraft meant that fewer intermediate stops were necessary for long-distance flights. Cities like Omaha or Oklahoma City that had hoped aviation would contribute to their economic development were disappointed once transcontinental non-stop flights became possible [9].

After jet aircraft, the next major development in the history of commercial aviation was the Airline Deregulation Act of 1978 (92 Stat. 1705). This act had a tremendous impact on the airline industry in three ways. First, the introduction of free-market competition resulted in lower average fares across the country, leading to rapid growth in air travel after 1978. Secondly, competition also led to the emergence of new carriers as well as increased mergers among old and new airlines. Strategic alliances between domestic and foreign carriers have substituted for mergers at the international level. Finally, once airlines were free to organize their own national route structures, they implemented the more efficient hub-and-spoke system, concentrating traffic at a few key centers for each of the major airlines. All of these effects have been felt unevenly across space, with hub cities in particular experiencing more of the negative effects of increased air travel while simultaneously paying higher average fares and accessing more destinations.

As Goetz notes, "The airline industry was the first to be deregulated, and has been more thoroughly scrutinized by academics and policy analysts than any other deregulated industry" [10]. The general conclusion has been that on average, deregulation has

benefited the American consumer (e.g., a 25 percent overall reduction in fares [11]). However, in recent years there has been increasing concern over possible antitrust and predatory behavior on the part of the major carriers, as well as recognition that the reduction in fares has not been evenly distributed across space. Goetz and Sutton found in particular that the two types of places where fares have tended to increase have been the cities at the innermost cores and outermost peripheries of the airline networks: in other words, the cities with little or no competition in their airline service [12]. Core or hub cities such as Minneapolis-St. Paul are partially compensated via service to more destinations than they might otherwise have.

One of the reasons many cities have little choice when it comes to airlines is the number of mergers that have taken place since deregulation. The thirty-two U.S. airlines in 1978 had combined to form eleven by 1994, from mergers and bankruptcy [5]. As one example, Southern and North Central merged in 1980 to form Republic. Hughes Air later merged with Republic as well, establishing service in the West and Southwest in addition to the South and North Central U.S. By 1986, Republic had merged with Northwest, greatly increasing traffic while reducing competition at Detroit and Minneapolis-St. Paul and completing the airline's geographic coverage of the country.

Mergers have often served to further consolidate the hub-and-spoke system that major airlines enhanced or implemented after deregulation. By forcing passengers to make an intermediate stop, airlines could serve more city pairs with the same number of aircraft. Pustay has summarized the consequences of the hub-and-spoke system as follows:

> The creation of "fortress hubs" to discourage competition;
> Integrating international and domestic operations;
> Concentration of the industry (largely through mergers);
> Increased price competition (for leisure more than business travelers); and
> "competition among carriers has been manifested in the form of competition among hubs" [13].

Hub cities can thus become quite closely tied to the airline that serves them. While a few new hubs have been located or strengthened in the past decade (e.g., Northwest in Memphis or Delta in Cincinnati), for the most part, the hubs that were established by the 1980s are the ones that exist today. Airlines are unlikely to make the tremendous investment required to establish a new hub, though they have been willing to shift their operations between existing hubs. United, for example, has moved a number of its operations from O'Hare to Denver after the opening of the newer, larger, DIA. Northwest has developed a tiered airport system, with Detroit as its main international gateway, MSP as a connecting point for east-west flights, and Memphis focusing on regional traffic. The hinterlands of these hubs become dependent on a particular airline as well, such as the Upper Midwest's reliance on Northwest for service via MSP.

Since U.S. carriers are dominant internationally, this deregulation and consequent restructuring of the domestic industry has had consequences around the world as well. Many other countries have at least partially deregulated their own (often state-run) airlines. Global networks like the Star Alliance headed by United and Lufthansa have been the equivalent of mergers, allowing international coverage under one ticketing

system. The U.S. has also negotiated more liberal, "open-skies" agreements with a number of nations, allowing unlimited access to markets in both directions. The hub-and-spoke system is not as prevalent in the rest of the world; the physical size of the U.S. market has made it possible for multiple airlines to spread their networks throughout the market, whereas the same process in Europe or Asia would involve carriers hubbing in foreign countries.

Balancing economic development and environmental effects

The cities that are host to airline hubs experience both advantages and disadvantages. The advantages are largely economic, from jobs at the airport itself to attracting national or even international branch offices or headquarters to the region. Airline service has come to be seen as a prerequisite for regional economic development. At the same time, the localities nearest the airport are likely to suffer from environmental effects including air and noise pollution. The mismatch between type of benefit and type of disadvantage, as well as the mismatch in scale between region and municipality or neighborhood, means that the environmental effects are often simply externalized by airport neighbors, who may or may not benefit from the airport themselves.

Transportation and economic development

There is a well-established association between transportation and economic development, though the direction of that connection is not clear. The assumption that transportation infrastructure drives development, rather than the reverse, has led to major investments by local, state, and federal governments in an attempt to stimulate economic growth. Historically, transportation infrastructure such as canals and railroads has clearly stimulated development in the United States and elsewhere [14]. The connection is less clear for other modes of transportation, however, particularly highways. For example, Stephanedes and Eagle found only a slight connection between the presence of interstate highways and increased employment in rural counties [15]. Guliano was less convinced of the impact of interstates in urban areas, as were Smith et al. [16, 17]. The latter study examined 24 counties in the greater Minneapolis-St. Paul metropolitan area and found that depending on the type of development (residential, industrial, commercial or office), interstate highway access may drive development, or the reverse may occur.

However, others are not so sanguine about the results of transportation infrastructure investment. Both Black and Banister and Berechman note that in developed countries, additional transportation infrastructure is unlikely to produce further economic growth [18, 19]. Black points out that while the economic growth of the U.S. in the 19th and 20th centuries *was* driven in large part by transportation infrastructure, it is a fallacy to assume that this growth will automatically continue. He suggests that the only way further investments in transportation will result in economic growth is if a particular economic activity is currently being held back by a lack of transportation. Similarly, Banister and Berechman state that the character of the local labor market is actually more important to spurring economic growth than are investments in transportation infrastructure. They advocate a "decoupling" of transportation and economic growth, in which the intensity of transportation is decreased through increases in efficiency rather than volume or distance, while the economy continues to grow. Both studies also note that the addition of infrastructure is likely to shift existing economic activity from one place to another rather

than increase it overall, benefiting the city or region that invests in the infrastructure only at the cost of another place.

Air transportation and economic development

While most of the transportation and economic development literature has focused on roads, there has also been a great deal of research on the economic impacts of air transportation. Air transportation has become an increasingly important mode of transport for both people and goods, leading to an increasing desire on the part of cities to be connected to national and international air transportation networks. For example, just-in-time production places greater importance on the timely arrival of goods in intermediate stages of the production process. As Bell and Feitelson note,

> "While most movements associated with production were previously along the assembly line--or among proximate production facilities--they increasingly take an interregional or even international dimension […] Due to the flexibility they allow, highways and airways are likely to be the main systems on which inputs and outputs are transported in the new economy" [20].

Additionally, as the U.S. economy becomes more service-oriented, employees fly more often as part of the services production process. Button and Taylor note that employees in "new economy sectors" fly over 1.6 times as often as employees in more traditional sectors due to the need for face-to-face contact [21]. While these sectors only comprise 10 percent of the total economy, about 90 percent of new-economy jobs are concentrated in the fifty largest cities in the U.S., further concentrating their importance as nodes in the air transportation network.

Because of these connections between air transportation and new production processes, in the literature on air transportation and economic development, the connection generally focuses on high-tech or new-economy employment. For example, Button et al. found that metropolitan areas with a hub airport have on average 12,000 more high-tech jobs than do similar metropolitan areas without a hub [22]. Ivy et al. studied the relationship between air service connectivity and employment in the administrative and auxiliary sector (as a proxy for service employment) [23]. They found that connectivity influenced employment levels to a greater extent than the reverse. Similarly, Irwin and Kasarda found that between 1950 and 1980, the centrality of a metropolitan area within the network of air service generally had a greater effect on overall employment levels than the reverse [24]. These studies therefore suggest that investment in air transportation infrastructure stimulates economic growth rather than the other way around, and in a clearer fashion than has been demonstrated for highways. For cities trying to attract or maintain growth in high-tech sectors, increasing air service is seen as fundamental to that growth.

International air service is of particular importance to debates on air transportation and economic development. Loughlin cites a 1994 study that estimates one additional international flight from MSP adds 3,700 jobs and $107 million to the local economy [25]. Button and Taylor cite a 1990 study that found that based on existing Houston-Tokyo service, adding service with a single daily flight from Houston to London would

increase exports annually by $84 million [215]. However, they go on to show that these figures are specific to the airports in question, since there are diminishing returns involved in adding international air service. Increasing the number of EU destinations from nine to ten, they estimate, would add 955 new economy jobs, while increasing destinations from twenty to twenty-one would only add 440 such jobs. Nevertheless, international air service is important to cities and regions as a means of demonstrating connectivity to the rest of the world. Additionally, there are other, intangible benefits to international air service, including metropolitan area prestige and facilitating connections between immigrants and their home countries.

Airports and economic development

Because of the relation of air transportation to economic development, the FAA has a standard method of measuring the economic impact of an airport on the entire metropolitan area. The FAA calculates direct, indirect, and induced effects. For example, for MSP in 1995, there were an estimated 28,000 direct airport jobs and 18,000 indirect jobs, totaling 10 percent of the employment in the seven-county Twin Cities metropolitan area [26]. However, these calculations are based solely on the number of passengers traveling through an airport, focusing on the economy of the entire region while not clearly defining what the "region" is.

All of the above studies focus on the regional or metropolitan scale. There is little consensus as to the economic development benefits an airport brings to its immediate surroundings. One way to get at this question is to determine the location within the metropolitan area of firms that use the airport on a regular basis, whether for goods or passengers. The converse of this approach is to look at the firms that *are* adjacent to an airport and examine their locational decisionmaking process.

Studies in the former category generally indicate that while airport access may be an important factor in locational decisionmaking, airport proximity is not. For example, Centonze found that while the U.S. headquarters of foreign firms consider access to air travel one of the main reasons to locate in large metropolitan areas, access to the airport *within* that metropolitan area is not as critical [27]. Similarly, Twomey and Tompkins noted that for Manchester (England), firms that use a lot of national and international air service tend to locate along airport access routes, not necessarily close to the airport itself [2]. Both Caves and Pitfield found that a number of different economic impact reports in the U.S. and Europe are inconclusive as to whether there is a positive impact on the airport vicinity or not [28, 29]. Finally, the Coley/Forrest study found that in Atlanta, Kansas City, and Dallas, economic development attracted to the metropolitan area by improved air service was not attracted to the airport environs: national headquarters in Atlanta, for example, chose to locate in the same geographic sector as existing office development, on the opposite side of the metro area from Hartsfield Airport [30].

What about the firms that *are* located near the airport? Hakfoort et al., in their case study of Amsterdam Schiphol, found that the direct economic effects of the airport (employment at the airport itself) were larger than any spin-off economic activity in the surrounding region [31]. McAdams studied Mitchell Airport in Milwaukee and found that the ground transportation links that exist because of the airport were more important in firms' locational decisionmaking than was air transportation access [32]. Finally,

Hoare discovered that the immediate environs of an airport may actually experience detrimental economic effects [33, 34]. Within eight to ten miles of Heathrow, there were more negative economic effects than positive ones. Labor competition was the biggest negative, as well as noise and traffic congestion. As he said,

> "The justification for regarding Heathrow as a growth pole depends partly on the geographical scale of analysis […] When vast sums of public investment are already sunk in such ventures it appears worthwhile incorporating in the overall appraisal projects research work designed to tackle at least three basic questions. How much growth? Growth for whom? Growth where?" [34, p. 96].

Though Hoare's work is decades old, he posited questions that have not yet been examined, much less answered. Airport expansion may have an economically devastating effect on surrounding communities, throwing into question the meaning of "regional" economic growth. This is particularly the case where airports are surrounded by built-up areas. In such places, any economic growth that an expanded airport will bring to the region will probably not occur adjacent to the airport. This imbalance is particularly important because the negative effects of the airport are felt almost exclusively in the immediate vicinity, as explained in the next section.

Environmental effects

The environmental effects of air transportation are often considered to be externalities or side effects that may be alleviated by some sort of mitigation. Increasingly, however, environmental externalities (particularly noise pollution) are feeding back into the system, keeping the expansion of airport infrastructure from being automatic. Graham and Guyer have observed that for European airports, "airport capacity is -- or is soon to become -- environmental capacity, with environmental criteria, rather than those related directly to physical infrastructure capacity, increasingly determining the magnitude of air transport movements" [35]. In many parts of the U.S., this is true as well: Boston, Seattle, and San Francisco, for example, have been functionally limited to their existing infrastructure because of decades-long citizen opposition to expansion. It seems likely that the magnitude of aircraft movements in this country as well as Europe will increasingly be determined by where citizen opposition on environmental grounds is minimal. As a Logan official said, "[I]f you continue to let *local* entities be the determinant, then you will have a lot of runways in Florida and a lot of runways in the South, and no runways in Chicago or Boston or San Francisco" [36].

There are two main types of environmental effects from airports: noise pollution and air pollution. The former has been well-studied in terms of its effects on health (minimal) and property values (small but significant), while the latter is just beginning to be seriously studied. Reducing the effects of noise involves either reducing it at the source through quieter engines or changes in operations (known as abatement), or reducing its effects through land use controls or by soundproofing existing structures (known as mitigation). Air pollution is mitigated through source reduction, both of aircraft and ground vehicles. At some point, however, without further technological improvements, the only mitigation that is possible within the constraints of current technology is to

reduce (or at least not increase) the number of flights, leading to the question of how much more expansion of airport infrastructure is possible in certain locations.

Noise pollution

As was explained in the section on federal legislation, noise exposure is determined for individual airports via the FAA's approved methodology [37]. Aircraft noise is averaged over a 24-hour period to produce DNL (Day-Night Level) contours. Contours are usually drawn at the 75, 70, and 65 DNL levels, and no contour higher than the 75 DNL usually extends outside of airport property. Normal conversation takes place at a level of about 65 dB, so that was chosen as the level at which residential land uses are incompatible with airport operrations. DNL levels are assessed via computer modeling, including data on the mix of aircraft at a particular airport, how noisy those aircraft are, how many operations there are per day, and the height of the flight paths. These same factors are then projected five or more years into the future, thus requiring input from airlines as to their future operations. Noise between 10 P.M. and 7 A.M. is given a weight of ten extra decibels due to less background noise and the fact that most residents are sleeping. Since the decibel scale is logarithmic, this means that nighttime flights (or "events") are considered ten times as noisy as daytime ones. The levels may be checked via sound monitoring, but more often the computer projections are used without ground verification.

The FAA and EPA have agreed that residential land uses are officially incompatible with airport operations within the 65 DNL contour, though about 5 million people nationwide lived within such a line in 1990 [38]. Other uses that are incompatible with certain levels of noise include hospitals, schools, and recreational space (Appendix A). The FAA's official policy is that land use planning should be left up to local communities, with safety restrictions on height and population density the only exceptions. Unfortunately, in about half of the airports under study in this report, surrounding land was already built up by the time jet noise became a concern.

There are two concerns about the effects of aircraft noise on residents: health risks and property values. Studies on the former have been inconclusive, showing no statistical connection between exposure to noise and negative health effects (e.g., [39]). However, there is a general consensus that aircraft noise does slightly lower residential property values (not to mention quality of life, which is much harder to quantify). Nelson's 1980 article summarized the studies done up to that point in time, showing an average decrease in property values from 0.4 to 1.1 percent for every 1-dB increase in DNL [40]. In other words, a house located in the 64 DNL contour is worth between roughly half a percent to a percent less than if it were located in the 63 DNL contour. More recent studies confirm these results (e.g., [41]).

Reduction of aircraft noise can be provided in one of three ways: mitigating the effects of the noise, as with soundproofing, abating noise at the source via technology, or changing flight operations. Many airports use all three methods. Because of concern over lost property values due to aircraft noise, the FAA will fund mitigation to residences and other buildings deemed incompatible with this noise level, partially via PFCs as described above. Airlines generally also contribute to the costs of mitigation. FAA statistics show that of the $728 million spend on noise abatement from 1982 to 1989,

nearly 70 percent went to the acquisition of property and relocation of individuals, while nearly 20 percent went towards soundproofing [38]. Only 3.4 percent of those funds went towards planning to prevent noise incompatibilies in advance. Soundproofing is generally preferred over relocation: by residents because they are able to stay in their neighborhoods, by cities because of the maintenance of neighborhoods and tax base, and by airport operators because of the lower cost and less disruption to neighborhoods.

Source reduction of noise, of course, is the mitigation method preferred by residents but opposed by airlines, while airport operators are often caught in the middle. There are two ways to reduce the noise heard on the ground: operations changes, such as flight tracks that take aircraft over non-residential land uses, or changes to the aircraft themselves to make them more quiet. Operations changes are generally considered voluntary, since the pilot has ultimate control over where his or her plane flies once it is in the air. Frequent communication is thus required between the air traffic control tower (managed by the FAA) and the airport operator to make sure the operational changes are being carried out. Operations changes often simply redirect noise to another area, spreading out the effects rather than reducing them and potentially pitting airport neighbors against each other. Aircraft themselves are the most permanent site of noise reduction, and as new technology has been made available, the sound produced by individual aircraft has decreased dramatically. For example, one of the first long-haul jet aircraft was the Boeing 707. On takeoff, a 707 results in an exposure of 65 dB or higher to an area covering 82 square miles. (Note that this does not mean that the 65 DNL contour covers 82 square miles, but that the area exposed to a one-time noise event of 65 dB is that large.) The comparably-sized 757 exposes only 14 square miles to the same sound level [42]. This 83 percent decrease, however, is offset at many airports by the rapid growth in traffic that has taken place over the same time period. The model that is used to determine the DNL contours is more sensitive to noise than to frequency, so the contours have generally grown smaller with time. However, residents may be equally sensitive to the level of noise and the number of noise events (i.e., flights), making the DNL method an increasingly less accurate reflection of the level to which residents are affected by airport noise.

The section on federal legislation above outlined the role of the ICAO in determining international noise requirements for aircraft, which have been partially responsible in the past for technological improvements to reduce source noise. One of the major steps towards reducing aircraft noise came in 2000, when all aircraft were required to meet Stage 3 levels of noise, a reduction of ten decibels or a 50 percent decrease from Stage 2. Some airlines met these requirements by purchasing new aircraft, while others chose the cheaper route of retrofitting existing aircraft engines with "hush kits" (which only barely meet Stage 3 requirements.) The newest set of agreements, known as Stage 4, will only apply to the manufacture of aircraft, not those already in service. However, nearly all aircraft currently being manufactured already meet the requirements set out for Stage 4, and of the aircraft already in service, 97.5 percent of all U.S. flights *already* meet these requirements [42]. Therefore, Stage 4 will have little to no impact on reducing airport noise at the source, requiring other methods such as soundproofing or operational changes.

Air pollution

Air pollution is increasingly becoming a concern of both airport neighbors and the larger community. Airport pollution comes from three sources: ground traffic, taxiing or idling aircraft, and overflights. At the local level, airports are often given exemptions from state and federal emissions laws, despite the fact that they can be among the highest-polluting facilities in a state. For example, the Natural Resources Defense Council found that O'Hare would rank 18th in Illinois in terms of volatile organic compounds and 22nd in terms of NO_x, if these rankings included airports [43]. Nor are airports required to report their toxic emissions totals in the National Toxic Release Inventory. Pollution at a global level may be an even greater cause for concern because NO_x emissions at high altitude have a more direct effect on global warming than those at ground level. Yet the only research that has been done on this aspect of air pollution has been in the context of sustainable transportation in Europe (e.g., [35], [44]).

There are three main types of pollutants produced by aircraft engines: oxides of nitrogen (NO_x), carbon monoxide (CO), and hydrocarbons or volatile organic compounds (VOCs). Most NO_x emissions are actually produced by motor vehicles, though NO_x is the primary pollutant produced during the high-power maneuvers of take-offs and cruising. VOCs and CO predominate during low-power operations such as taxiing, meaning that delays on the ground translate to more emissions of these compounds into nearby areas. Both of these types of emissions are actually decreasing around major airports because of technological changes. However, the changes that enabled engines to be quiet enough to meet Stage 3 requirements for noise also mean that those engines produce more NO_x. Airport neighbors therefore have traded one kind of pollution for another [45].

Most studies that have been done on air pollution in the vicinity of major airports in the U.S. have been sponsored by local communities concerned about the health of their residents. A study commissioned by Park Ridge, IL, for example, found a higher cancer risk than is considered acceptable under federal standards for residents not only in municipalities adjacent to O'Hare, but for 98 total municipalities in the metropolitan area [46]. Results on other health risks such as respiratory disease were inconclusive. A study funded by the Illinois EPA found, in contrast, that pollution levels around O'Hare were comparable to those found in other urban environments, and that the worst pollution in the Chicago area was on the southeast side of the metro area, near the heaviest concentration of industrial activity [39].

One of the major difficulties with conducting such studies is that it is difficult to measure the effects of aircraft emissions from vehicle traffic on the roads surrounding the airport. In fact, most studies have shown that emissions in the area of airports are no worse than in urban areas in general [45]. The one exception is a study commissioned by the town of Winthrop, MA [47]. Winthrop is located at the end of a peninsula in Boston Harbor, so that the only emissions come from residential auto trips--and aircraft. The study found a correlation between residents' proximity to Logan Airport and the incidence of respiratory diseases. While Winthrop's study is only a single data point, the town is currently working with the Massachusetts Department of Public Health on a larger-scale study.

Striking a balance

One of the difficulties with mitigating the environmental effects of air travel is that it is difficult to know where to place the responsibility, and thus who should pay for mitigation. The airlines themselves are responsible for aircraft, but passenger demand determines how many planes are in the air. Airport operators are responsible for some of the pollution resulting from ground transportation, though airport users are the ones who drive rather than use transit. Municipalities are responsible for planning land uses in accordance with airport operations, but they need to be fiscally responsible and put land to its highest and best use.

In many states, when private developers build an office building or a subdivision, they are responsible for funding whatever mitigation is determined to be necessary. This might include a new traffic light at a particular intersection or paying impact fees to the local school district. A U.S. airport, however, is built by a public entity, using bonds and/or user fees, built to be used by private interests. Those private interests are not mandated to pay for mitigation; nor is the airport operator. While some sort of mitigation agreement is usually reached between the airport operator and the airport neighbors, usually funding for soundproofing, there is no requirement that that be done, or that the cost be included as part of the construction project (as with private developments). Without a clear method for determining responsibility for the environmental effects of airports, it is impossible to mandate mitigation for those effects, and thus they are left unbalanced with the positive economic effects.

One of the other difficulties with balancing economic and environmental effects is the fact that economic impacts are dispersed throughout the entire region, while environmental impacts are largely limited to the area immediately surrounding the airport. When higher levels of government require an airport to expand, they rarely provide funding to help mitigate the costs of their decision (see Chapter 5 on MSP) because of this scalar mismatch between costs and benefits. Without a means of mediating between scales, other than to argue that the larger number of people should win out, actors on both sides "jump scale" in an attempt to make their views relevant to a larger audience.

Scale and globalization

We turn now from technical background in terms of regulation and pollution to theoretical background. This study uses two bodies of literature as a basis for analysis: geographic literature on the production of scale, and geographic and economic literature on globalization. The rest of this chapter consists of a summary of each body of literature, with a final section linking the two.

The production of scale

> "'Scale,' then, is not simply an external fact awaiting discovery but a way of framing conceptions of reality" [48].

A relatively recent body of geographical literature discusses what is known as either the production of scale, the politics of scale, or the political construction of scale. This work argues that we should not take for granted labels such as local, regional, or even global. By assigning certain processes to certain scales (for example, arguing that trade should be

regulated at an international level, but not environmental issues), we identify the political level that should be making policy on those processes. Once that political level has been identified, it often becomes a given that that is the scale at which a certain issue is to be dealt with. For example, "inner-city problems" such as poverty are in recent years considered to be of municipal rather than regional or national concern. Examining how these scale labels are applied gives us insight into the political conflicts that occur between and among actors at a variety of scales, and even into how scales themselves are constructed.

There are three main ways in which the production of scale can be discussed: as part of understanding a phenomenon, in tracing political power, and in defining scales themselves. First, as Kelly argues, the production of scale is "the creation of a level of resolution at which phenomena are deemed understandable" [1, p. 10]. In the field of environmental justice, for example, determining whether underprivileged populations are disproportionately exposed to environmental hazards can depend on whether data are used at the block, tract, or county level [49]. Scale has always been a fundamental part of geography in this fashion, where the level of resolution is a critical part of the research design. However, scales are produced by more than just researchers. Kelly's work examines how politicians at various levels of the Philippine government produce the "global" as the scale that drives the restructuring of local land relations, when in fact there are regional and national actors that also determine what "globalization" means. (This work will be discussed in greater detail later.) In Smith's words, "The production of scale may be the most elemental differentiation of geographical space and it is every bit a social process" [50].

The identification of a phenomenon as taking place at a particular scale obviously has implications for the scale at which policy will be made regarding that phenomenon. The production of scale thus is closely related to the location of political power. Williams observes, "The scale(s) at which a social problem is generated may not coincide with the scale(s) at which the problem might be resolved via public policy. It is precisely in that divergence that the politics is situated" [51]. Williams is writing about environmental justice, and notes that the question of scale as debated by activists and industry is the crucial issue for this arena of public policy. He also finds that political power lies in being able to act at multiple scales at once; actors who are limited to a single scale (whether through deliberate actions on the part of others or through their own failure to broaden their movement) become disempowered. Similarly, Miller points out that protest does not always occur at the scale responsible for the situation, but the one that is most open to change [52]. His study of anti-nuclear movements in Massachusetts shows that both activists and industry worked to reframe their side of the debate as being politically relevant to different scales, depending on their goals. For example, anti-nuclear activists who were unable to effect change at the international level focused on encouraging their respective municipalities to become "nuclear-free zones." Industry advocates reframed the issue as a question of jobs, pointing out the importance of the defense industry to the Boston *region* in terms of economics. Activists were unable to counter this new scale, and the nuclear-free zone was not created.

One of the most familiar examples of the political production of scale is the so-called NIMBY (Not In My BackYard) phenomenon. An issue such as a hazardous waste storage facility produces a social problem at a small scale, relevant to the immediate neighbors of the facility. However, siting disputes are usually resolved at a higher scale for political reasons. Morrill has observed that as siting projects hit local resistance, they are redefined as being of state or even national importance. This not only taps into a larger number of people who benefit from such a project, but dilutes the voices of those who oppose it [53]. The tactic of labeling citizen objections as NIMBY instantly acts to diminish those objections because of scale. The back yard is a very small space, and therefore has support from a small number of people--basically a household, not even a neighborhood. Siting proponents use this deliberate strategy of "scaling down" to make an issue relevant to as few people as possible [49]. Citizens have to counter NIMBY discourse either by showing that the negative aspects of a facility are not as narrowly locally focused as is being portrayed, or by connecting their local struggles to similar battles in other places, both aspects of what Smith and others call jumping scale. In both cases, what siting opponents are trying to do is produce their own scales in counterpoint to those being produced by siting proponents. As Smith notes, "Thus the scale of struggle and the struggle over scale are two sides of the same coin" [50, p. 74].

Leitner is another author who has been concerned with this political aspect of the construction of scale. For example, she writes, "A central aspect of the practice of the political construction of scale is the manipulation of relations of power and authority between overlapping or mutually inclusive political territories, by actors operating and situating themselves at different geographical scales" [54]. Leitner outlines three types of struggle over scale in her case of migration regulation in the European Union: where power should be located, over how large a territory that power should extend, and whose norms and values should guide the use of that power. To some extent these struggles are over where power should be invested in scales that already exist: the national, the supra-national, or the international. Indeed, Leitner says, "The notion of scale employed here is that of a nested hierarchy of political spaces, each with a distinct geographical scope, that is, territorial extent" [54, p. 125].

However, the European Union is a new kind of political institution, one that is still very much in the process of becoming, and one for which questions of scale are of utmost importance. Leitner's work leads to the question of what we even mean when we talk about a specific scale, or the third type of scalar construction. How do words such as "regional" or "local" acquire meaning, and how are those meanings fought over and redefined by actors at different political levels? Most of the literature on the construction of scale traces the shifting power relations between already-established scales of governance rather than the actual construction of scales. As Smith points out, “[w]hat never gets challenged in all of this, however, is the structure of geographical scale itself” [55]. Is a higher scale simply a collection of units at a smaller scale that are spread out over a large area? This question about the structure of geographic scale is important because one of the ways in which the idea of scale has power is in the assumption of homogeneity within a scale. For example, the regional economic benefits of an airport are assumed to apply to individuals across the region, not only to certain localities within

that region. The large geographic area covered by these benefits therefore overrides the locally negative effects of noise pollution and traffic. But if the economic benefits could be shown to apply only to a few places, then the concept of "regional" economic benefits, and their trumping of local concerns, can be brought into question. Chapter 5 will discuss this in greater detail.

Scales are assumed to cover space rather than simply span it--to be homogeneous within their borders--which is part of the taken-for-granted power of scales. Scales may transcend traditional boundaries, especially labels such as "region" or "community" that do not correspond to governmental jurisdictions. By the same token, scales may shift their scope either in name or in actuality, as with the above example of Czechoslovakia. Scales can also overlap in a couple of ways. The overlap may occur when describing the same place in different ways: "Boston" can refer to eastern Massachusetts, the four-county Metropolitan Statistical Area, the municipality, or downtown. Alternatively, a place may belong to more that one entity at the same scale, as with a river that acts as a border between two countries. Examining the political construction of scale, therefore, can mean determining how a network became a scale--how separate places were brought together and presented as a single territory rather than as a series of connected places. Chapter 7 further explores this issue.

Finally, Cox has explored the connections between scale and networks through his concepts of spaces of dependence and spaces of engagement. He addresses the question of whether the politics of a particular jurisdictional level necessarily match that jurisdiction's scale: "is a politics that engages with local government necessarily local, with central branches necessarily national, and so on?" [56]. Scale jumping still assumes homogeneity within scales, and even its name suggests that interaction between scales is unusual and somehow inappropriate. To get at these issues, Cox employs two types of spaces: "Spaces of dependence are defined by those more-or-less localized social relations upon which we depend for the realization of essential interests and for which there are no substitutes elsewhere […] a space of engagement [is] the space in which the politics of securing a space of dependence unfolds" [56, p. 2]. For example, utility companies depend on their commercial and residential customers to exist. Utilities therefore engage with developers, Chambers of Commerce, and local governments to encourage regional development and provide themselves with customers.

In the case of utilities, the space of engagement is actually smaller than the space of dependence, since the regional-level utilities must work with local entities to achieve their goals. Usually, however, the "politics of securing a space of dependence" are larger than that space itself. Municipalities seek state legislation for tax-increment financing districts to aid them in redevelopment; airlines lobby for international agreements that will enlarge their markets; and airport activists argue that air traffic is damaging national parks. "Local politics appears as metropolitan, regional, national, or even international as different organizations try to secure those networks of associations through which respective projects can be realized" [56, p. 19]. This is not to say that all politics are local; however, it does throw into doubt blanket statements about whether a particular issue is inherently local, regional, etc. Spaces of dependence and engagement do not

correspond neatly to jurisdictional scales, but rather consist of networks between actors at different levels.

Scales and airport expansion

Scales are produced regarding airport expansion in a number of ways. At the broadest possible scale is global airline industry with the network of cities that it serves. The industry, however, depends on government at various levels to provide the infrastructure it needs. First of all, there are international agreements on service and fares, as well as some environmental restrictions. Airport operators, whether at the regional or municipal level, control day-to-day airport operations, while municipalities (among others) provide the land for the facility and its concomitant land uses. National governments regulate safety and aircraft operations. Neighborhoods or municipalities may be opposed to airport expansion and may come into conflict with the airline industry or with other scales of government over such issues. Airlines have to engage with all of these levels in order to maintain their spaces of dependence.

Besides the airline industry itself, economic development also operates at a number of scales. States or regions depend on airports for attracting businesses that need good air transportation access. Metropolitan areas competing with one another for economic development may use air transportation access as one of their selling points, particularly if they have a hub facility. At the local level, municipalities near airports may benefit from ancillary development such as hotels, freight forwarders, and industrial parks, or their spaces of dependence may be threatened by airport expansion. Internationally, countries maintain flag carriers for reasons relating to economics and national identity. Further, while the national economic ramifications of the shutdown of the U.S. air transportation system after September 11th, 2001 have not been researched in detail, are nevertheless considered to be substantial, as evidenced by the possibility of bankruptcy for more than one of the major carriers.

Finally, there are environmental issues at a number of scales as well. Of course, the environmental issue most commonly associated with airports, noise pollution, directly affects people at the municipal, neighborhood, or even individual level. Concerns about global warming and damage to the ozone layer halted the development of supersonic transport (SST) in the 1970s, and debate continues over the harm that current technology has on the upper atmosphere. For metropolitan areas in the U.S., concern is growing over the health implications of the emissions generated at airports, particularly since airports are often exempt from meeting state or federal emissions requirements. In Europe, concern at the national level over sustainable transport has led to policies to encourage the use of rail over air for short-haul trips.

So it is clear that multiple scales are involved when dealing with airport expansion, and that this complexity is part of why expansion is usually controversial. However, as Brenner has warned, "the mere *existence* of scalar organization does not, *ipso facto*, result in sociologically or politically relevant *scale effects*" [57]. By this, Brenner means that it is not enough to identify the scalar units involved as actors, but that the relationships between them must be considered as well. For example, rather than just describing the Suburban O'Hare Commission (SOC) as a collection of municipalities fighting expansion at O'Hare, it is necessary to connect SOC down to the individual mayors who speak for

that organization (not necessarily in unison with their own municipal staff), and who try to represent as well as influence their residents, and up to the state and national politicians who represent the SOC municipalities. Cox's spaces of dependence and engagement are useful here in understanding how SOC deliberately acts at and works with multiple scales all at the same time, and thus why scale matters.

Beyond identifying scales and their relationships to one another, the next step is to examine how various scales are constructed. New jurisdictional levels may be deliberately created, as with the Metropolitan Airports Commission, whose geographical scope has been increased from the Twin Cities to the state of Minnesota (or at least the network of cities that have airports within that state). Scales may be constructed in more general terms as well, as with the "regionalization" of air transportation in New England. While the official definition of the region is the six New England states, the large service area of major airports means that the region functionally consists of a corridor between Manchester, NH, Boston, MA, and Providence, RI. Questioning the structure of scales in this fashion leads to the questioning of the largest scale of all: the global.

Globalization and transportation

The literature on globalization discusses networks and flows, the death of distance, and transnational organizations superseding the nation-state. All of these processes require the use of transportation to get goods and people from one point to another, making transportation actually part of the production process. Goetz and Rodrigue have observed that "One cannot fully appreciate how globalization works without understanding how seaports, airports, rail terminals, and truck terminals operate as the linchpins of the global economy" [58]. Yet for the most part, transportation (particularly air transportation) has been taken for granted within the globalization literature. Trade, transnational corporations, and technological improvements are cited as among the most important indicators of globalization. However, it is assumed that transportation is not problematic, that if two places need to be connected, they will be. Authors do not mention possible limits; indeed, they suggest that transportation demand will decrease with production and communications technology, making possible ever-larger networks of firms. But with production processes increasingly spread throughout the world, the demand for transportation is likelier to *increase*. Furthermore, not only does transportation have important impacts at the regional and local level that are often ignored, but there are constraints on the expansion of the network, potentially affecting the flows of people and goods that define globalization processes.

This final section of the chapter provides some background information on the literature on globalization. There are three parts. The first discusses how transportation enables globalization, something that is often taken for granted. The second part reviews the literature on how globalization affects transportation, particularly the air transportation industry. Finally, the third section discusses the limits that transportation may be placing on globalization processes and shows that even the scale that we call the "global" is constructed as is any other scale and should not be taken for granted.

Before getting into a detailed discussion, it is necessary to define exactly what is meant by globalization. Hirst and Thompson define it in terms of reduced regulatory power at the national level, something that is not necessarily accurate in the case of air

transportation [59]. Others define globalization more broadly, as the "increasing geographic scale of economic, social, and political interactions" [60]. Simply widening the scale at which action takes place isn't necessarily a new concept, however. Others state that globalization is a process where not only are geographical restraints receding, but people are aware of and are taking advantage of that receding [61]. This deliberate manipulation of scale is an important component of both the literature on globalization and globalization itself. Additionally, Kelly notes that globalization is not merely an increase in the flows of people and goods, but the functional integration of economic processes across borders.

Others caution that globalization is a process as well as a product [62, 44]. These authors are more likely to point out relevant trends in global economics and politics, including liberalization of trade and finance, increase in international trade, more complex links between nations and sectors, lower transportation and communication costs, and more environmental problems. Rather than considering globalization as a final end state that the world is moving towards, I would agree with these authors that globalization has to be considered as a set of processes. For this discussion, the most relevant processes are increasing international trade, including production processes occurring in multiple nations; the growth of transnational corporations; technological improvements, primarily the jet engine, that have reduced transport costs and thus in some sense shrunk distances between places; and deregulation and liberalization. As is apparent from these examples, transportation both enables globalization and is shaped by it in turn, as the two sections below describe.

Transportation as an enabler of globalization

The deregulation of the airline industry that began in the United States in 1974 has had a major impact on the structure of the air transport network, with consequences felt throughout the system. The hub-and-spoke system, which is by some measures the most efficient method of production for the airlines, tends to create and reinforce inequalities between places. The best example of these inequalities is the difference between those cities that serve as the hub for a particular airline and generally have better if more expensive service than cities that are at the ends of spokes. Nevertheless, the hub-and-spoke system is seen as responsible for many of the processes that are associated with globalization:

> "It is well acknowledged that globalization has been supported by improvements in transport technology and massive investments in transport infrastructures. The result has been a space/time collapse of global proportions, which has shrunk the transactional space and enabled extended exploitation of the comparative advantages of space in terms of resources, capital and labor" [63].

As Button et al., point out, hubbing did exist to some extent before deregulation, though it may have involved interline travel into and out of a particular airport [22]. Janelle and Beuthe also point out that without the technological advances in computing of the 1970s, hub-and-spoke routing would have not been as efficient [60]. However, it was the jet engine that made the greatest contribution to this "space/time collapse," though no consideration is given as to the continuing rate of that collapse. Rodrigue, unlike most

authors, at least notes that “Although the capacity of air corridors is almost limitless, the capacity of terminals is obviously not” ([63], p. 258). Held et al., for example, only briefly mention the consequences of the jet engine and containerized shipping: “these have combined to increase massively the interaction capacity of separate states and societies. They have contributed to declining unit costs and diminished opportunity costs in crossing huge distances” [64]. However, these consequences are mentioned only in the conclusion of a book that is described on the cover as being “the definitive work on globalization.” Without visible limits on the increase of transportation provision, firms have been able to integrate their production processes across continents, making commercial transportation a vital part of their intrafirm processes.

The regional jet is one example of a technological improvement that has altered the ways in which places are connected. Regional jets seat from 25 to 90 passengers, larger in both size and range than turboprops, and preferred by passengers for their speed and perceived safety [65]. Since 1993, regional jets have enabled airlines to provide service on more point-to-point routes, as well as linking remote locations to central hubs. For example, in the mid-1990s, travelers from Portland, ME, had to fly on a turboprop plane to Boston to connect elsewhere. Regional jets have made it possible for Portland to mimic Boston's service to all major eastern hubs and East Coast cities (albeit with fewer flights) [66]. This technology encourages regional competition for air service and thus economic development, while at the same time concentrating even more traffic at hubs. This dispersal-concentration tension is one of the underlying features of globalization, and is enabled through the air transportation network.

Trade is one of the fundamental measures by which various authors determine that globalization is taking place [67, 62], and it would not be possible without improvements in transportation. International trade in particular has increased dramatically over the last several decades, generally faster than GNP. Dicken observes that much of this trade is intrafirm, and therefore there is some question as to whether it should actually be considered international. However, the fact remains that goods are crossing international boundaries, and for the most part, this is done via commercial transportation. Particularly within the rapidly-growing high-tech sectors, air transport is the preferred mode for carrying goods from one nation to another, whether they are going to another location affiliated with the same firm or not. The rapid growth of air traffic in East Asia is due in no small part to the increase in trade. New airports in Hong Kong, Seoul, and Osaka are a result of this growth, along with their concomitant environmental and financial issues.

Closely related to trade is the issue of the transnational organization of firms. If companies are becoming transnational, they must need more international transportation in order to connect their various components, both in terms of cargo and people. “Increasingly, the locational preferences of firms are being set by their ability to organize spatially dispersed or spatially concentrated activities”[68]. Part of that organization is transportation, which relies on infrastructure at a very large scale. While the shrinking costs of transportation have enabled firms to take on a transnational form, locating the nodes within the firm’s network still depends on the location of nodes in the transportation network. Delays in the system are more than a personal inconvenience;

they threaten the entire production process, whether it is goods or information (in the form of business travelers) using air transportation.

One of the most common ways of speaking about the new organization of global processes is in terms of networks, or what Castells has described as “spaces of flows” [70]. While there are electronic flows, especially in the financial world, that are to some extent placeless (though they do still depend on physical infrastructure and nodes at either end), the flows of people and goods that comprise Castells’ networks need some sort of transportation to make those flows happen. Furthermore, those flows have to occur between two points, and the nature of the physical infrastructure of air transportation means that the points themselves are fairly well fixed. There are certain places that are vital nodes in the air transportation network, and those places are going to continue to affect how the rest of the network functions. For example, Atlanta’s airport is considered to be one of the main reasons why the number of international companies with branch offices in Atlanta has grown so rapidly over the last several decades [30]. The size of the airport and the fact that it serves as a hub for Delta Airlines means that the metropolitan area is able to insert itself into international networks in a way that a city like Memphis is not.

Transportation as influenced by globalization

Much of the literature on transportation and globalization focuses on the ways in which globalization processes place demands on transportation. Because transportation has become an integral part of production processes, the reliability and reach of commercial transportation are of increasing importance. Bell and Feitelson note that as places begin to specialize in function rather than sector, different places put different demands on their transportation networks [20]. Cities with many service firms that rely on face-to-face interaction require service to a large number of destinations, while those that rely on just-in-time manufacturers require highly reliable service. For example, Boeing recently decided to move its headquarters from Seattle, where it was the lead firm in establishing the agglomeration of aerospace and high-tech firms that Seattle has become known for, to Chicago. Boeing executives wanted to control their transnational operations from a location that is more convenient for the frequent flights demanded of top-level executives and more centrally located with regards to their network of operations [71]. O'Hare's centrality in the network of two major airlines is the factor that placed Chicago ahead of Dallas and Denver.

This need for reliability conflicts with recent increases in airport delay. For example, from September 1999 to September 2000, average delay per flight at O'Hare increased from 2.2 to 6.3 minutes during the morning peak hour, and from 12.0 to 19.7 minutes in the evening peak hour [72]. Airport capacity is defined by the number of planes that can take off in an hour with less than a certain amount of delay, generally four minutes per flight [73]. Thus, airports can operate "over capacity" for years, as long as airlines are willing to occasionally be late. In fact, in response to increasing delays, airlines have begun to increase the amount of time scheduled for a flight so as to remain “on-time,” if only by adding a few minutes here and there [66]. While the jet engine may have made the world smaller, the increasing frequency of its use may now be slightly expanding the effective distance between places.

Finally, despite arguments to the contrary, globalization's influence on air transportation actually strengthens the role of the nation-state as the entity ultimately responsible for making sure infrastructure is provided. Jessop describes "the hollowing-out of the nation-state" (1994) as the process whereby international actors such as multinational corporations are gaining power, while simultaneously regional and local actors gain more power to determine their economic futures [74]. Swyngedouw refers to "glocalization" as a similar process, where the nation-state matters less and less with regards to regulation of economic and environmental issues [75]. However, air transportation retains a strong dependency on national governments. For example, nation-states are still the main regulators of international flights, with most agreements still made on a bilateral basis. Most nations have a strict number of slots they allow for international carriers from a particular country, as well as limitations on where those carriers can transport passengers. The application of these freedoms, as well as the fact that most of the nations of the world have an official air carrier, means that there are still strong connections between airlines and the nation-state around the world. At a less formal level, airlines are among the biggest campaign contributors to both major political parties in the U.S., because of the importance of federal legislation regarding the industry. Air transportation is one example of how the need for massive public investment, to be used by politically powerful private interests as part of the nation's economy, shows the power the state (at many levels) still has.

Increasingly, the environmental effects of globalization are feeding back into the provision of transportation infrastructure. Noise pollution is a serious issue around most major airports, making capacity improvements impossible at many of the nation's largest and most congested urban airports. Building on "greenfields" sites is not necessarily a solution: in the first year after the inauguration of Denver International Airport (twenty-four miles from downtown, re-located in part to reduce noise complaints), DIA received more noise complaints than any airport in the country by a factor of eight [76]. Worldwide, it is projected that by the year 2015, jet airliners will account for 15 percent of all CO_2 emissions worldwide[77]. While improvements in technology may reduce noise and particulate pollution (though not simultaneously, as with Stage 3 engines), this reduction in pollution may motivate the increased use of transport if the negative effects per flight are reduced [44]. Similarly, while the service and manufacturing sectors may be less polluting themselves as compared to 50 years ago, they require faster modes of transportation, that, when considered as part of their production system, result in as much or more pollution. Because of local opposition on environmental grounds, only two new major airports have been built in the U.S. since 1970 (Dallas-Ft. Worth and Denver), and only a few new runways at existing airports. Environmental impacts are therefore more than just externalities, since they have the power to feed back into the system and affect the provision of infrastructure.

Globalization and scale

As the previous section pointed out, all scales, including the global, are to some extent artificial. The three types of scalar construction discussed above are also present in the "global. " We begin by going back to Kelly's argument that the production of scale is all about making a phenomenon or process seem understandable. He argues that the recent

trend towards portraying economic forces as operating at a global level have the consequence of making that the only scale at which those processes can be understood. He showed that in the Philippines, changing the local land tenure system in order to attract foreign investment was blamed on global forces, when it actually worked to the benefit of local and national elites. To reiterate the opening quote, "To represent economic and social change as a consequence of 'global forces' and to justify development strategies with reference to the requirements of such forces […] is frequently to defer the understanding, explanation and meaning of socio-economic change to a scale that can not be easily grasped or held accountable" [1].

However, just because the global scale is socially constructed does not mean that there are not material consequences of globalization. Kelly's point is that the discursive and material aspects of globalization do not always occur at the same scale. This is again where the question of politics comes into play: where the generation and solution of a problem differ. To quote Kelly again, "In political terms, then, globalization discourse is widely deployed to imply the inevitability of certain events and the necessity of particular policy options in the name of global competitiveness […] Globalization is the *deus ex machina* of national politics, to which unpleasant decisions can be defended--or against which national struggle must be directed" ([3], p. 384). Politicians at a variety of scales argue that they are forced to take actions such as lowering environmental standards or giving corporations tax breaks because of global competition. In many cases, those who benefit from these political actions do not even live in the immediate vicinity, and thus are able to reap the benefits without paying any of the consequences such as higher property taxes or increased pollution. Kelly points out that the global should not always be privileged as the scale at which explanations are deferred: national, regional, and local politics should also be examined to determine the causes and possible solutions of social problems. "Explaining a phenomenon at the global scale is a political judgment not a technical one" ([1], p. 11).

Finally, there is the question of what we mean when we say "global." The forces of globalization described above, such as transnational corporations and increased international trade, are not felt across the entire planet. Swyngedouw (2000) observed that what is commonly called globalization is perhaps more accurately termed "triadization," as the trio of North America, Europe, and East Asia are the main actors in and benefitters from the processes described above. And within those continents, certain nodes such as New York, London, and Hong Kong certainly have more air traffic than others such as Denver, Rome, or Kuala Lumpur. Does "global" perhaps refer to a network of places that stretches around the planet, rather than to all places across the planet? Does what happens in the localities on that network therefore constitute globalization? What about what happens in the spaces in-between? As Kelly argues, "It is through local politics and social structures…that globalized development is constituted. From there, other scales spiral outwards" ([3], p.164-5). In other words, rather than globalization being some worldwide force that is present everywhere on the planet, it is a compilation of activities within smaller places, whether nations or regions or cities.

Flusty has carried this argument even further, pointing out that "Globalization is in flows of capital and waves of migration, in satellite broadcasts and in transoceanic air-routes.

But the global is no less in the heads, and commonplace interactions, of those whose daily lives underpin these larger-order phenomena" [78]. He argues that instead of thinking of the local impacts of globalization, we should think of the local *formation* of globalization, that globalization is really made up of billions of interactions among individuals. Some of these individuals are more well-connected than others, to be sure, but the fact remains that globalization is not some external, inexorable force, but rather a compilation of activities at the scale of the individual.

However, even Flusty falls prey to taking transportation for granted, as in the above quote. Globalization is partially formed and maintained by worldwide communication and transportation systems, and so the actions of individuals and localities concerning those systems play a particularly important role precisely *because* they are often taken for granted. Recall that one of the research questions of this study concerns the influence that globalization and air transportation have on each other as reflected through local land use. As will be shown in later chapters, local actions can affect the global air transportation system, thus calling into question the omnipresent assumption that transportation will continue to grow as needed to meet the demands of a globalizing world.

CHAPTER 3

METHODOLOGY

> "Qualitative research is multimethod in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them" [80]
>
> "Now, I understand for your purposes this is going to get put down as the opinion of an incensed local official, and that's fine" [81].

The overall framework of this research is the case study method, the most appropriate for the research questions. Within the case studies, a number of different methods were used: interviews, qualitative analysis of documents and maps, quantitative analysis of SIC (Standard Industrial Classification) data, and spatial analysis. Each of these methods will be described below, along with the reasons for using them and the results they were expected to achieve. Because some of the research questions were asked for individual places and others were asked at all three, some methods apply only to a single place (such as SIC analysis) while others were used at all three (such as the interview).

A review of the research questions will help explain the methods used. The first two questions concern all three study areas and thus are relevant to the choice of the case study as an overall research method. The second three refer to the individual case studies and use more specific methods explained below.

> How do globalization and air transportation influence each other with regards to local land use, in both discursive and material terms?
>
> How are new scales constructed in struggles over airport expansion? Namely, how is the scale defined at which policy should be made, and what are the implications for municipalities in terms of land use and economic development?
>
> At the local level, how have land uses changed over time around O'Hare Airport in Chicago? How are municipalities able to exert power over airport decision-making, or are they always reacting to decisions made at other scales?
>
> How are the economic benefits of the Minneapolis-St. Paul International Airport distributed geographically throughout the Twin Cities region? Are they in equitable balance with the environmental and other disbenefits of the airport?
>
> How has the regional approach to long-distance transportation in the Boston area come about, including the promotion of regional airports and alternate modes of transportation? Is this regionalization truly successful? What impacts has it had on municipalities and local land use?

Case studies

This project used case studies as an overall research strategy. Three case studies were chosen to represent different issues, following Howitt's method of intersecting case studies [81]. Yin notes that case studies are meant to answer the questions of "how" and

"why" rather than "what" or "who" [82]. As evidenced by the research questions above, this project is concerned with a number of "how" questions, requiring greater in-depth study than would be possible when comparing a large number of airports. Previous studies on airports have also tended to use case studies, including Goetz and Szyliowicz on Denver, Karsner on Tampa, Detroit, and Tucson, and Twomey and Tomkins (1995) on Manchester, England [83, 84, 2].

According to Feagin et al., case studies offer two principal advantages over other methods such as surveys or experiments: a closer reading of the phenomenon or process under study, including more richness and depth; and greater contextualization, meaning "more than a description of events and processes, [but] articulating the relationship of the social phenomenon of interest to the surrounding world in which it is embedded" [85]. One of the goals of this study is to connect the processes involved in air transportation to the larger world at a variety of different scales, to show that air transportation is, in fact, embedded in the surrounding world in ways that are not usually taken into account. Additionally, the unique characteristics of each airport and each municipality located near an airport, including history, position in the national air transportation network, and physical size, requires a closer reading than a statistical analysis alone could supply. Thus, the case study is the appropriate method.

The most common criticism of case studies is that because they are individual situations, results gleaned from examining a single situation can not necessarily be generalized to multiple places. Gomm, Hammersley, and Foster address the issue of generalizability in three ways [87]. First, some case studies are of enough individual interest that generalizability is unnecessary. For example, the fact that expansion at O'Hare may be mandated by federal legislation is a unique situation worthy of study. Secondly, case study researchers use theoretical inference rather than empirical generalization to reach their conclusions, where "the aim in research directed towards drawing conclusions on the basis of theoretical inference is to identify a set of relationships among variables that are universal, in the sense of occurring everywhere that specified conditions hold" [87, p. 103]. While all three study areas are different, there are enough common characteristics in terms of politics, economics, and transportation that they can be legitimately compared with each other and with non-studied airports as well. Thirdly, case studies should be chosen either because they are representative or because they embody or exaggerate a particular characteristic under study, both of which do make empirical generalization possible. In this study, for example, MSP is a representative example of fortress hub airports, while Boston stands out as the only place with a regional approach to air transportation.

Multiple case studies were chosen for two reasons. First, there are relatively few major metropolitan airports in the United States (there are twenty-nine Large Hubs under the FAA's classification system), so each airport is a unique case study in itself. Therefore, multiple case studies make it easier to draw conclusions that are applicable to more than one place. The three particular case studies of Chicago, Minneapolis-St. Paul, and Boston were chosen for a number of reasons. Minneapolis-St. Paul recently finished a decision-making process concerning expansion, and the implications of that expansion for nearby land uses are very much on the minds and in the planning documents of

neighboring municipalities. Chicago's unique situation of seeking federal legislation to mandate expansion of O'Hare made it an obvious choice, as did its history of rancorous airport-community relations. Finally, Boston is the only major airport in the U.S. that has devoted its own resources towards promoting the use of airports in other states, offering an alternative to the traditional build-new-or-expand dilemma. Additionally, personal familiarity with all three metropolitan areas and airport expansion controversies made the research go more smoothly.

Secondly, multiple case studies were chosen in order to explore issues at different scales. Chicago was chosen to focus on issues at the neighborhood or local level because inter-municipal relations play a major role in airport-community relations due to the City of Chicago's management of O'Hare. Minneapolis-St. Paul was chosen for issues at the scale of the metropolitan area because of the regional approach to governance at both the airport and the seven-county region. Finally, Boston's regional approach to air transportation made it a good case study for multi-state regional issues. While I compare municipalities and structures of governance across all three case studies, the particulars of each place highlight some scales more than others.

Qualitative methods

The predominant methods used in this project are qualitative: interviews and document analysis. The Handbook on Qualitative Research succinctly describes the overall method:

> "The word *qualitative* implies an emphasis on the qualities of entities and on processes and meanings that are not experimentally examined or measured (if measured at all) in terms of quantity, amount, intensity, or frequency. Qualitative researchers stress the socially constructed nature of reality, the intimate relationship between the researcher and what is studied, and the situational constraints that shape inquiry" [79, p. 8].

There are three points to emphasize here:

a focus on processes as the subject of inquiry;
the social construction of reality; and
recognition of the constraints on both the processes under study and the research process itself.

As stated above, this project is concerned with how the *processes* of globalization and air transportation interact, including the constraints that operate on them both. As for the "socially constructed nature of reality," it is of course obvious that airplanes and airports really do exist, and are not "constructed" per se. However, the legal and regulatory frameworks that govern the functioning of the air transportation industry and determine what constitutes an environmental impact *are* constructed, based on the actions and opinions of politicians, their constituents, lobbyists, corporations, and others. Additionally, arguments over the success of an expansion plan at reducing airport delay, for example, are subject to different interpretations by different actors. It is not the goal of this study to determine which of these interpretations is factually correct, but to examine the politics behind and the implications of these conflicting interpretations. For example, community organizations and airport operators have different opinions as to what constitutes adequate mitigation for airport noise, based on either personal

experience or federal regulations. Reconciling these different opinions can lead to better airport-community relations and a faster airport expansion process, regardless of which one is "right." Finally, while quantitative researchers also consider the limitations of their data and methods of analysis via error analysis or significance tests, qualitative researchers have to consider themselves as part of the research process, incorporating their own backgrounds and preconceptions into the data collection and analysis stages. The sections below describe this process for the two methods of qualitative research: interviews and document analysis.

Interviews and coding

Interviews fall in the middle of a continuum of research methods from controlled experiments on one hand to participant observation on the other. This "semi-natural" state maintains some of the context of interviewees' usual activities while also allowing them to step outside of their everyday world in order to focus on particular questions [87]. Interview protocols range from structured, where the same list of questions is asked of every interviewee in as uniform a manner as possible, to unstructured, where the interviewer is responsible for directing the flow of the conversation. For this project, semi-structured interviews were conducted, with an initial list of questions that was added to or reduced depending on the individual situation. Additional considerations besides the type of interview concern recruitment, power relations, and positionality of both the interviewer and the interviewee.

Interviews as a research method

Because of the importance of interviews to qualitative research, there has been a significant amount of research in recent years on this method. In much the same way that the use of quantitative data requires consideration of the limitations of data sources, the sources of qualitative data must be considered as well. For example, researchers have written at great length about the power issues involved in conducting research on people who are less empowered than the researcher (e.g., [88], [89]). The opposite situation has also been examined, when the interviewees have more power (whether economic, political, or other) than the interviewer [90]. Other issues to consider include the implications of gender in the interviewing process, the means of access to a research site, and the background and preconceptions of the researcher him/herself, also known as positionality [91, 92, 89, 93].

McDowell, for example, wrote about the implications of researching elite financial workers in London. She found that self-presentation matters in a different way when interviewing elites than when interviewing the disempowered (which has been written about at much greater length). The interviewer has to walk a fine line between appearing knowledgeable enough about the subject so as to not be wasting the interviewee's time, but not as if they already know all there is to know about the subject (whiz kid vs. naïve laywoman, in McDowell's words). For example, during interviews I often had to indicate that I was familiar with an existing controversy while still getting interviewees to tell me the story in their own words. McDowell also points out that even when the researcher asks the same questions of all interviewees, differences such as the setting of the interview and the temperament of the interviewee ensure that the data collection process is not uniform.

Cochrane discusses another set of issues involved in dealing with local elites and trying to trace power structures [96]. First, there is the question of the relationship between the researcher and the researched. One aspect of this relationship is the danger of "leading the witness" by asking questions in certain ways rather than leaving open-ended questions up to the interviewee to answer in ways that indicate what is most important to them. I endeavored to deal with this by, for example, asking municipal leaders to describe their relationship with the airport rather than asking if it was good or bad. On the other hand, the busy elite who is being interviewed may shape the conversation to their advantage, rather than answering the questions that the interviewer is actually interested in. This was apparent in a few interviews when the interviewee appeared to be giving me the standard spiel they were used to giving to reporters.

Another issue involves identifying the interviewees, the "elites," in the first place. For example, those who influence local politics may not live in the immediate area, or they may be businesspeople or others who are not visible to the public eye. Conversely, interviewees may have an inflated sense of their own importance, making themselves out to have more power or knowledge than they actually do. My forty-seven interviewees were selected in a variety of ways. Because the research focused on the municipal point of view, it was important to find the person within each municipal government who was most knowledgeable about airport issues. In the case of Chicago, if a city was a member of the O'Hare Noise Compatibility Commission (see Chapter 4), it was possible to contact the Commission representative directly, usually either a mayor or a city planner. For municipalities that were part of the Suburban O'Hare Commission, the mayor was usually the contact person. In the Twin Cities, the MSP Airport Joint Zoning Board served the same purpose in terms of providing me with a list of contacts at each municipality. In the Boston area, it was necessary to call City Hall and ask who would be the best person to talk to on airport issues. Citizens' groups were determined from newspaper articles and contact information gathered from websites. Airport operators were contacted directly, with the individual's name known ahead of time. Personal connections came into play as well, as a former employer was able to give me contact names within Boston. I have endeavored to take into account the position and background of the interviewees, as well as the structure of the interview process itself, when analyzing what they told me.

Interviews were conducted as semi-structured and open-ended. The structure consisted of a list of questions for each type of interviewee (municipality, airport operator, or citizen). Not all questions were asked of all interviewees for a couple of reasons: the list of questions was developed after the first few interviews were conducted, and not all questions were relevant to all places. The lists of questions are included in Appendix B. The general themes of the questions were municipal land use, airport-community relations, airport governance, and the airport planning process. The questions are open-ended because of the nature of the information I was interested in. For example, I asked, "How would you describe your relationship with the organization that operates the airport?" rather than asking respondents to describe the level of cooperation on a numerical scale, in order to get a better picture of the complexity of airport-community relations. Over half of the interviews were conducted in person, with most of the rest

over the phone and a small number over e-mail. While in-person interviews were preferable, the short timetable did not always allow for that.

Most of my respondents were interviewed in their professional capacity (indeed, a few of them informed me that they were used to answering similar questions from students working on school papers or from reporters). The discussions were therefore usually formal. While I was asking for official municipal positions on the issues, respondents would sometimes make it clear that they were giving their personal opinion, often based on the fact that they were personally affected by aircraft noise. Others were quite conscious of their relative position in the chain of command, as evinced by the opening quote in this chapter from "an incensed local official." Occasionally a respondent would ask how I got interested in the topic, and I would tell them that I used to live under a flight path in St. Paul, letting them know that I have experience living with airport noise. After one of my early interviewees asked for a copy of my questions in advance and had spent some time considering the questions before the interview, I always faxed the questions ahead of time. This also gave respondents a better idea of what I was interested in than did the short introduction I gave over the phone, as well as time to find maps or other materials that might be helpful for the interview.

Coding and memos

All interviews that were successfully recorded were transcribed [96]. Interviews were then analyzed using iterative coding. In this method, data (whether interview transcripts or fieldnotes; see [97] for more information) are first read over to determine the general themes and ideas that are expressed. For example, "municipal actions" might be one of the open codes developed at this stage. The next step is to write initial memos based on the codes. These memos are often only a paragraph or two long, exploring what a particular code means and what sub-categories might be identified. A page describing the data labeled as "municipal actions" can make clear the different, sometimes contradictory, actions that different municipalities take with regards to land use planning or airport opposition. This method is designed not simply as a means of classifying data, but of letting the data speak for themselves: "sensitively representing in written texts what local people consider meaningful and then in making their concerns accessible to readers who are unfamiliar with their social world" [97, p. 108], or discovering the themes and ideas that are expressed in the interviews without imposing preconceived ideas about what people have to say.

Once an initial set of categories has been developed, the data are then re-read with those categories in mind, and a more fine-grained set of codes is developed. Known as focused coding, codes in this stage might include "municipal actions--conduct study," for example. Finally, integrative memos begin to connect different codes and flesh out the categories and sub-categories with background information on the case study or the theory involved. These short writings not only help to identify the main issues involved, but when linked together, provide the basis for developing theories. Open coding is therefore the qualitative equivalent of exploratory statistical analyses, with focused coding roughly equivalent to a statistical method such as regression analysis.

Document analysis

Besides interviews, the other qualitative method that was used in this study was document analysis. Hodder has discussed some of the main issues involved in using documents and other forms of material culture in doing research [98]. He points out that this type of analysis is a useful counterbalance to interviews, because what people say is not always the same as what they do (whether citizens or government officials). Document analysis (the written word) and interviews (the spoken word) should be used in conjunction with one another. Hodder also provides two different ways to confirm the validity of conclusions reached from using these materials: coherence and correspondence. The theory and conclusions that are reached must be internally coherent as well as relevant to existing work in the same field. Correspondence in the world of quantitative data refers to such issues as sample size or exactness of fit. In qualitative work, correspondence can refer to the fit between theory (existing or new) and data, or to the connection between different case studies or different data sources. One means of verifying correspondence is to show the results of the research to the interviewees themselves in order to see if they feel they have been fairly and accurately represented [87]. While this was not possible with all forty-seven interviewees, portions of the research were shown to key individuals for their verification of its accuracy.

Documents were gathered from three main sources: newspaper articles, zoning maps, and documents from airports. Newspaper articles helped to identify the main issues in each place and were instrumental in developing interview questions. Statements made by interviewees were also compared with what was said in newspaper articles to see if they were consistent. For example, one interviewee pointed out the difference between their mayor's public stance against the neighboring airport and his failure to take the airport into account in municipal land planning. Though zoning maps may not correspond precisely to the land uses that are on the ground, they show what the municipality intends for its land use pattern, particularly in areas exposed to noise. Airport documents include websites, brochures on airport programs, annual reports, expansion proposals, and environmental impact statements. These documents were examined not only for factual information (e.g., growth in number of flights), but how that information was presented or what other information was missing.

Quantitative methods

The quantitative methods used in this study varied by location. First, SIC codes were mapped and analyzed for Minneapolis-St. Paul to determine the distribution of the economic development that the airport brings to the immediate area. Standard distribution ellipses were used to quantify this spatial distribution. Secondly, while the history of land use around O'Hare was partially determined via the examination of topographic maps, land use patterns were also quantified via Census and industrial directory data, including the construction of a land use compatibility index. Finally, data from industrial directories were used for all three case studies to investigate the extent to which branches of national or global firms are located near the airports.

SIC code analysis

In Minneapolis-St. Paul, regional economic benefits from the airport's position in Northwest Airlines' global network have been touted as a reason for airport expansion.

The FAA has a standard method of measuring the economic impact of an airport, including airport-based, direct, and indirect effects. Because these numbers are based solely on numbers of passengers traveling through an airport, there is no attempt made to spatialize those impacts. The goal of this portion of the study was to find where the $1.9 billion dollars and 45,000 jobs are located within the Twin Cities metropolitan area, and if there is some sort of equitable spatial distribution between economic benefits and environmental disbenefits [26].

Economic impact studies of airports identify three main types of jobs created by an airport:

1 Direct--people employed by aviation-related businesses (e.g., flight attendants)
2 Indirect--people employed by businesses who use air transportation (e.g., electronics manufacturers)
3 Induced--multiplier effects based on the above employees (e.g., grocery stores)

According to Wilbur Smith Associates (WSA), approximately 15 percent of the total economic impact of aviation is attributable to direct impacts [99]. Direct jobs, almost by definition, are usually located on airport property, thus benefiting the entity that operates the airport. At the other extreme, induced jobs (65 percent of the total impact) are likely to be either spread throughout the metropolitan area (since they provide their goods and services to more than just airport-related firms) or concentrated near direct and indirect businesses, if those are their main customers. Therefore, the question that remains with regards to the spatial distribution of regional economic impact from an airport is, where are indirect firms located, comprising the remaining 20 percent of economic impact? Are the sectors that comprise the indirect category truly regionally distributed, or are they concentrated in certain places? These questions are especially important considering that these are the sectors in which the Twin Cities is competing with other major metropolitan areas for a share of national and global markets, and thus the sectors in which growth is encouraged.

To answer these research questions, I relied mainly on mapping businesses in order to determine the distribution of the companies that are thought to be brought to the region by the airport, or that are considered to be important to the regional economy based on their level of export production. Employment data were used to determine the number of jobs in addition to the number of businesses. Two sets of firms were chosen: the direct and indirect firms, based on the Minneapolis-St. Paul economy.

The first step in answering the research question was, what *are* the direct and indirect firms? The identification of direct firms was straightforward: air transportation, car rental facilities, and hotels. This identification came from a previous study that observed common land uses around airports [100], as well as interview respondents who talked about the direct economic benefits of an airport. Indirect firms were identified specifically for the Minneapolis-St. Paul metropolitan area. For any particular metropolitan area, the firms that are dependent on air transportation are those that:

have a high location quotient (i.e., produce a relatively large percentage of products for export);
produce high-value, light-weight goods that tend to be shipped by air; or

have company headquarters or regional offices, thus requiring travel on the part of their executives or sales representatives.

Based on previous work identifying these types of firms (described below), a list of twenty-five sectors was drawn up for the Minneapolis-St. Paul metropolitan area.

Since this portion of the research project is concerned with how the "region" is constructed as a territory for economic development purposes, selecting the geographic area of study was of crucial importance. The studies described below, from which the list of sectors to examine has been chosen, use the seven county Metropolitan Statistical Area (MSA) as the study area. Because the data I used were available statewide at the ZIP-code level, it would have been simple to extend the study area beyond the MSA. If firms belonging to sectors that are important to the Twin Cities economy are found outside the seven counties, it is still likely that they use MSP for freight and passengers.

However, outside the seven counties (a distance of approximately twenty-five miles from MSP), it is unlikely that such firms base their locational decisions on proximity to the airport. Additionally, the negative effects of MSP such as noise and air pollution are not likely to be felt at such a distance, and so the balance of airport effects is clearly positive. Therefore, the study area consists of the seven-county MSA (though since the data were collected by ZIP code, in some cases a ZIP code extends beyond the boundaries of the seven counties).

Standard Industrial Classification (SIC) codes were used to map the sectors which are most likely to use the airport, and where firms in those sectors are located in relation to MSP. SIC codes have four digits, the first describing one of eight general sectors such as Services or Wholesale Trade, with each successive number adding more detail. The U.S. Economic Census lists businesses based on their four-digit codes in their yearly *ZIP Code Business Patterns*. It is thus possible to map all of the businesses within a metropolitan area that produce a certain good or service or determine exactly what goods or services are produced in a certain area, down to the ZIP code or street level depending on the directory used.

The initial goal, then, was to define the sectors that are most likely to use the airport, whether for passengers or freight. I relied on two main reports on MSP that have been produced in conjunction with the Center for Transportation Studies at the University of Minnesota. One of these reports, by Melissa Loughlin of the Department of Geography, analyzed U.S. markets for overseas cargo service, including identification of the eight three-digit SIC codes that are most likely to use air transportation for shipping cargo overseas (based on data at the national level, not the Twin Cities) [25]. The other report was conducted by a team headed by Mahmood Zaidi of the Carlson School of Management, and it focused on the competitiveness of the Twin Cities with regards to other U.S. metropolitan areas [102]. Part of this analysis included identifying the sectors in the Twin Cities' economy with the highest value of exports, the highest location quotients, and the highest commodity shares, based on 1997 data. Zaidi noted that while data are not available on what mode of transport these sectors use to get their goods to market, domestic exports tend to use air transportation for passenger travel of executives

and sales personnel, while foreign exports use air transportation for both passengers and freight.

Having done some mapping of SIC codes in previous research [100], I determined that the number of sectors to examine should be somewhere between twenty and forty. As I worked through Loughlin's and Zaidi's lists, I found that twenty-five sectors could be identified fairly easily, and any additional sectors were not likely to add anything to the analysis. Because the IMPLAN model emphasizes manufacturing sectors over services, less detail is available in the service sectors. "Insurance Carriers," for example, a two-digit SIC code, is entered into the model in the same manner as "Magnetic and Optical Recording Media," a four-digit code. The number of businesses found under these two-digit codes could be an order of magnitude greater than those found under a four-digit code, thus skewing the data. Because of this, some two-digit sectors were eliminated from consideration even though they would have been included by strictly following the process outlined below.

I began with Zaidi's list of the top eighty exports (domestic plus foreign), sorted by value of exports and again by commodity share (percentage of the nation's production of a good or service that was produced in the Twin Cities region). Ten sectors appeared in the top twenty-five of both sorted lists:

2041	Flour and Other Grain Mill Products
2671	Paper Coated and Laminated Packaging
2672	Paper Coated and Laminated, NEC
3444	Sheet Metal Work
3489	Other Ordnance and Accessories
3695	Magnetic and Optical Recording Media
3823,4,9	Mechanical Measuring Devices
3841	Surgical and Medical Instruments
3842	Surgical Appliances and Supplies
3845	Electromedical Apparatus

Then I identified any additional codes in the top twenty-five of both sorted lists that were identified in Loughlin's report as being likely to use air cargo:

3571	Electronic Computers
3822	Automatic Temperature Controls

Zaidi's report also included the top ten sectors with regards to location quotients, for all sectors and for high-tech sectors. As an alternative measure of the concentration of production of a certain product or service in the Twin Cities, location quotients can portray the concentration of jobs in a certain sector, not just the value of the good or service produced. I identified any sectors in these location quotient lists that were not already included above:

2083	Malt
3482	Small Arms Ammunition
3483	Ammunition, Except for Small Arms, NEC
3572	Computer Storage Devices
3577	Computer Peripheral Equipment
3672	Printed Circuit Boards

Finally, I identified additional codes in the top twenty-five in exports and in commodity share that were feasible (i.e., not large two-digit sectors as described above) and appropriate (for example, wholesale trade was the highest-ranking export in terms of dollar value, but wholesale trade obviously deals with large amounts of exports no matter the metropolitan area):

2045	Blended and Prepared Flour
2731	Book Publishing
2750	Commercial Printing
2782	Blankbooks and Looseleaf Binder
3080	Miscellaneous Plastic Products
3599	Industrial Machines, NEC
4500	Air Transportation

The final list appears in Table 1, along with rankings in terms of exports and commodity shares, and whether or not a sector was identified in Loughlin's report or in the top ten lists of location quotients for all firms or for high-tech firms.

Four different sets of data were mapped: the direct firms, the full list of indirect firms, the indirect firms that are most likely to use air transportation for cargo, and the list of three-digit SIC codes identified by Loughlin as being the most likely to ship cargo (though they may not be particularly important to the Twin Cities' economy). The full set of maps appears in Appendix 3, showing the number of firms and the estimated number of jobs for each ZIP Code in the seven-county area via dot density maps. Standard deviation ellipses were constructed for the three data sets mentioned above to determine the distribution of firms and jobs. A standard deviation ellipse has the standard deviation of the data in the x-direction as its major axis and the standard deviation in the y-direction as its minor axis, rotated so that the longest axis corresponds to the direction with the maximum dispersion [103]. The ellipses therefore contain three pieces of information: the mean center of the data, the orientation of maximum and minimum dispersion, and the area that contains all points within one standard deviation of the center. Data were assigned to the centroid of each ZIP Code, and the calculations performed using the latitude and longitude of each centroid, weighted for the number of firms or jobs. Chapter 5 explains the results of this analysis, including two choropleth maps that summarize the results, showing the ratio by ZIP Code between firms and jobs in the target sectors and all firms and jobs.

Industrial directory data/topographic map analysis

In order to determine the history of land use around O'Hare, three sources were used: USGS topographic maps for 1953, 1963, 1972, 1980, and 1997; data from commercial directories on manufacturing and service industries; and Census data on housing units. Topographic maps were used in lieu of aerial photographs, since a decade-by-decade set of aerial photos was not available for the study area. The commercial directories list firms individually for each municipality, including where the national headquarters is if it is a branch firm.

Table 1. Sectors Chosen for Analysis, by SIC Code

Code	Commodity	Export Rank	Comm. Share Rank	Loughlin	LQ
2041	Flour and Other Grain Mill Products	7	2	N	Y
2045	Blended and Prepared Flour	36	13	N	N
2083	Malt	>80	9	N	Y
2671	Paper Coated and Laminated Packaging	9	4	N	N
2672	Paper Coated and Laminated, NEC	4	3	N	Y
2731	Book Publishing	11	26	N	N
2750	Commercial Printing	10	50	N	N
2782	Blankbooks and Looseleaf Binder	38	11	N	N
3080	Miscellaneous Plastic Products	5	92	N	N
3444	Sheet Metal Work	16	21	N	N
3482	Small Arms Ammunition	>80	5	N	Y
3483	Ammunition, Except for Small Arms, NEC	58	10	N	Y
3489	Other Ordnance and Accessories	17	1	N	Y
3571	Electronic Computers	13	48	Y	Y
3572	Computer Storage Devices	51	30	Y	Y
3577	Computer Peripheral Equipment	29	31	Y	Y
3599	Industrial Machines, NEC	14	53	N	N
3672	Printed Circuit Boards	>80	>80	Y	Y
3695	Magnetic and Optical Recording Media	18	8	Y	Y
3822	Automatic Temperature Controls	28	7	Y	Y
3823,4,9	Mechanical Measuring Devices	22	50	Y	Y
3841	Surgical and Medical Instruments	25	16	Y	Y
3842	Surgical Appliances and Supplies	23	25	Y	Y
3845	Electromedical Apparatus	19	6	Y	Y
4500	Air Transportation	3	49	N	N

In developing an index for municipalities with regards to the compatibility of land uses within the 65 DNL around O'Hare, Census data on housing units were used rather than population. Population declined in a number of the study area municipalities over the time period in question, but the number of housing units never did. Since the focus of this research is on land use compatibility, where fully compatible places are those with no housing inside the 65 DNL, it is important to see where new housing units are located within municipalities, particularly those where population has actually fallen. The initial data collection used annual building permit data from the Census from 1960 to the present, allowing for a fine-grained analysis over time. However, these data were only available at the municipal level, and it would be therefore impossible to determine the extent to which municipalities were able to keep residential uses away from the noise contours within their borders. Census data were available at the block group level, but only by decade. It was determined that spatial differentiation was more important than temporal differentiation, and so decennial Census data were used. Census data at the block group level were only available up to 1990 at the time the research was conducted.

The study area includes the land roughly covered by the 1997 65 DNL noise contour. (Contours for the year 2000 came out after the research had begun, and so the older ones were used. Chapter 2 explains the methodology of DNL contours.) Since the contours changed over time, particularly with the introduction of new runways, these areas did not necessarily experience airport noise at the time they were developed. However, rather than use different sets of contours (and thus block groups) over time, I have elected to stay with one set, being concerned with the history of existing compatibility and how municipalities have been able to plan their own land uses to take the airport into account. Block group boundaries do not always coincide with municipality boundaries; when a difference occurred, an estimate was made with the aid of topographic and zoning maps as to the percentage of residential units located in one municipality as opposed to another.

After initial research based on topographic maps and interviews, it became apparent that the only major changes in land use around O'Hare have been the development of vacant land, not redevelopment from one land use to another. A six-point index was therefore developed to analyze the timing of residential development in municipalities, particularly the extent to which they have kept residential land uses out of the noise contours. There are three criteria, all based on Census data concerning the number of housing units in a municipality and in the block groups inside the 1997 65 DNL contour. Though noise does affect residents beyond that contour, it is the official line as far as the FAA is concerned for determining compatibility.

The index assigns points to municipalities as follows, with a higher score indicating greater compatibility for the overall municipality. Results are presented in Chapter 4.

1) Percentage of housing in 1990 that is inside the 65 DNL:

0 points	more than 60 percent
1 point	between 20 and 60 percent
2 points	less than 20 percent

This is the most basic measure of land use compatibility, though it is ahistorical. The divisions were determined based on natural breaks in the data.

2) Percentage increase or decrease from 1950 to 1990 in number of housing units inside the 1997 65 DNL:

0 points	more than 5 percent increase
1 point	little change (between 5 percent increase and 5 percent decrease)
2 points	more than 5 percent decrease

This measure indicates the change over time in compatibility for the municipality as a whole, which can authenticate municipalities' claims that "we were here first." The divisions are consistent with those in the third criterion.

3) Difference in percentage of housing units inside the 1997 65 DNL built after 1970 as compared to all housing units built after 1970:

0 points	more than 5 percent increase
1 point	little change (between 5 percent increase and 5 percent decrease)
2 points	more than 5 percent decrease

While similar to the above criterion, this looks at only housing units built after 1970, a decade after the introduction of jets and concurrent with the existing runway layout. This criterion looks at the municipalities that still had undeveloped land after 1970 in order to determine the degree to which they took the airport's presence into account. Divisions are based on natural breaks.

Conclusion

As stated above, the research questions investigated in this study are more appropriate to the case study methodology than to broad statistical analysis. Within the case study framework, however, both qualitative and quantitative methods are appropriate, depending on the specific question involved. Interviews, open and focused coding, document analysis, mapping of quantitative data, and spatial analysis are all part of this research. The limitations and constraints of each method have been described here and taken into account in the following chapters.

The next three chapters present the three case studies, focusing on the research questions and methods specific to each. I move up in scale from local land use around O'Hare in the Chicago area, to the metropolitan impacts of expansion at MSP in Minneapolis-St. Paul, and finally to multi-state regionalization in New England. The following three chapters describe broader implications for all three places (and others as well) in terms of planning and public participation, the politics of scale, and globalization.

CHAPTER 4

CHICAGO AND LOCAL LAND USE

> "Geography smiled generously on Chicago, for one need only to study the map of the world to see that it sits at the crossroads of many of the great air routes. How important will be the position which this great city will take in the air transportation of the future depends upon the vision of its people, on their ability to see what lies just over the horizon" (Major General Harold L. George, on the dedication of Orchard Field, 1943; [103]).
>
> "[I]t seems to strike me as patently unfair, that one mayor and one city council *owns* the air transportation system for the state of Illinois, and holds hostage the air transportation system for the country" (Mayor Tom Marcucci, Elmhurst, IL, 2002; [104]).

O'Hare International Airport in Chicago is a clear example of both the importance of scale and the discursive and material connections between globalization and air transportation. First, the politics of scale are a fundamental part of conflict over past and current O'Hare expansion plans. The city of Chicago, in order to ensure other municipalities and the state cannot thwart its expansion plans for O'Hare, is seeking federal intervention, citing O'Hare's importance to the nation's transportation system (as well as to the individuals in Congress with connecting flights through O'Hare). Municipalities and citizens argue that the region is better served with a third airport, and that if O'Hare really is that vital a piece of infrastructure, the city/mayor of Chicago should not have as much power as they do. At the same time, municipal opposition is driven to some extent by incompatibilities in land use for which both those municipalities and Chicago as the airport operator are responsible.

Secondly, O'Hare's position as a hub for both United and American Airlines makes it a fundamental part of global airline networks. Constraints on traffic at O'Hare have already caused these airlines to shift some of their operations to other central U.S. hubs (St. Louis for American and Denver for United), evening out traffic distribution within the hub-and-spoke network to some extent. Chicago sees its position in the global network of air transportation as under threat, and therefore has to argue that O'Hare is important to the entire nation, not just to the Chicago metropolitan area.

O'Hare is the newest of the seven airports in this study, with scheduled commercial traffic operating since 1959. The siting of O'Hare was similar to the process in Denver, Dallas-Ft. Worth, and Washington, DC: close enough to downtown to be easily accessible, but far enough away that the surrounding land was undeveloped. Unfortunately, going just beyond the existing fringe of development meant that once the post-WWII suburban boom was underway, O'Hare was quickly surrounded. Simultaneously, technological and policy changes such as the jet engine and deregulation spurred even greater growth in air traffic, resulting in new runways and new flight paths that subjected already-developed areas to aircraft noise. By examining the timing of development on the part of municipalities surrounding O'Hare, it is possible to determine where land use

compatibility is due to imprudent municipal planning, and where it has occurred because of airport growth.

The question of which came first, the airport or surrounding development, is important not in terms of placing blame, but for two reasons. First, one of the arguments that is made for so-called greenfield airports is that there are no neighbors to be bothered by the noise, or at least relatively few. O'Hare would have been considered a greenfields site when it opened, and yet airport-neighbor conflicts here are among the most severe in the country. Understanding how current incompatibilities came about is important if we wish to prevent them from happening at future new airports. Secondly, the FAA relies heavily on municipalities to keep their own land uses compatible with airport operations, while airport operators control aircraft operations and airlines to control noise emissions. If there are limits to how much municipalities can do, whether for fiscal reasons or simply because they are too small relative to the airport, it is incumbent on the airport operators and airlines to do more to keep noise to a minimum.

The study area consisted of fourteen municipalities around O'Hare (Figure 2), those with at least a portion of their land inside the 1997 65 DNL. Chicago was not included in most of the analysis because of its disproportionately large size and its clear position in favor of airport expansion. Interviews were conducted with all but one of the fourteen municipalities in the winter and spring of 2002. The chapter begins with a history of O'Hare Airport, then a description of the current expansion plan for O'Hare. The next section analyzes the history of land use around the airport by decade, followed by the political implications of land use compatibility and airport expansion support.

History of O'Hare International Airport

Early history

The history of Chicago has always been closely tied to transportation. The city began at the mouth of the Chicago River, near an important portage between the Great Lakes and the Mississippi River watershed. The importance of this connection grew with the Illinois and Michigan Canal in 1848, allowing barge traffic to pass from one system of waterways to another and providing a market for the farm goods that were being produced on the former prairies of the Midwest. Shortly thereafter, the railroad transformed the city and the region, making Chicago the hub of the Midwest and putting it ahead of St. Louis in the race for supremacy in the region [105].

Aviation did not have an instant impact on the local economy, though it would eventually be touted as the economic engine of the entire metropolitan area. One of the first government airmail contracts in the country was between Chicago and New York, started in 1918 by the precursor of United Airlines [5]. As outlined in Chapter 2, commercial service did not immediately follow airmail routes. It was not until 1926 that Chicago Municipal Airport opened, later to be known as Midway Airport. By 1931, Chicago Municipal was already the busiest airport in the world in terms of passengers, though it operated on only a single square mile of land on the southwest side of the city [103].

Fig. 2. O'Hare International Airport and Study Area Municipalities

As with many other metropolitan areas in the 1940s, Chicago was chosen to house a number of military installations during World War II, including the Douglas Aircraft Plant. The Army wanted a site with good rail transportation, a reliable labor supply, reasonable land costs, and the potential for expanding as a civilian airport once the war was over. While different sites were considered, the favorite was about seventeen miles northwest of the city. For the most part, there was little resistance to this choice. Landowners in the area, many of whom were German immigrants or their descendants, received nearly 90 percent of their property's value, an unusually good deal for condemned property. The town of Park Ridge voiced objections, but "the patriotism of the audience was called upon to accept the plant as Park Ridge's contribution to the war effort" [*ibid*., 23]. By June 1942 the site had been approved, and the plant produced its first plane just over a year later.

The Douglas Plant operated for over two years, from July 1943 to October 1945, producing 655 C-54 transport planes for the war effort. Before the war was even over, plans were underway to reuse the airfield that had been adjacent to the plant, known as Orchard Field. In all, five locations were considered for a new commercial aviation facility for Chicago, including enlarging Chicago Municipal Airport, which by then had been renamed to honor the Battle of Midway. By April 1944, a technical committee had determined that Douglas was the best site for four reasons: it had room to grow, travelers in the north and west suburbs would have better access than they did to Midway, there was little political opposition, and the federal government would donate the site to the city. The airlines preferred the site as well, and in October 1945 the final decision was made, just as the Douglas plant was completing its final cargo planes. In January 1946 the newly-formed Air Force declared the property surplus, and the first commercial flight took place on October 23, 1946 [*ibid*.].

In many ways Orchard Field was a testing ground for the regulation of air transportation. As discussed in Chapter 2, it was not until 1946 that federal funds were made available for airport improvements (82 Stat. 395). Chicago was the first city to apply for funds under that legislation. The presence of military aircraft at the field made it easier to get federal funds, though there was also the threat that the airfield would be reclaimed by the military, especially during the Korean War. Since a State Department of Aeronautics had been established in 1945, federal funds were channeled through the state, thus requiring its permission for any improvements. Most importantly, since Orchard Field had been given to the City of Chicago, the city would manage day-to-day planning and operations. Any attempt on the part of the city to annex land to enable the expansion of the field was met with resistance on the part of neighboring suburbs. Chicago eventually annexed the airport via a strip of land down the center of Higgins Road, between Rosemont and Schiller Park, promising to annex no more land than that in the future.

Commercial traffic was slow to come to O'Hare (renamed in 1949 for a WWII flying ace). As late as 1957, Midway was still the world's busiest airport, over ten years after O'Hare opened. There were two major obstacles to the airlines transferring their operations to the new site, besides the usual reluctance to invest in new facilities: ground transportation connections and funding. When Orchard Field opened in 1946, the airlines refused to switch from Midway until there was a faster connection between O'Hare and

downtown. By 1953, the Eisenhower Expressway was finished, extending from downtown to a few miles south of O'Hare. It was not until 1960 that the Kennedy Expressway connected O'Hare directly to downtown. Secondly, because O'Hare was run by the city, it had to be self-supporting, which necessitated more income in the form of landing fees. But there were not enough flights to provide the necessary landing fees, setting up a vicious circle between having facilities available and having the landing fees to pay for them [*ibid.*]. Chicago tried to claim that Midway was unsafe because of the high volume of operations and that airlines *had* to move to the new facility, but the FAA disagreed.

While the ground transportation and funding issues inhibited O'Hare from becoming Chicago's major airport in the early 1950s, two other recurring factors enabled that transfer to happen: the powerful mayor of Chicago, and changes in technology. In April 1955, Richard J. Daley became mayor and solidified the hold of the Democratic machine on Chicago politics. Within a month, an agreement had been reached with the airlines on a fee structure, and within six more months, the first commercial traffic was transferred to O'Hare, in October 1955. Significantly, this transfer occurred only four days after United Airlines ordered its first jets [*ibid.*]. Once those jets became available in 1959, Midway was doomed. Its longest runway was too short for the new aircraft, and without massive demolition of Chicago homes, further expansion was impossible. Runways were extended at O'Hare, and jets followed quickly. In the fall of 1959, United switched half of its flights, and by July 1962, Midway had no scheduled commercial flights. By July 1963, Chicago asked the airlines to return some flights to Midway because O'Hare was too crowded. But not wanting to duplicate operations or staff, the airlines were reluctant to do so. O'Hare International Airport was formally dedicated in March 1963, the world's largest in terms of land area and number of passengers per year. At the dedication ceremony, President Kennedy noted that "No great airport is really ever 'complete,' and I am sure Chicago-O'Hare will never be finished" [*ibid.*, p. 270].

After becoming the world's busiest airport, O'Hare was soon facing complaints from its neighbors, primarily about noise. When land was acquired for Orchard Field, jet airplanes had not yet been invented; even after the conversion to a civilian airport, jets were not in use as commercial airliners for over a decade. Since O'Hare was built at what was at the time the edge of the developed metropolitan area, housing and other development filled in around it throughout the 1950s, as explained in the next section. By the time the first jet flew into O'Hare in 1959, residential development was already in place in many neighboring municipalities that were unaware of the increase in noise that jet technology would mean. By 1965, there were an estimated 300,000 people seriously affected by airport noise [106], roughly equivalent to the population of the fourteen study area municipalities at the time. Only four years after O'Hare's official dedication, the airport was so crowded that the city commissioned a study for a third major airport. The city's preferred site was on a polder in Lake Michigan on the South Side, while the FAA preferred a site to the southwest, near Joliet. Without consensus on a new site, runways were added to O'Hare in 1967 and 1971.

There were only two possible solutions to the noise problem at the municipal level: restrictive zoning on the part of local communities, or restricting operations at the airport.

Chicago requested that the area adjacent to the airport be rezoned to keep land uses compatible; the suburbs said this "was comparable to taking 330 square miles of land in the area without compensation" [*ibid*., 331]. While some general zoning regulations were adopted in 1964, they were not, of course, retroactive, and many communities already had stricter laws on their books. The City of Chicago wanted the FAA to determine noise criteria and come up with abatement methods as part of a nationwide push for aircraft noise standards. The FAA said that limitations on operations for other than safety reasons were up to the airport operator, and land use controls on the part of neighboring communities were the best solution.

With zoning not working as a solution, O'Hare's neighbors turned to activism. Some communities had already been complaining: Park Ridge is on record as having complained to the Defense Department at least ten times during the summer of 1955 about the noise from Air Force jets [*ibid*.]. Later, Park Ridge followed the lead of Hempstead, NY, in passing a noise ordinance meant to apply to airplanes that was ultimately unenforceable. Sixteen nearby suburbs formed the O'Hare Area Noise Abatement Council in 1969, the precursor of today's Suburban O'Hare Commission. At the national level, the National Organization to Insure a Sound-Controlled Environment, N.O.I.S.E., was formed in Washington, DC, that same year to lobby for federal regulations on noise pollution and abatement. The mentality of Chicago-vs.-suburbs with regards to noise abatement had been set, and remains the same thirty years later.

Capacity problems worsened with deregulation, and a third airport was again proposed. An Illinois Department of Transportation study in 1986 narrowed down the list of third airport sites to four, all to the south of the metropolitan area. After a 1989 proposal for two more runways at O'Hare, bringing the total to eight, met strong opposition, Mayor Richard M. Daley (son of Richard J.) issued a plan for a third major airport on the site of Lake Calumet, a largely artificial lake surrounded by industrial development on the southeast side of the city. The plan was presented as a *fait accompli*, but pressure from the thousands of residents whose homes and jobs would be lost, environmentalists who feared the loss of wetlands around Lake Calumet, and others questioning the Mayor's cost estimates forced Daley to withdraw the plan in 1992.

As decades went by with increases in traffic and noise at O'Hare, nearby residents grew increasingly vocal. In the early 1980s, a number of lawsuits were filed over damages to property values, all of which were turned down [107]. When Chicago proposed conducting a Part 150 study to obtain federal funds for soundproofing, some municipalities protested from fear that having their housing identified as being in a noisy location would lower property values. But the Part 150 study was conducted, and residents slowly began to receive some relief in the form of soundproofing. Daley's introduction of the O'Hare Noise Compatibility Commission in 1996 allowed municipalities the opportunity to participate in the planning process for mitigation and abatement, both in terms of soundproofing and in decreasing noise at its source. A number of towns have remained firmly opposed to the airport and reluctant to trust any group organized by Chicago. These municipalities are members of the Suburban O'Hare Commission and are mostly located west of the airport (Figure 3).

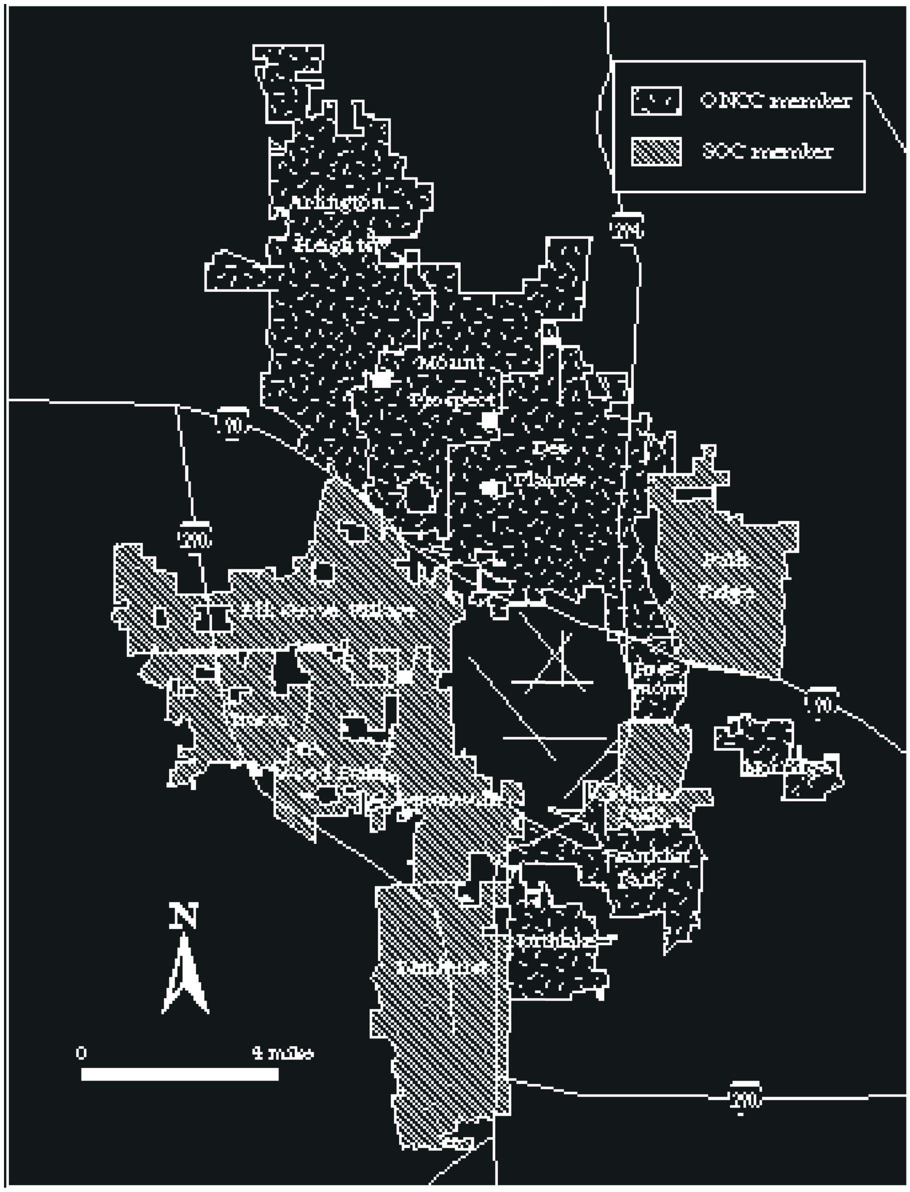

Fig. 3. O'Hare Noise Compatibility Commission and Suburban O'Hare Commission members

Proposed expansion

After a decade of insisting that no new capacity was needed in the Chicago aviation system, Mayor Daley announced in 2001 that new runways were needed urgently at O'Hare. Delays were choking traffic, and because of O'Hare's prominent role in the hub-and-spoke system of United and American Airlines, these delays were affecting the entire nation's air transportation system. Daley's proposal for expanding O'Hare was announced in early 2002 as the addition of a single runway and the "relocation" of three others. Because a great deal of uncertainty remains about whether the expansion will happen at all, much less its time frame or effects, this section only briefly outlines the proposal and its possible effects.

The proposed expansion of O'Hare would involve removing three of the seven existing runways and adding four new ones, for a total of eight. Figure 4 shows the proposed new runway layout. The new layout would better take advantage of predominant westerly winds, allowing for more simultaneous landings and takeoffs. The city estimates delays due to weather conditions would be reduced by 95 percent and overall delays would be reduced by 79 percent by using parallel rather than intersecting runways. Other parts of the plan include a new access road from the western side of the airfield and a new terminal on that side, improvements to the current eastern access road, and a possible extension of the rapid transit Blue Line to the western suburbs beyond its current termination at the airport.

Of course, this type of reorganization plan at an airport surrounded by existing development is bound to have an effect on surrounding communities. The western and southern sides of O'Hare are largely industrial, with the northern and eastern sides partly residential and partly industrial. First, the construction of a new runway along the southern edge of airport property would require the removal of at least 500 homes and 100 businesses in Bensenville, for the runway itself and for clear zones [108]. The proposed runway layout would expose new areas to noise north and south of the current Runways 9L-27R and 9R-27L, including the municipalities of Elk Grove Village, Park Ridge, and Bensenville [109]. The current Runway 9R-27L would be extended to handle the largest jets after Runway 14L-32R, currently the longest, is removed. This would extend the noise contours farther to the east and west, impacting areas of Wood Dale and Itasca that are currently compatible and worsening noise in already incompatible Schiller Park and Norridge. All of the above municipalities are officially opposed to the expansion because it would worsen noise for them.

With the removal of two major runways (the third is a short north-south runway that is no longer used), there *are* towns that would benefit in terms of noise reduction, and they tend to be in favor of the proposal. Aircraft would no longer fly over Arlington Heights and Mount Prospect to the northwest, though Arlington Heights does not officially support the plan. Northlake and Franklin Park to the southeast would also experience a decrease in noise, and are in favor of the runway realignment. To the southwest, Elmhurst would experience a reduction in overflights, but is firmly opposed to expansion for reasons of political solidarity. On the other hand, residents of Chicago would experience an increase in noise due to the doubling of runways pointed at their city, but since it is the city's proposal, residents' concerns are overruled.

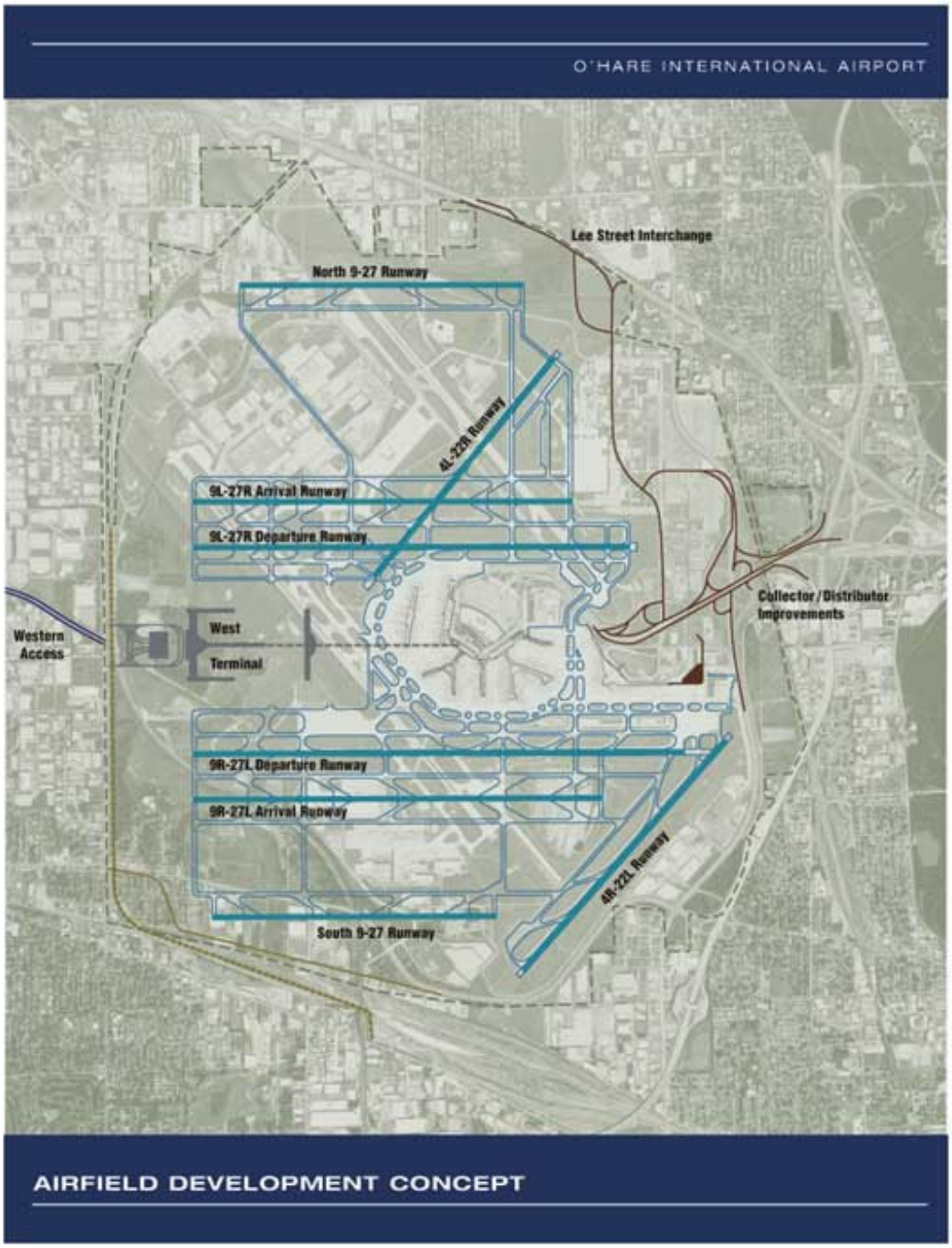

Fig. 4. Proposed expansion of O'Hare. Chicago Department of Aviation, http://www.O'Hare.com, viewed January 7, 2003.

While location with regards to the proposed runways has the most impact on determining a municipality's receptivity towards O'Hare expansion, politics plays an important role as well. The city of Chicago has a long history as the Democratic stronghold in Illinois. Nardulli notes that for most of the 20th century, state politics were characterized by a split between Chicago and downstate Illinois, differentiated not only by location but economic activity and population diversity [110]. The mayor of Chicago is the second most important political figure in the state after the governor, and the two of them have often been from opposing parties. Once post-WWII suburban growth was reflected in representation to the state Congress, a power shift took place. The suburbs became the largest voting block in the state, and so the city-suburb conflict that is typical of many major metropolitan areas is manifested in state as well as local politics. The suburbs to the west of O'Hare are strongly Republican, in sharp contrast to the city. Conflicts over control of O'Hare are therefore closely connected to more general conflicts over city-suburb politics, and city-state politics.

O'Hare is owned and operated by the municipality of Chicago. As the opening quote from the mayor of Elmhurst noted, this leads to considerable frustration on the part of neighboring municipalities which, while technically equal to Chicago in terms of jurisdictional power, have no control over O'Hare Airport. This frustration is further compounded by the fact that O'Hare is connected to Chicago by a strip of land the width of a road. This connection makes it appear that the city is not an airport neighbor itself, and thus has the power to expand its airport facilities without worrying about impacts to its own residents. However, there are more residents living inside the 65 DNL in Chicago than in any other municipality [111], suggesting that Chicago has prioritized the airport above its own residents, as well as those of neighboring municipalities, and would be unlikely to have different policies even if its residents directly bordered airport property.

Chicago's control over the area's aviation facilities has influenced expansion plans in the past as well as the present. The history of the proposed Lake Calumet airport, described above, was heavily influenced by Mayor Daley's desire to keep any new airport (and its jobs and construction contracts) under his control. After that proposal failed, Daley looked towards reducing future conflict and keeping control by stating that no new capacity was needed in Chicago's aviation system, whether at O'Hare or elsewhere. Terminal and taxiway improvements were considered to be enough, and the World Gateway Project was proposed in the mid-1990s as a means of increasing groundside capacity. The World Gateway Project is currently under litigation; O'Hare opponents charge that the city did not get state approval for this transportation project, while the city insists new capacity is not being provided and therefore state permits are not necessary. The fact that the supposedly independently designed new runway layout fits perfectly with the World Gateway terminal layout throws the city's position into question.

In 2000, national politicians first became involved at O'Hare. Hourly flight caps had existed at O'Hare, LaGuardia, and National Airports since 1968 as a means of reducing delays. By April 2000, demand had increased to the extent that the U.S. Congress decided to remove the flight caps as a means of increasing capacity [112]. Increasing competition was also a goal of lifting the flight caps; with a limited number of slots

available, new entrants (which tend to be low-fare carriers) were largely unable to gain entry to O'Hare. However, once the flight caps had been lifted, the majority of new flights were from major airlines [113]. Furthermore, within a few months, delays reached record levels, due to severe thunderstorms in addition to the lifting of the flight caps. By early 2002, Daley had reversed his position and insisted that new runways were needed at O'Hare, under the proposal outlined above. As with the attempt to build an airport at Lake Calumet, Daley needed the approval of the governor of Illinois because of the state's veto power over transportation projects. Republican Governor George Ryan was a supporter of the third airport option, due in part to his political connections to the northwestern suburbs. He agreed to support Daley's expansion plan, thus earning the enmity of his former suburban allies, in exchange for support of a future third airport far to the south, near the municipality of Peotone.

The O'Hare plan now had state approval. However, since the governor still retained veto power over airport expansion, and 2002 was the year of the Illinois gubernatorial election, Daley wanted to get the state's approval of the expansion plan written into law so a future governor could not take it back. The only way to do this was to seek federal

legislation. Daley (and others) made the case that because O'Hare is an important part of the nation's transportation network, federal legislation is necessary to keep local politics from interfering with the national network. The U.S. House Transportation Committee passed such legislation in July 2002 (H.R. 3479). Though a similar bill was scheduled to be before the Senate in the fall of 2002 (S. 1786), the session ended before that legislation could be considered. This bill would require that O'Hare be expanded according to the six-parallel-runway layout (subject to environmental review), and that review of O'Hare expansion and the development of a third airport be expedited by all reviewing agencies.

Municipalities have raised three major concerns about this proposed legislation (aside from questions of states' rights and local control). First, there are concerns about the spacing of the runways; two of the three sets of proposed parallel runways are too close to meet FAA minimum separation standards during inclement weather. If the runways are useless in bad weather, the delay-reducing potential is reduced; if the runways are exempted from FAA standards, safety may be an issue. Next, while a western access road is mandatory as part of the plan, it is not clear whether it would be on airport property (conflicting with the proposed runway layout) or within neighboring municipalities (resulting in the loss of hundreds more homes and businesses than Chicago has estimated). Finally, since the access road would be built by the state and not the city, Chicago has not included it in its cost estimates. As one interviewee vehemently pointed out, Chicago has a history of cost overruns of 50 percent or more on projects as small as a bandshell on the lakefront; the overruns on a project estimated at $6 billion dollars would likely be quite costly.

Most of the concerns about the proposed expansion are fundamentally related to the system of governance at O'Hare. One municipality has control over development at the airport itself, including the condemnation of land in neighboring municipalities. The history of conflict between Chicago and O'Hare's neighbors has led Chicago to be extremely secretive about its plans, which further irritates the suburbs. As will be discussed in Chapter 7, while there are differences of opinion as to the meaning of public

participation, most agencies at least agree that keeping the public informed of proposed plans is important. Chicago has taken the extreme position of not only discouraging public input, but keeping details of the plan private until federal law approving the plan is passed. Even Department of Aviation staff members note that the proposal is too vague to determine the impacts in terms of new noise contours or estimates of housing units affected (since the federal legislation mandates soundproofing out to the 65 DNL, staff would like to be able to determine how much that new mitigation might cost) [114]. A number of municipalities noted that they would like to be able to take their proposal for a third airport and compare it to Chicago's proposed expansion, but the lack of public information makes it impossible. Municipalities therefore find themselves arguing against expansion in general rather than any specific details, and then being portrayed as narrow minded and not concerned with the economic welfare of the region and the nation.

History of land use

Because O'Hare was built and dedicated during the same decades that Chicago's northwestern suburbs were booming, residential development closely paralleled growth in air traffic. While many municipalities credit the airport with the growth in population and economic development they experienced in the 1950s and 1960s, it is likely that many of these places would have grown to a similar extent without the airport's presence. With some of today's incompatible residential land uses, airport noise moved into an existing neighborhood because of new technology or changes in runway layout. In other places, new development was constructed in the path of existing runways. This section examines the timing of development in fourteen of the suburbs surrounding O'Hare, both in terms of population and in the number of manufacturing and service firms. The results match interviewees' opinions that the airport has had only an indirect effect on growth, and that the history and geography of individual municipalities have played more of a role in determining today's land use compatibility.

1950-1959

In the early 1950s, before commercial traffic had been transferred from Midway to O'Hare, undeveloped land existed both east and west of the airfield. This northwest sector of the metropolitan area was traditionally middle- and upper-middle-class, a demographic characteristic that corresponds with strong economic and population growth [114]. The site for Orchard Field was chosen because of the undeveloped land in between the spokes of the major railways that led out of Chicago [115]. Even within Chicago, development in-between the rail lines had not yet spread as far west as the Des Plaines River, east of the airport. Commuter suburbs had been developed along all of the rail lines since the late 1800s, including nine of the fourteen study area municipalities. The population of the study area towns at this time, as shown in Table 2, strongly correlated with their distance from Chicago on the rail lines. The rail yards to the south attracted industry to towns southeast of the airport, including Franklin Park, Schiller Park, and Northlake. West of the airport, the land was largely agricultural, including truck farms that served produce markets in the city of Chicago. The airport itself consisted of four runways, the shortest and northeasternmost of those that exist today.

Table 2. Population growth in study area municipalities

Municipality	1950	1960	1970	1980	1990	2000
Arlington Heights	8,768	27,878	65,058	66,116	75,460	76,031
Bensenville	3,754	9,141	12,956	16,124	17,767	20,703
Des Plaines	14,994	34,886	57,239	53,568	53,223	58,720
Elk Grove Village	N/A	6,608	20,346	28,907	33,429	34,727
Elmhurst	21,273	36,991	46,392	44,276	42,029	42,762
Franklin Park	8,899	18,322	20,348	17,507	18,485	19,434
Itasca	1,274	3,564	4,638	7,129	6,947	8,302
Mount Prospect	4,009	18,906	34,995	52,634	53,170	56,265
Norridge	3,428	14,087	16,880	16,483	14,459	14,582
Northlake	4,361	12,318	14,191	12,166	12,505	11,878
Park Ridge	16,602	32,659	42,614	38,704	36,175	37,775
Rosemont	N/A	978	4,825	4,137	3,995	4,224
Schiller Park	1,384	5,687	12,712	11,458	11,189	11,850
Wood Dale	1,857	3,071	8,831	11,251	12,425	13,535

Source: U.S. Census.

During the 1950s, the strongest influence on growth in the area around O'Hare was not the airport, but the interstate highways. A few miles to the south, I-290 opened in 1953. By 1960, I-294 was open along the eastern edge of the airport, and I-90 was open along the north edge, connecting to downtown. During this decade, Census data show the greatest population growth occurring in two areas. To the east of the airport, Chicago, Park Ridge, and Norridge were taking advantage of the planned interstate access to downtown (Figure 5). To the southeast, the industrial towns of Northlake and Franklin Park were growing rapidly as well. Table 2 shows that this is the decade in which the highest rates of population growth occurred in the study area towns. However, most of this growth spread out from existing town centers, along the rail lines and away from airport noise.

Two exceptions to the proximity to rail lines are the municipalities of Elk Grove Village and Des Plaines. Northwest of the airport, Elk Grove Village was planned by the Centex corporation so that residential land would be as far from the airport as possible. The municipality takes up about a third of the land on the western border of O'Hare, and the easternmost five and a half square miles are all industrial and commercial development (Figures 6 and 7). The remaining five and a half square miles are residential. The first houses were built in Elk Grove Village in the late 1950s, along with the first industrial development. In contrast, Des Plaines is a commuter suburb northeast of the airport which by the 1950s had annexed the subdivision known as Orchard Place from which the airport got its original name. Growth began in the southern part of Des Plaines because of proximity to the new interstates, I-290 and I-90. Unfortunately, this growth was right in the path of Runway 4-22, one of the airport's original runways and in use well before the advent of jet aircraft.

1960-1969

Two major changes were made at O'Hare after its official opening in 1959 to commercial traffic, increasing both airside and groundside capacity. A new runway was built in the early 1960s to handle jets, much longer than any of the existing runways. It would run northwest to southeast, pointing in one direction over I-90 and the planned Elk Grove Village, and over heavily developed Franklin Park and Chicago in the other. Existing runways were also lengthened, exposing more land area to noise. Secondly, the terminal moved from the northeast corner to its current location in the middle of the field and was connected by interstate highway to I-90 and I-294. The first access point for travelers was no longer the Rosemont/Des Plaines border, but the interstate exit from I-90 into Rosemont, shifting the location of airport hotels.

A different set of towns experienced rapid growth in this decade, mostly those along the new interstates: Arlington Heights, Mount Prospect, Rosemont, and Schiller Park are the best examples. Arlington Heights and Mount Prospect were commuter suburbs well north of O'Hare that annexed land southwards to I-90. The area in between the old downtowns and the interstate began to fill in during the 1960s, mostly with industrial land uses near the airport. Rosemont was not incorporated until 1956, and is tucked between I-90 and I-294, the Des Plaines River, and the airport. At this time, it consisted of a few blocks of residential land and a few blocks of industrial. Immediately to the

Fig. 5. 1950s-era housing in Norridge, IL. Aircraft is approaching Runway 27R-9L.

Fig. 6. Industrial land uses in Elk Grove Village, Wood Dale, and Bensenville, IL. Looking south on approach to Runway 9L-27R.

Fig. 7. Industrial land uses in Elk Grove Village. Aircraft approaching Runway 14R-32L.

south, Schiller Park more than doubled its population from 1960 to 1970, though no comprehensive planning was done by the city until the mid-1970s [117]. To the southwest of the airport, outside the flight paths at the time, Bensenville and Elmhurst continued to grow, though not as rapidly as the towns to the north (Figure 8). Industrial growth was also occurring in the 1960s in all directions from the airport. Elk Grove Village and Des Plaines to the west and north experienced the largest growth, followed by Franklin Park and Schiller Park to the east and southeast. Much of this growth was not new firms being attracted to the area by the air service, but companies moving out from Chicago to the larger spaces and lower taxes of the suburbs (the neighborhoods of Chicago within the study area started losing industrial firms in 1963). It is difficult to determine the influence that the airport had on both population and industrial growth during the 1960s. Because of the interstate highways and the distance from downtown, it is likely that the area would have experienced rapid growth regardless of the airport's presence, particularly since many of the firms did not actually use the airport for transporting goods or materials. A 1960 newspaper article noted conflicting views on this topic that are similar to those held in 2002 by officials from the same municipalities. An official from Bensenville noticed no connection between its industrial growth and the airport, and city staff in Des Plaines found that "People would come out regardless of the field. They're looking for space, to get away from the city and high taxes." On the other hand, an official from Franklin Park said, "We've definitely been affected by O'Hare airport. We're strategically located for industry, right near the airport" [117]. While some of the differing views have to do with the municipalities' location with regards to airport access roads, municipal politics are also apparent in both eras, with Franklin Park a strong supporter of the airport and Bensenville a strong opponent.

One of the ways to indicate the extent to which firms might be using O'Hare is to determine the number that are local or regional branches of national companies. Even if the products are not shipped by air, sales personnel and management are likely to be traveling from the national headquarters to the local facility. In 1959, of the fourteen study area municipalities plus western Chicago, about 92 percent of the firms were local, meaning not branches of a national firm (Table 3). By 1969, that number had fallen to 77 percent, and all but one municipality had fallen in terms of their percentage of local firms. Therefore, it seems likely that national companies decided to locate their Chicago branch offices in the area of O'Hare at least in part because of the airport. By 1979, however, the average had risen back to 83 percent, suggesting that the new national firms were resulting in spin-off local businesses.

It was in the mid-1960s that the tension between airport and municipality growth first became apparent from a planning perspective. The Northeastern Illinois Planning Commission estimated that in 1965 there were 300,000 people living within the 65 DNL contour [106]. They also estimated that by 1975, there would be up to an additional 218,600 residents affected if no improvements were made in aircraft technology. Of the newly affected residents, about a quarter would be in new construction planned in areas that experienced aircraft noise. The rest would be existing residents affected by two new runways, resulting in an increase of 33 percent in terms of land and 68 percent in terms of people. Municipalities to the south and west would be most strongly affected,

Fig. 8. 1960s- and 1970s-era housing in Bensenville, IL. Note the anti-airport expansion lawn signs.

Table 3. Growth in Manufacturing Firms in Study Area Municipalities

City	1959-60 Total	1959-60 % Local	1969 Total	1969 % Local	1979 Total	1979 % Local
Chicago/Harwood Hts.	164	87	116	78	109	86
Arlington Heights	42	98	63	89	240	87
Bensenville	N/A	N/A	85	82	223	89
Des Plaines	93	95	290	69	400	68
Elk Grove Village	6	100	324	72	951	86
Elmhurst	N/A	N/A	69	75	197	77
Franklin Park	251	97	396	87	541	92
Itasca	N/A	N/A	11	82	62	79
Mount Prospect	23	91	46	70	76	89
Norridge	N/A	N/A	N/A	N/A	22	100
Northlake	16	69	40	73	45	76
Park Ridge	46	70	74	54	95	66
Rosemont	N/A	N/A	93	65	162	77
Schiller Park	73	95	157	85	232	79
Wood Dale	N/A	N/A	11	91	40	98
Total	714	92	1775	7	3395	83

Source: Registry Publications. (1959-60, 1969, 1979). Big green book (Business directory of industry and service in the State of Illinois). Northbrook, IL.

particularly Bensenville, Wood Dale, Itasca, Elmhurst, and Northlake. Unfortunately, these are also the towns that were in the midst of their main growth spurt. Finally, in many cases, the physical size of the municipality made it difficult to put new housing outside of the planned new flight paths.

1970-1979

By 1971, two new runways had been built at O'Hare: 9R-27L, the southernmost east-west parallel, and 4R-22L, the southwest-northeast runway at the southeast edge of airport property. While both runways were built on existing airport property, they both exposed new areas to airport noise, including the centers of the commuter suburbs of Wood Dale and Itasca, and the recently-developed areas of Norridge and Chicago.

Population growth during the 1970s continued in the remaining undeveloped areas of the study area municipalities. Since the municipalities' historic centers were at the opposite end of town from the airport, this meant their remaining developable land was often in the flight paths. Indeed, the three hot spots for growth in this decade were all in the path of either new or old runways. To the north, Arlington Heights and Mount Prospect were reaching their southern borders in terms of development, near both I-90 and O'Hare. To the east, Chicago's last undeveloped land was under the flight paths of both east-west parallels. This Census block group had more new housing units between 1970 and 1980 than any other in the study area, over 2800, nearly all of which were apartments (Figure 9). To the southwest and west, Bensenville, Elmhurst, and Wood Dale were filling in their undeveloped land, which happened to be right in the path of the new runways 4R-22L and 9R-27L. Finally, the municipalities to the east actually started to lose population during this decade, though the number of housing units continued to grow.

Manufacturing grew at a steady rate in most of the study area towns. Unsurprisingly, the places with the fastest growth were those with the most undeveloped land, including Elk Grove Village, Arlington Heights, and Elmhurst. In contrast to the 1960s, the 1970s saw an increase in the percentage of local firms in nearly all of the municipalities, as the large national branches that had previously moved in encouraged local businesses to follow.

1980-1990

With no major changes to the airport, new housing units in the 1980s were located in the same areas as in the 1970s. The built-out municipalities of Norridge and Park Ridge to the east received a number of new units. Interviews indicate these units are largely tear-downs, the replacement of 1950s brick bungalows that characterize much of the area with much larger houses (Figure 10). Apartment complexes were approved and built under the east-west flight paths in Chicago, while Bensenville and Wood Dale officials increased the density of housing around their historic downtowns. The heaviest area of new construction was to the northwest of the airport, in line with Runway 14L-32R. This construction was also mostly apartments, in Mount Prospect, Arlington Heights, and unincorporated Cook County. The only dramatic increases in population in the study area towns in the 1980s were in Arlington Heights and Elk Grove Village, both of which had adequate land on the opposite end of town from the airport to make most of their new residential construction compatible.

Fig. 9. 1970s-era apartments in Chicago. Aircraft on approach to Runway 27R-9L.

Fig. 10. Old and new housing in Park Ridge, IL. Aircraft on approach to Runway 22R-4L.

Arlington Heights and Elk Grove Village were also among the few municipalities to experience a noticeable increase in the number of manufacturing firms in the 1980s, again because of their location at the far west edge of the study area. Des Plaines and Bensenville also saw an increase in the number of these firms, with undeveloped land still available in the parts of town closest to O'Hare. Comparable data on the percentage of local firms are not available after the early 1980s, so it is not possible to determine the effect of deregulation and increased service on the attraction of national firms.

Because the corresponding directory of service firms began in the late 1970s, it is difficult to say whether the rapid increase in firms is due to the growth of the service industry during this time period or increasing awareness of the directory itself. Recall that the economic development literature has found a strong connection between air transportation and jobs in the service sector. The municipalities with the most rapid growth in services were for the most part the same as those with growth in manufacturing: Elk Grove Village, Arlington Heights, Bensenville, and Des Plaines, plus Elmhurst and Park Ridge. The smaller, older industrial suburbs to the southeast of the airport never experienced a great increase in service firms, despite their closer proximity to the airport's access road. This confirms Centonze's finding that airport access *within* a metropolitan area is not top priority in a firm's location decisionmaking process; available land and lower taxes are likely to play a more important role.

Summarizing the history of land use

The preceding history of the land use around O'Hare suggests that municipalities largely made their own decisions regarding their growth with little consideration of the airport's presence. In some cases, land use patterns had already been put in place by the time the airport began to grow. In other cases, changes in the airport's layout made pre-existing residential land uses incompatible. This section compares interview data with a closer analysis of the timing of development to show that for the most part, the geographical setting of each municipality played a greater role than did deliberate planning in determining the compatibility of land uses in the present day. As described in the chapter on methodology, Census data on housing units were gathered for the block groups within the 1997 noise contours. Data on the percentage of existing housing units as of 1950 that were inside the 1997 noise contours, as well as the percentage of development added in ensuing decades, indicate the wide variety of land use compatibility around O'Hare.

While each municipality (except Itasca) added between 900 and 8000 units from 1950 to 1990 inside what is today the 65 DNL contour, some have reduced the percentage of units exposed to noise by shifting new construction to quieter areas. There are four categories of municipalities based on these data, as shown in Table 4. First, in 1950, before the airport was open to commercial traffic, there were towns where all or nearly all of the housing that was already built is today inside the 65 DNL. Because of the small size of these towns relative to the footprint of airport noise, they have generally had to build at least 80 percent of their new housing inside the contour. Such towns include Rosemont, Northlake, Franklin Park, Schiller Park, and Norridge. Another set of municipalities is at the opposite extreme; their percentage of new housing units is generally under 20 percent because they are large enough to have sufficient land outside the contour. These cities are Arlington Heights, Mount Prospect, Park Ridge, Itasca, and

Table 4. Percentage of housing inside 1997 O'Hare noise contours, by decade built.

City	Total in 1950	Built 1950-1959	Built 1960-1969	Built 1970-1979	Built 1980-1989	Total in 1990	Increase in %
Percentage generally high							
Franklin Park	78.89	86.68	83.91	95.68	97.21	84.88	5.99
Norridge	20.79	79.96	79.55	74.29	26.67	67.20	46.41
Northlake	92.57	90.70	91.43	86.72	100.00	92.05	-0.52
Rosemont	100.00	100.00	100.00	100.00	100.00	100.00	0.00
Schiller Park	69.20	86.73	71.09	69.31	69.05	74.51	5.31
Percentage generally low							
Arlington Heights	0.00	1.75	3.59	4.77	3.39	3.24	3.24
Elmhurst	1.31	3.05	15.66	17.85	7.49	6.29	4.98
Itasca	2.54	3.65	0.00	1.32	0.00	1.70	0.84
Mount Prospect	0.00	1.27	7.36	25.50	21.57	11.95	11.95
Park Ridge	3.99	12.93	17.67	25.61	8.39	12.08	8.09
Significant decrease in percentage							
Bensenville	94.94	73.90	61.37	72.45	90.04	75.37	-19.57
Elk Grove Village	76.76	88.55	80.82	26.92	10.46	46.16	-30.60
Wood Dale	61.45	68.24	32.41	37.47	23.90	39.02	-22.43
Moderate percentage, little change							
Des Plaines	50.27	43.17	56.47	47.04	47.65	49.61	-0.66

Source: U.S. Census.

Elmhurst. Except for Itasca, all are located north or south of the airport. Additionally, as officials in these municipalities have redeveloped their downtowns in recent years to attract new residents, they have encouraged the addition of housing units along the original commuter rail lines, far from the airport. A third group of municipalities has been able to significantly reduce the percentage of housing units exposed to noise (if not the number) since 1960. Elk Grove Village, Wood Dale, and Bensenville have all been able to concentrate new housing away from noise-prone areas. As an outlier, Des Plaines has always had about half of its new housing units inside the 1997 65 DNL.

Figures 11 and 12 further confirm that a municipality's location, size with regards to O'Hare, and extent of undeveloped land all play a role in its ability to maintain land use compatibility. The first figure shows the median age of housing for whole municipalities. As has been explained, those municipalities east and south of the airport were largely built out by the time the airport started commercial service in 1959, even more so by the time the final runway configuration was set in 1970, ten years after jet aircraft came to O'Hare. Municipalities west and north of the airport built half or more of their housing units after 1970. The second figure shows only the medians for housing units within the block groups that are inside the 1997 65 DNL contour.

Based on these two figures, there are again three categories of municipalities: those where the timing of development was no different inside the noise contours as for the municipality as whole; those where there was a higher percentage of housing built *after* 1970 in the contours than in the whole municipality; and those where a higher percentage of housing was built *before* 1970 in the contours than in the municipality as a whole. The first group largely consists of the municipalities that border the airport: Des Plaines, Rosemont, Norridge, Schiller Park, Franklin Park, Northlake, and Bensenville. These municipalities are generally small enough that the majority of their housing units are inside the 65 DNL because the majority of the municipality's land area is inside the contour. The median age of housing in these municipalities varies from 1955 to 1967. The second group is smaller, consisting of Elk Grove Village, Itasca, and Wood Dale, all located west of the airport. Because of their relatively late growth and an east-west orientation that includes land relatively far from the airport, they have been able to locate residential development outside of the noise contours. The median age of development here falls between 1968 and 1973. The third group appears to have failed to take the airport into account in planning, with a higher percentage of residential units built after 1970 located inside the noise contours than for the municipality as a whole. Two, Park Ridge and Elmhurst, have median years of construction of housing in the mid-1950s, while Arlington Heights and Mount Prospect have median years of construction in the late 1960s. All four towns, however, are railroad suburbs, indicating that as they grew from their historic centers, there was nowhere to put new residential development but in the path of the runways. (While Des Plaines also fits this geographic description, its proximity to Interstates 90 and 294 attracted development near the airport decades earlier.)

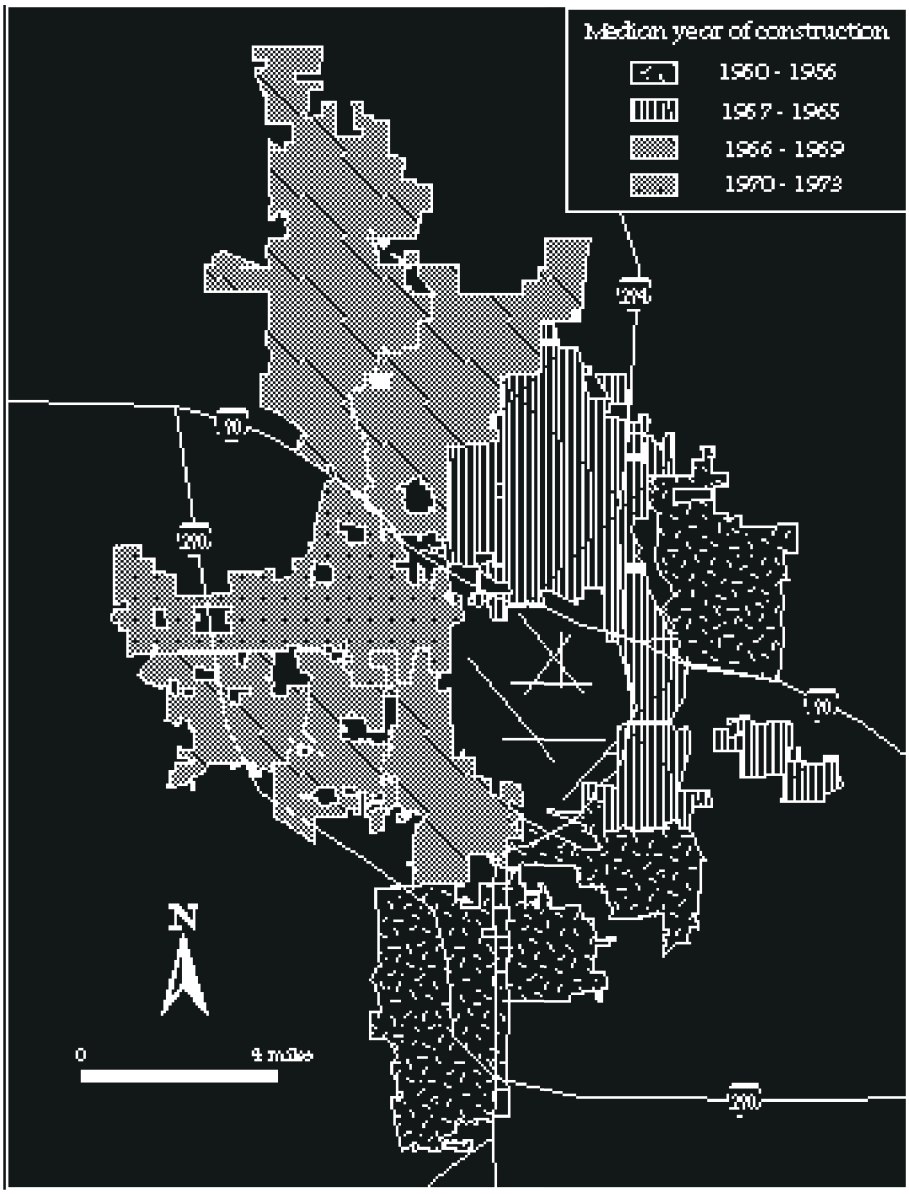

Fig. 11. Median age of housing construction, all study area municipalities

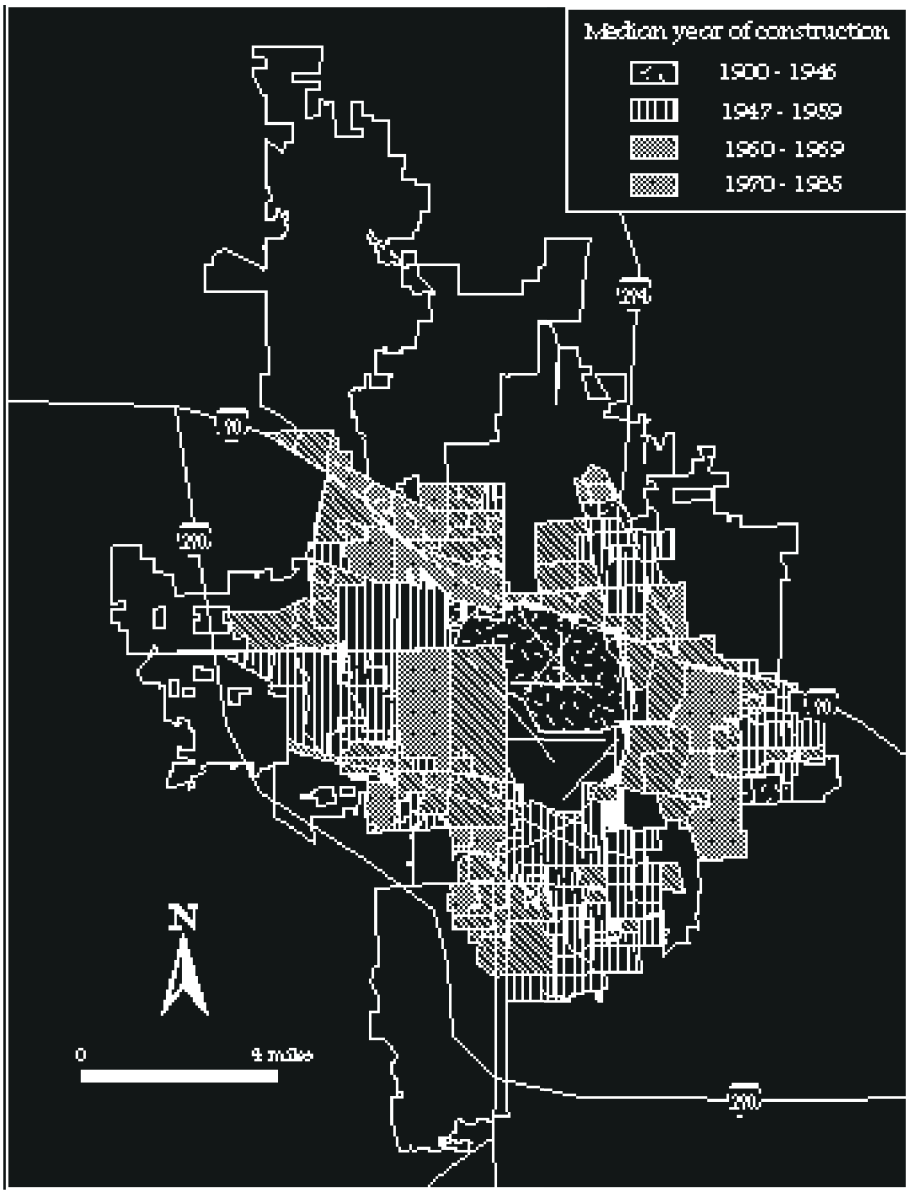

Fig. 12. Median age of housing construction, block groups inside 65 DNL

In order to quantify the distinction between various municipalities in terms of their land use compatibility, a six-point index was developed as explained in Chapter 3. Municipalities with a higher score are those whose land uses are more compatible with airport operations, meaning their residential development is concentrated outside the 65 DNL. Figure 13 shows the index results.

With the exception of the two northwesternmost municipalities (Arlington Heights and Mount Prospect), land use compatibility seems to be correlated quite simply with distance from downtown Chicago, or in other words, with time of development. As described above, the southeasternmost towns were largely built up by the time airport noise became a problem, and were generally too small to take the airport into account in land use planning. Those to the north and south are railroad suburbs that grew towards the airport over time, which is why Arlington Heights and Mount Prospect are penalized for a large percentage of their airport-incompatible development happening since 1970. The towns to the west were small when the airport arrived, and have been the best able to keep residential land uses away from the noise contours.

These results correlate with interview data, where only one municipality (Elk Grove Village) agreed that there had ever been citywide land use planning with regards to the airport. Only one other municipality (Arlington Heights) indicated that a specific development had not received approval because of its location in a flight path. Officials in a number of places stated they were already built out or at least had their land use patterns set in place by the time the airport started to grow, as shown in Table 4. Municipalities north of the airport, along I-90, noted that market forces drove the location of office and industrial development in the areas closest to the airport rather than any deliberate planning on their part. Respondents therefore verified McAdams' findings for Milwaukee that other factors such as interstate access and lower taxes may be more important than airport access in attracting firms to the area.

A number of municipalities expressed the view that true land use compatibility was not possible, for two reasons. First, all but one of the municipalities has a median housing date prior to 1970, when the current runway layout was implemented. Redeveloping the land inside the noise contours would be prohibitively expensive for most of these places due to the large number of homes involved. Secondly, the municipalities are sometimes too small in size to keep all of their residential development strictly compatible. All of Rosemont is inside the 1997 65 DNL, as well as most of Northlake and Franklin Park. A few interviewees noted that current development or redevelopment plans are on hold while the airport expansion debate is underway. Because the time scale of municipal development is generally faster than that of airport development, these places are being forced to either postpone their planning or risk that they are building in what will in the future be an incompatible area. Chapter 7 explores this in more detail.

Other interviewee comments on the history of land use in the area were contradictory, in part because of the different situations of the places involved. One wealthy suburb's mayor worried about a loss in property values due to airport noise, while city staff in a nearby working-class suburb noted that its housing values have probably stayed *higher* because of its location next to the airport. Other interviewees noted that the negative

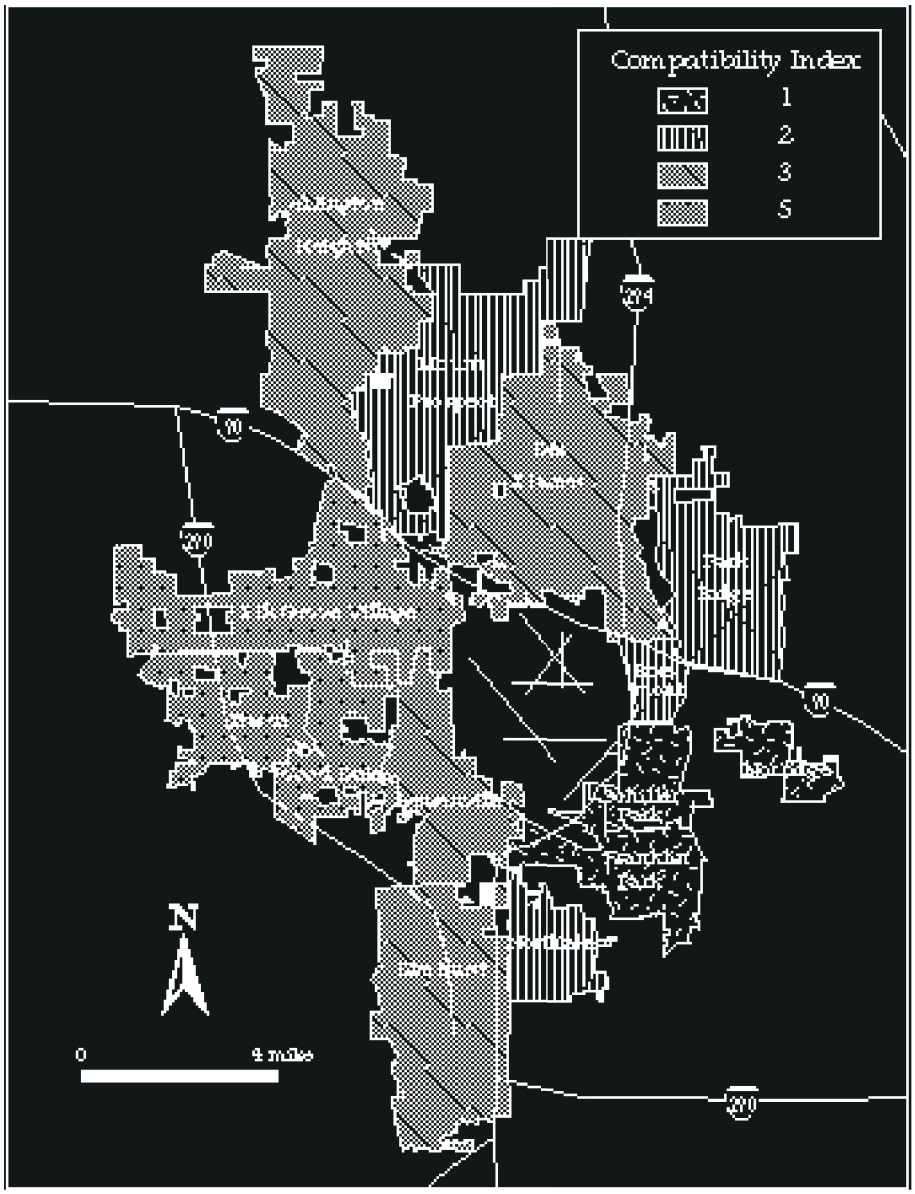

Fig. 13. Land use compatibility index for O'Hare-area municipalities

effects of the airport at least contribute towards the presence of affordable housing for airport workers, which is relatively rare in this part of the metropolitan area. There were also differing opinions on which municipalities could say, "we were here first." Places to the east and south noted that they were built out prior to the airport's growth, in contrast to the airport's western and southern neighbors, while those places to the west and south claimed they were already in place when the airport began to grow. Both are right to some extent; as shown above, the municipalities to the west and south already existed as railroad suburbs, but there was still a large amount of vacant land in what were to become the flight paths.

Finally, conflicts exist at the individual level. Two different city planners noted that their professional opinions were not taken into account by elected officials when it came to approving certain development in incompatible areas. One said, "[We have] never acknowledged the airport really [...] I think this is the way the city has dealt with Chicago and the airport, is to look at it as a problem and not to acknowledge that it's--not that it's not there, but it's kind of that it's this big -- *sore* at the end of the town." Because I am focusing on the municipality as the principal actor in land use planning, the data generally show the municipality's final, official position without investigating any such internal debates that may have taken place. Furthermore, because only one interview was conducted in most municipalities, it is impossible to determine how widespread these internal conflicts are.

Other internal conflicts involve the responsibility that the municipality has to current vs. to future citizens concerning notification. Representatives from two municipalities argued that it is the responsibility of citizens to know what the neighborhood is like before they move in. "And I always seem to want to go back to, were you asleep when you bought this house? Were you not aware of the fact that within 10 miles of your home there was an airport?[…] that's lack of planning on *your* part." At the same time, a number of municipalities noted they are not willing to require notification of potential buyers of the airport's presence because of its potential effect on property values. The O'Hare Noise Compatibility Commission is working on a model ordinance that would require buyers of *new* residential development to be informed of their location in a noise zone and would require soundproofing as part of construction. Chicago will be the first city to implement the ordinance, with others waiting until its success can be shown. Until then, as one interviewee said, "We don't have guidelines at this point, we're trusting that people *know* they're in line with the runway."

Interviewees largely agreed with the statement that as a municipality they were forced to react to Chicago's decisions, and that the changing runway layout hindered in their own land use planning. While airport-municipality relations and the politics of scale will be explored in more detail in Chapters 7 and 8, there are a number of pertinent comments here:

> "'How much influence do we have?' None. None […] in the state of Illinois Chicago has the right to take land without your approval. So they could just come in and say we're going to build an airport, we're going to take this chunk of land right here, and what recourse do we have?"

> "We do feel that it's primarily reactive. We do feel that our rights get trampled on with regularity."
>
> "I don't think that O'Hare was ever treated as a growing entity, it always was looked at as *existing* […] I think that we pretty much have municipal, local control over how we're developed, but I think that how O'Hare is going to affect those towns is sometimes out of the town's hands. Because there are bigger issues, there are bigger regional issues, state issues, and, when you look at it at the larger scale [as] a decision maker, they're not going to worry about, I think it's several hundred homes that look to be demolished."

These comments suggest that municipalities are frustrated by the constraints placed on their land use planning not only by the airport's existence, but by its plans for future growth. Despite the planning that municipalities may do to keep their land uses compatible, as the first speaker notes, the city of Chicago does have the authority to condemn land in other cities because it operates O'Hare.

Land use compatibility and municipal politics

For the most part, those municipalities that scored highest on the land use compatibility index are the same ones who are most vehemently anti-airport, particularly with regards to the proposed expansion. To some extent, this is understandable; these are the places that have done as much as any municipality has to keep residential development out of flight paths, and with the proposed new runways, that planning will be negated. On the other hand, one would expect the older municipalities, who have not been able to be proactive with regards to land use compatibility planning, to be less likely to cooperate with the city of Chicago because it is the growth of the airport that is largely responsible for their current incompatibilities.

As mentioned in the previous section, there are two main organizations for municipalities around O'Hare. The Suburban O'Hare Commission (SOC) consists of suburbs that are opposed to expansion at O'Hare and feel they are unable to work with Chicago on airport issues. The O'Hare Noise Compatibility Commission (ONCC) is a group of municipalities that work with Chicago on increasing noise compatibility in the area, including allocating soundproofing funds as well as reducing noise at the source. Though SOC does not allow its member municipalities to join ONCC, it is oversimplifying to consider SOC anti-airport and ONCC pro-airport. ONCC members' positions on expansion at the airport are separate from their cooperation on noise issues, and indeed, one third of the ONCC municipalities that were interviewed officially oppose O'Hare expansion. Many of these municipalities are also former members of SOC who quit because they felt their municipal dues were not being well-spent, and that some co-operation with O'Hare on the soundproofing program was desirable.

There is a clear division between the two organizations in terms of their attitudes towards O'Hare and the city of Chicago, a division that correlates negatively with members' score on the land use compatibility index. The mean score of SOC municipalities is 3.3, while the mean for ONCC members is 2.0. This suggests that factors other than land use compatibility determine the willingness of municipalities to cooperate with the airport.

The most important of these factors is the political geography of the area. The city-suburb split is clearly manifested between the two airport organizations, with SOC members more strongly Republican. Elmhurst in particular was home in 2002 to the former state Speaker of the House, the current President of the Senate, the state attorney general (all Republicans), and the state chairman of the Republican Party [118]. SOC members also have wealthier residents, who tend to be more politically active. In 1990 median income for the SOC municipalities in the study area was $45,779, while for the ONCC municipalities it was only $35,766.

Perceived economic benefit is not as clear an indicator in determining municipal attitudes towards O'Hare. On one hand, the less-wealthy ONCC municipalities rely more on the airport for jobs for their residents and for economic development in general, and thus are less willing to speak out against the airport. On the other hand, most SOC interviewees emphasized the importance of the airport to their municipal economies and that they are opposed to expansion, not the existence of the airport. They pointed out that they support a third airport in part because of the hypothesis that the economic development that O'Hare fueled in the northwest metro area will be replicated in the south metro if a new airport is built in that direction. The South Side of Chicago and southern suburbs have traditionally been working-class, African-American neighborhoods and municipalities that are among the poorest in the metro area.

Conclusion

There is no doubt that O'Hare plays an important role in the nation's air transportation system. Because it is a hub for two of the largest airlines, capacity issues are particularly critical. O'Hare's hub status also means those airlines have a significant amount of influence over local business and political leaders in determining how that capacity is provided. It is easiest and cheapest for the airlines to simply add flights to their existing base of operations, rather than move flights to another facility, whether a new airport or regional facilities in Gary, Rockford, or Milwaukee. The airlines have been able to use national political clout to help the airport operator, the city of Chicago, influence the passage of federal legislation that would mandate the expansion of the existing airport, with little consideration as to its effects on surrounding municipalities. Reductions in the number of flights after September 11, 2001, on the part of American and United have reduced delays considerably, and United's potential bankruptcy has reduced its willingness to provide financial support. However, both airlines and the city still support the O'Hare expansion plan and concomitant legislation.

The airport-neighbor relationship around O'Hare is particularly difficult because it is also the city-suburb relationship. For older, working-class suburbs, allegiance to Chicago is the norm despite the large percentage of residents affected by noise. For newer, richer suburbs, opposition to the city is expected, even if the percentage of residents within the noise zones is relatively small. As shown in this chapter, neither land use compatibility nor economic development are clear indicators of municipal political views regarding O'Hare. There are two possible explanations. City-suburb politics might override all other issues, so that co-operation on airport issues is not possible because of other conflicts. Interviews indicate the reverse is true as well, as one city manager noted: "It affects other day-to-day non-airport related interactions as well. I mean, we do border the

city of Chicago, and having conversations about simple things like stormwater and other unrelated things becomes very difficult; we often have to rely on intermediaries because it has created a situation where the two parties really talk together very seldom, if ever."

Another explanation is that municipalities do not feel they and their residents receive benefits from the airport's presence in proportion to the negative effects they feel. When asked point-blank about such a balance, none of the O'Hare municipalities said it was all negative. They acknowledged economic benefits in terms of jobs and tax dollars. However, many also pointed out that even the soundproofing program, the most direct way for users of the airport compensating residents for the negative effects they produce by flying, is not enough to make up for the damage to quality of life brought about by O'Hare's presence. Furthermore, current FAA standards for determining what level of noise "affects" residents are not sufficient, as noted by residents who complain to the ONCC, their municipal governments, and to O'Hare directly. While this study used the accepted definition of the 65 DNL as the demarcation for where residential land use is and is not appropriate, it is important to remember that there are still incompatibilities beyond that line.

Based on the history of development, the question of land use compatibility around O'Hare has more to do with geography than with planning. Many municipalities are small enough that the only way to keep residential development out of the noise zones would be to eliminate most of their town's population, such as Rosemont or Schiller Park. In other places, market forces and the history of development played more of a role than did planning in determining land use patterns, as with Arlington Heights and Mount Prospect. Finally, the planning that *was* done in other places has been overridden by new runways, as in Bensenville, or is threatened by proposed expansion, as in Elk Grove Village. The scale that a regional facility such as an airport operates at (both in terms of time and physical size) is so much larger than that of an individual municipality that it is impossible for municipalities to adjust their existing and planned land uses to keep them compatible. While the municipalities around O'Hare certainly could have improved their planning (recall the thousands of new housing units built in the flight paths after the introduction of jet aircraft), they are not solely responsible for creating and maintaining land use compatibility. As Major General George said in 1943, "How important will be the position which this great city will take in the air transportation of the future depends upon the vision of its people, on their ability to see what lies just over the horizon" [*ibid.*, p. 30]. Ironically, it is not Chicago's ability to see over the horizon that is the problem, but its inability to see into its own backyard.

CHAPTER 5

MINNEAPOLIS-ST. PAUL AND ECONOMIC DEVELOPMENT

> "High-quality air transportation services to major domestic and international markets is essential for an urban area wishing to compete and grow. As the Twin Cities area economy becomes increasingly more global in nature, the need for extensive air connections, along with backup facilities and an operational structure to support them, becomes an ever more critical item" [119].
>
> "A changing landscape of noise contours is detrimental to the long-range land use planning efforts by the City, past and future, and undermines planning appropriately for neighborhoods" (City Council member Sandra Krebsbach, Mendota Heights, MN, 2002, [121]).

The main conflict over air transportation between actors at global and local scales has to do with the scalar imbalance of the positive and negative effects. The airport is a vital piece of infrastructure, connecting the Twin Cities to the larger economy and providing economic development benefits for the entire region and/or state. What is not always seen are the local impacts, the ways in which municipalities are restricted from doing their job of serving their citizens' interests, and the ways in which economic benefits and environmental effects are spatially distributed.

As the operator of the Minneapolis-St. Paul International Airport (MSP), the Metropolitan Airports Commission (MAC) went through a dual-track planning process in the mid-1990s to decide whether a new airport should be built or the existing facility expanded. The decision was made in 1996 to expand the current airport with an additional runway and an enlarged terminal, and construction was scheduled to be completed in 2004. The regional economic impact was one of the most important factors in debating the dual options, where the "region" meant anything from the seven-county metropolitan area to the four-state Upper Midwest. The spatial distribution of regional economic impacts, however, was not addressed, including if there were economic benefits to places that would feel the negative effects of expansion.

Neighboring municipalities, all of which benefit to some extent from the airport, were not officially opposed to the expansion, though most of them preferred that a new facility be built. The seven study-area municipalities (those with at least some land area inside the 65 DNL noise contour) are being affected by expansion in different ways depending on their individual situations: Minneapolis, St. Paul, and Mendota Heights by overall increases or decreases in noise, Richfield and Bloomington by redevelopment, Eagan by shifts of noise to areas that were previously unaffected, and Inver Grove Heights by development pressures that may in the future conflict with airport operations (Figure 14). Each of these municipalities has been able to plan its land uses in accordance with the airport to some extent, but the changing layout of the airport may negate some of that planning. Each municipality receives different benefits and pays different costs due to MSP's presence.

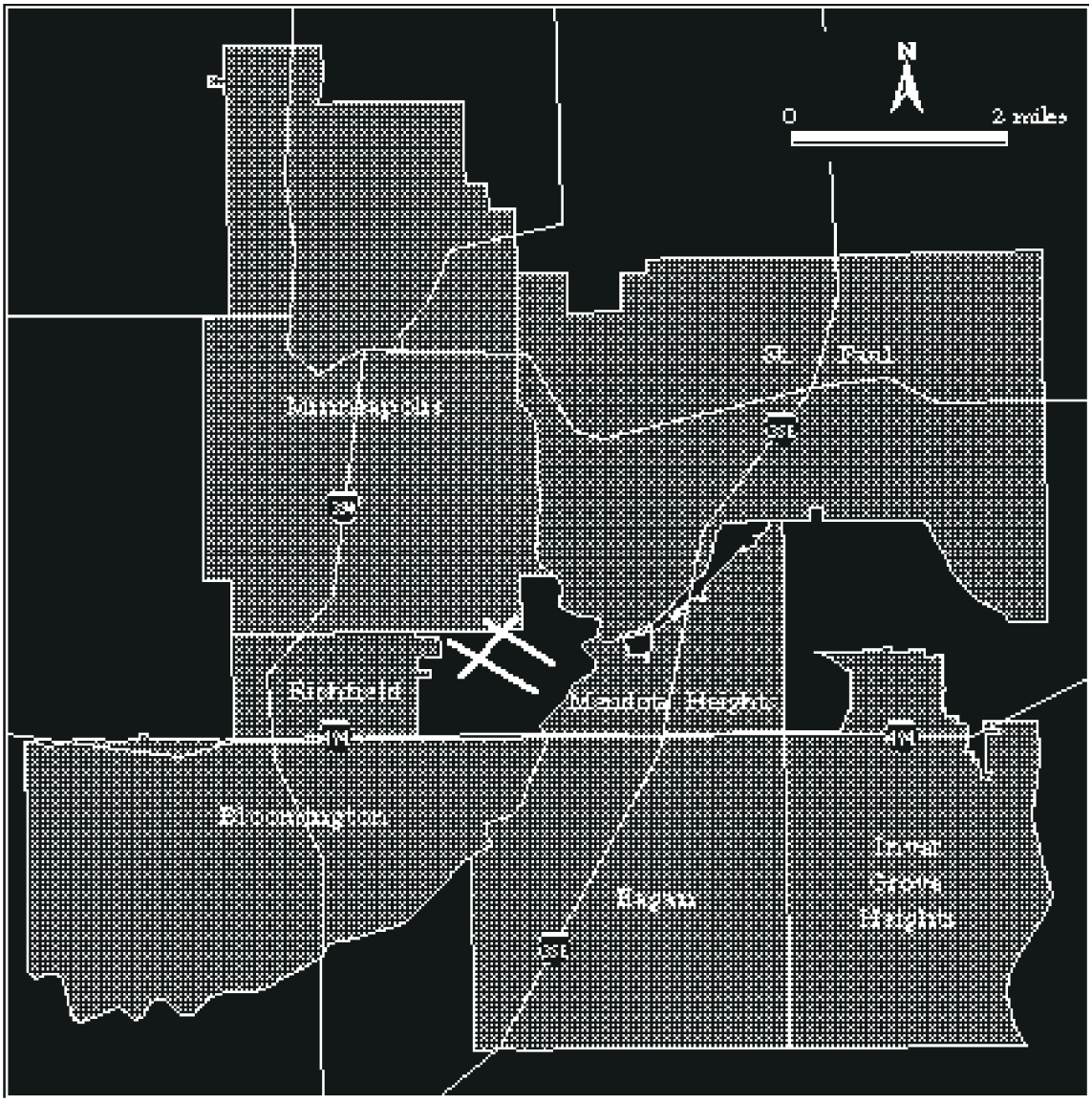

Fig. 14. Minneapolis-St. Paul International Airport and study area municipalities

This chapter has four sections. The first outlines the history of MSP, including its system of governance, its relationship with Northwest Airlines, and the current expansion plan. The second section analyzes the economic development impacts of the airport, both direct and indirect, in order to determine where they are located. This section also describes the land uses around the airport by municipality. This is followed by a section discussing the implications for the study area municipalities of the current pattern of land use, and a final section that considers the effects the expansion plan will have on land use in the seven municipalities. The main goal of this chapter is to determine where the economic benefits of MSP are located, if they are in balance with the negative environmental impacts of the airport, and if the "regional" economic impact is spread throughout the region or simply concentrated in a few places.

History of Minneapolis-St. Paul International Airport

There are two main factors in the history of MSP that set it apart from the other two case studies: governance by the Metropolitan Airports Commission (MAC), and the dominating presence of a single airline: Northwest. The MAC has controlled the airfield since 1943, and its board of geographically representative commissioners allows for regional and even statewide input in running the airport. At the same time, because most MAC commissioners come from the metropolitan area, there is greater opportunity for input on the part of communities most strongly affected by the airport than at most U.S. airports. Secondly, because of its strong presence at MSP, Northwest has exerted major influence over airport planning to meet its own needs. This influence was shown with the outcome of the dual-track planning process in the 1980s and 1990s. For example, during the build/expand debate, the role of MSP as one of Northwest Airlines' hubs meant that air traffic growth itself could not be questioned, for if MSP was unwilling to expand to meet Northwest's demands, the airline would shift flights elsewhere.

MSP history

In 1819, Fort Snelling was established on a bluff above the confluence of the Mississippi and Minnesota Rivers, about seven miles from both Minneapolis and St. Paul. As time went on, the fort was no longer necessary to protect settlers, and the land was used firstfor a racetrack and then by 1920 was an airfield [122]. By 1928, the Minneapolis Park Board was running the Minneapolis Municipal Airport, with commercial service beginning in 1929. The current three-runway configuration was in place by 1938, though the runways were only 3,000 feet long.

Each of the Twin Cities was operating its own airport when the state decided in 1943 that one airport was needed for the entire metropolitan region, and that it should be managed by an independent agency. The Fort Snelling site was chosen because it was roughly equidistant from both downtowns, and unlike a similar site on the north side of the metropolitan area, it was already a commercial airport. In 1950, the airport expanded westward to Cedar Ave., taking land from the city of Richfield. Richfield was then able to get state legislation passed prohibiting any further westward expansion [123]. By 1968, MSP needed to be expanded to accommodate jet aircraft. Studies examined the north and south sides of the metropolitan area for a new airport, at the same time that the lengthening of the north parallel runway was debated. Opposition to relocating the airport on the part of the airlines and north side residents led to the lengthening of the

runway instead, just ahead of the National Environmental Policy Act and its requirement for environmental impact statements [124].

The next major change to come to MSP was deregulation of the airline industry. The effects of deregulation were felt in the Twin Cities beginning in the mid-1980s. MSP became a hub for both Republic and Northwest Airlines, and traffic increased steadily. In 1985, when the two airlines merged, the resulting increase in traffic and noise caused citizens' complaints to increase dramatically. State legislation in 1987 required the Metropolitan Council to conduct a thirty-year evaluation of airport capacity and the MAC to prepare a ten-year development plan for MSP (1989 Ch. 279). The Metropolitan Council's Adequacy Study Task Force decided on a dual-track planning process, which was then codified into state law. One track would examine the impacts of expanding MSP by adding another runway, while the other track would determine the site and design for a new airport. This process (described in greater detail below) led to the choice by the governor and the legislature to expand MSP with a new north-south runway.

MSP has been one of the most progressive airports in the country in terms of noise mitigation ever since the jet era began. In 1969, the Metropolitan Area Sound Abatement Council (MASAC) was established to bring together airlines, airport officials, and community members to discuss airport issues. Though funded by the MAC and Northwest, MASAC was a separate organization that met monthly to review data on flight operations and make recommendations to the MAC regarding airport noise. MASAC was considered to be one of the most successful airport-community groups in the country for two reasons: the three perspectives of airlines, the airport, and citizens were represented, and a certain level of trust and dialogue existed among them. Unfortunately, the airline members withdrew from MASAC in 2001, largely because of conflicts with municipalities over land use planning. A new version of MASAC, with fewer members (there had been 38) and sub-groups devoted to technical advice and community input, was in the process of being formed in 2002 [125]. Besides MASAC, the airport has championed mitigation measures to a greater extent than most other U.S. airports. For example, MSP was the first in the country to use a preferential runway system, sending flights over areas with more compatible land uses when weather permits. The MAC has also backed the most extensive soundproofing program in the country. Over 6,000 houses have been soundproofed at an average cost of $26,800 per unit, though in recent years costs have risen to $43,900 per unit as larger and more expensive houses are soundproofed [122]. In contrast, similar programs near O'Hare cost $33,000 per single-family house [126], while those in Boston average $25,000 per unit, single- and multi-family combined [36]. Since 1993, a permanent noise monitoring system has used microphones set up in neighborhoods adjacent to the airport to provide hard data on noise. These data have been used to determine the accuracy of the noise contours, as well as help the MAC determine whether changes in operations have been successful in reducing the noise levels experienced by residents.

MSP governance

MSP's system of governance is unique in this country: not a city or port authority, but a geographically representative, governor-appointed state authority. When the airport was

established by state legislation in 1943, the Metropolitan Airports Commission was instituted as the first independent airport authority in the country, though today approximately half of all major airports are run by some type of authority. As an independent agency, it reports directly to the legislature and the governor. Besides MSP, the MAC also operates six general aviation and reliever airports in the metro area, the largest such system in the country [128].

The MAC was originally composed of the mayors of Minneapolis and St. Paul (or their representative); one member of each of those two city councils; one member of the Minneapolis Park Board, as part-owner of airport land; one citizen from each of the two cities, one resident each from the other six counties in the seven-county metropolitan area; and a chair appointed by the governor. In 1975, membership was expanded to take into account the six reliever airports. By 1989, an additional four commissioners had been added to represent the rest of the state in order to achieve statewide representation during the dual-track planning process: two from local units of government with commercial air service, and two from places with general aviation airports. MSP is thus one of few major airports in the country to have some form of statewide representation on its governing board.

This system of governance ensures that a number of different interests are represented directly in the MAC's decision-making process while providing an internal system of checks and balances. These interests include the citizens of neighborhoods affected directly by the noise and pollution of the airport, as well as businesses and travelers throughout the metropolitan area and the state who rely on MSP to connect them to the international air transportation system. Both commissioners and MAC staff note that commissioners do not function as strict representatives of their particular geographical area: "[T]hey tend to look at the best interests of aviation as an entity. And there is not as much parochial discussion as one might expect, given where these folks come from" [128] However, because the majority of commission members represent interests at some sort of regional scale, the interests of local communities are often subordinated. For example, when the MAC's Planning and Environment Committee voted in June 2001 not to extend full soundproofing for houses past the 65 DNL, the three commissioners from affected municipalities were outvoted by the four commissioners from cities who have few (if any) residents affected by noise.

The MAC is an independent agency, and it is not funded by state or local taxes, though municipalities did provide some of the land for the initial airport, and the state backs bonds that the MAC issues. Though the commission does have the authority to levy property taxes, it has never used that authority. User fees from the seven airports account for the MAC's revenue, including landing fees, parking fees, rents, and concessions. In 2000, this revenue totaled $150 million. Revenues declined sharply after September 11, 2001, forcing budget cuts that include reductions in the planned soundproofing program, as well as delaying improvements at reliever airports and the construction of the new MSP runway by a year [127].

MSP and Northwest Airlines

Cox has pointed out that one of the arguments against the "footloose company" as a hallmark of globalization is that even companies with a worldwide reach can be quite

locally dependent [129]. Northwest Airlines is a prime example of this argument. MSP's close connections with Northwest Airlines extend back to 1926, when Northwest Airways won a contract from the federal government to carry airmail between the Twin Cities and Chicago. In 1927, Northwest started commercial service on that same route, with stops in La Crosse, Madison, and Milwaukee. The Twin Cities-Chicago route still carries the most passengers of any of Northwest's routes from MSP, confirming Taaffe's thesis about the persistence of early airport city hierarchies [8]. Additionally, Northwest's headquarters are located in Eagan, just east of the airport.

As its name implies, Northwest Airlines had a strong orientation towards the northwestern U.S. from the beginning, with airmail contracts to the Twin Cities and later Seattle. This geographical orientation led to half of its fleet being commandeered in WWII for operations on the West Coast, particularly in Alaska. This in turn led to Northwest's service to Asia, starting in 1947 with Tokyo, Seoul, Shanghai, and Manila and its renaming to Northwest Orient Airlines (the name switched back in 1988). In fact, it was not until 1979, after deregulation, that Northwest had any service to Europe.

Because Northwest began in Minneapolis, that has historically been its strongest hub, even more so after deregulation. In 2002, for example, 76.5 percent of all MSP operations were from Northwest [122]. However, the airline's acquisition of Republic in 1986 gave it another hub at Detroit. The airline's international hub operations have been shifted there since, particularly since the opening of a new terminal in 2002. MSP has thus become the secondary hub in Northwest's three-hub domestic system. Detroit is the predominant airport in the system, particularly for connections to international flights. MSP serves as a directional hub, linking east-west connecting flights and providing regional service to the Upper Midwest, comparable to Denver's role for United or Salt Lake City's role for Delta. Memphis serves as a regional hub for the southeastern U.S. The MAC keeps in close contact with the other two airports because of their common interests in the fate of Northwest, as well as their competition for Northwest flights.

A number of interviewees described the airport's relationship with Northwest as "love-hate." One commissioner said that "they feel that they are under-appreciated in this community, and everybody's criticizing them all the time, and yet look at all they do for the community, and all the money they put in, and all the jobs, and blah blah blah, all of which is true! And why are they under-appreciated? Well, maybe it's their attitude." "Northwest really is the 800-pound gorilla, there's no doubt about that," noted another MAC representative. The symbiotic relationship between Northwest and the MAC is an example of the public-private connections that make the airline industry unique. Northwest relies on the MAC to provide the infrastructure that it needs, including runways, terminals, and gates. At the same time, Northwest is able to threaten the MAC and the state by proposing to move operations or even its headquarters to another metropolitan area if that infrastructure is not provided in a manner that Northwest finds satisfactory. This is apparent in the story of the current expansion program at MSP, known as the 2010 Plan.

Recent airport expansion

Because the operator of MSP is directly responsible to the Minnesota Legislature, questions of airport expansion are debated at the state level, which is unusual for a major

U.S. airport. The MAC has the authority to construct a new major airport, as long as it is as equidistant as possible from both Minneapolis and St. Paul, and provided that the Legislature authorizes it to acquire the necessary land. In 1987, the Legislature called for a capacity study of MSP. When the results showed that the airport would be reaching its capacity within a few years, the Legislature set up a dual-track planning process to examine the two potential futures of airport facilities in the Twin Cities. One task force would plan the expansion of the existing airport, while the other would select a site for a new airport and plan the new facility. A second major airport for the Twin Cities was not considered because of the relatively small size of the metropolitan area, as well as the predominance of Northwest Airlines. The smallest metro area with two airports, Miami-Ft. Lauderdale, has nearly 25 percent more people than Minneapolis-St. Paul and is the major U.S. gateway for Latin America [120]. Additionally, as with other metropolitan areas such as St. Louis or Atlanta, a second airport would be unlikely to succeed because of the fortress hub at MSP. By April 1, 1996, the dual-track process was to conclude and the results of the overall studies were to be presented to the legislature.

As would be expected, residents of the municipalities nearest the airport were generally in favor of a new facility. Environmental organizations such as the Sierra Club, however, opposed a new facility on the grounds that it would pave over farmland and encourage sprawl in the southeast metro area. Many businesses also favored maintaining the existing airfield. Northwest in particular threatened to move its headquarters from Eagan to its Detroit hub, with up to 10,000 jobs, should the airport move [130]. Others encouraged the building of a new "world-class" airport as Denver was doing, to accommodate capacity for decades.

The search team charged with finding the site for a new airport chose one in southeastern Dakota County, twenty miles south of St. Paul and twenty-five miles southeast of Minneapolis. This geographic sector was the slowest to develop in the Twin Cities, partly because of its location south of the Mississippi and Minnesota Rivers, and partly because of the existence of MSP itself. This location was therefore ideal for an airport in terms of allowing relatively easy access from the metro area as a whole. Another part of the dual-track process was deciding what to do with the existing airport, as it would be closed to aviation. The task force on the reuse issue advocated a long-term mixed-use plan that would have no aviation activities, with particular attention paid to the open space opportunities for the site because of its location on the river bluffs.

The team that was examining the expansion of MSP considered numerous ways to fit a new runway into the airport's footprint. Bounded by the Minnesota River to the south and east, forbidden by state law to expand to the west, and bounded to the north by Minneapolis (fiercely protective of its residential neighborhoods), the airport was physically restricted. A third parallel runway was considered, either to the south of the existing two (discarded because the proximity of Fort Snelling National Cemetery), or to the north. This third parallel was strongly opposed by Minneapolis, which would have lost hundreds of homes to the runway and had hundreds more exposed to noise. It was also opposed by Mendota Heights, where the runway would have pointed right over the parts of town that had been planned as residential because there was no issue with airport compatibility at the time. Though the airlines favored the third parallel, they did not get

their way. The new runway would run north-south along the western edge of airport property, still enabling the simultaneous use of three runways and thus increasing capacity by 25 percent [131].

Before the committees' work could be completed, the governor asked the Legislature to step in and end the dual-track process, with the existing airport to be expanded. This overriding of the planning process made the municipalities nearest the airport bitter that the process had not been carried out to its full extent. Furthermore, these municipalities were angry that the Legislature took control of the decisionmaking power while accepting little to no responsibility for that power in terms of providing state funds for additional soundproofing or other mitigation. It seems likely, however, that expansion of MSP would have been the preferred option anyway, given the cost of a new facility and the estimates that a new runway could meet demand until at least 2020. Two factors were part of this assessment: first, Denver's new airport opened in 1995, and was instantly a failure in terms of being on time and on budget. (Since Denver went through its decision-making process only a few years ahead of MSP, it had been closely watched throughout the dual-track process.) Secondly, the flexibility of expanding MSP was appealing; if demand for air traffic dropped, or budgetary constraints suddenly appeared (both of which happened as a result of the 2001 economic downturn and 9/11), it would be possible to delay parts of the project more easily than with construction of a new facility. Northwest's insistence that it would move its headquarters with its 10,000 jobs to Detroit probably played a role as well.

Governor Carlson pressured the state to pass legislation that forbade the MAC from not only building a new airport, but from acquiring land for one in the future, and forbade the Met Council from asking local governments in Dakota County to keep their zoning and land use compatible with a potential future airport. Although the original expansion plan had included a new terminal on the west side of the airport, this law required further legislative approval for the MAC to build it. Furthermore, before a third parallel runway could be built, approval of all affected cities would be required (in other words, Minneapolis and Mendota Heights, which would be unlikely to give such approval) [132]. The law also allowed for more funding for noise abatement, including tax relief for affected housing, and the extension of soundproofing past the 65 to the 60 DNL. However, after one year, the tax relief was repealed. In addition, in late 2000, the MAC raised the question of whether the Legislature had meant to extend full soundproofing past the 60 DNL, or just a few improvements such as air conditioning. After over a year of public debate, the MAC decided to use the budget that it had to extend full soundproofing as far as it could, to the 63 DNL in full and with limited improvements out to the 60 DNL [122]. Finally, the law required a yearly report comparing operations and delays at MSP to those at Wayne County Metropolitan Airport in Detroit, reflecting the competition between these two Northwest hubs.

Besides terminal and roadway improvements (nearly complete as of July 2002), the expansion consists of the construction of a new runway and the extension of the crosswind runway, currently the airport's longest. The extension of this runway is meant to enable Northwest Airlines to send fully loaded aircraft non-stop to Hong Kong and other points in Asia; currently, its non-stop flights to Asia must fly under capacity

because of weight restrictions due to runway length. Additional deicing pads are being installed along with a drainage system that will enable the recycling of de-icing fluid rather than letting it drain into the Minnesota and Mississippi Rivers. A new terminal for the northwest corner of airport property was part of the original expansion plan, but because of Minneapolis's opposition, is now off the table.

The other major part of the expansion plan is the new Runway 17-35. An agreement with the city of Minneapolis provides that takeoffs and landings will occur only to the south, over a largely non-residential area of Bloomington, as well as the Minnesota River Valley National Wildlife Refuge. About 37 percent of takeoffs and 16 percent of landings will occur on Runway 17-35, enabling a shift of flights from the two parallel runways and potentially reducing noise in Minneapolis, Mendota Heights, northern Richfield, and Eagan. However, the runway will expose new municipalities and portions of municipalities to airport noise, areas where land uses were planned in accordance with the way the runways have pointed since 1938. A later section will discuss this shift in more detail, as well as the land use impacts of this expansion plan.

Balance of economic development and environmental impacts

Throughout the expand/build debate of the 1990s, economic impact was one of the major issues. A MAC study found that the number of jobs created under each plan would be about the same, about 16,600 direct jobs and 19,600 indirect jobs [130]. For the new airport, however, those jobs probably would have consisted of a shift of existing jobs to the new site as much as they would have consisted of jobs new to the area. For expansion of the existing site, the question remains of where those jobs are located, both the ones that already exist and the ones that expansion will bring. Do they benefit the municipalities near the airport, or as has been found for Atlanta, are they concentrated in the parts of the metropolitan area that are already growing?

Chapter 2 outlined the existing literature on air transportation and economic development. There are two ways to explore the connections between the two, either by determining where the firms that use the airport are located, or by describing the land uses that are found around the airport itself. This section uses both approaches; the first a quantitative analysis that consists of mapping firms by SIC codes, and the second a qualitative analysis through interviews and direct observation. A third sub-section discusses the negative environmental impacts of MSP, particularly with regards to a balance with the economic effects.

Airport-related economic development

As previously explained, there are three types of airport-related employment that are considered in official economic impact reports: direct, indirect, and induced. Direct impacts are those directly related to air transportation, either within the sector itself, or related sectors such as hotels, car rental facilities, or airport parking. These sectors are often called "ancillary" because they are necessary to airport users but are not part of the airport itself. While such firms are likely to locate at the airport itself, they may also be found in neighboring towns, creating a characteristic landscape of parking lots and chain hotels. The willingness of a municipality to accept airport expansion is often tied to the direct economic benefits it reaps, but as will be explained below, this is not always the case.

Indirect impacts are also called forward and backward linkages: those firms that take the product of air transportation and use it as part of their own production process. As explained in Chapter 2, the presence of air service has been shown to lead to high-tech and service sector employment, both of increasing importance to economies at regional, national, and global scales. Indeed, a 1991 economic impact report prepared for the MAC noted that there are over 1,300 technology-intensive firms in the metropolitan area [133]. Indirect impacts are often assumed to be evenly distributed throughout a metropolitan area, and indeed are often lumped together with induced impacts in economic impact reports. Induced impacts are the *backward* linkages to air transportation, consisting of the retail or services firms on which direct-impact firms and workers spend money. Induced impacts are more likely to be evenly spread throughout a region because of the mobility of workers and the fact that business services are likely to be serving more than just airport firms. Indirect impacts, however, are not only more closely connected to the airport, but they are the kind of firms that are touted as being of importance to the regional economy in terms of competition with similar areas. Thus, determining where these firms are located is critical to examining the equity of economic development impacts from MSP.

The Met Council economic impact study of 1998 included a survey of 2,100 businesses in the greater Minneapolis-St. Paul metropolitan area. Of these, 81 percent indicated that they use passenger air service regularly, meaning about every other day on average. Additionally, 72 percent used cargo service regularly. These businesses estimated that 20 percent of their activity was due to the presence of scheduled commercial air service at MSP. These figures further show the importance of MSP to the regional economy; however, data were not available on the location within the metro area of the businesses who responded to the survey.

Chapter 3 described in detail the methods that were used to generate Figures 15 and 16, which demonstrate the spatial distribution of the economic impact of MSP. The first map (Figure 15) shows the distribution of target firms as a percentage of total firms, while the second (Figure 16) shows the distribution of jobs as a percentage of all jobs. The full set of maps for direct, indirect, target, and high-tech firms appears in Appendix 3.

These maps confirm the literature that indicates that the indirect economic benefits of an airport do *not* fall in the immediate vicinity (e.g., [30]). Rather, these benefits fall in the parts of the metropolitan area that are already experiencing growth; in the case of Minneapolis-St. Paul, these are the southwestern and northern suburbs. So for the most part, the communities adjacent to MSP are not receiving the economic development benefits of the airport to the same extent that some communities farther away are, showing that scalar and spatial mismatches exist between airport benefits and negatives. The exceptions are Minneapolis and Bloomington, the former because it contains firms and jobs that are airport-related in other parts of the city than those affected by airport noise. The Minneapolis City Council found that moving the airport to Dakota County would cost the city approximately $1 million in tax revenues downtown [134]. Bloomington is the only city of the seven under study that has aggressively pursued ancillary development (and is the most pro-airport of the seven as well). When

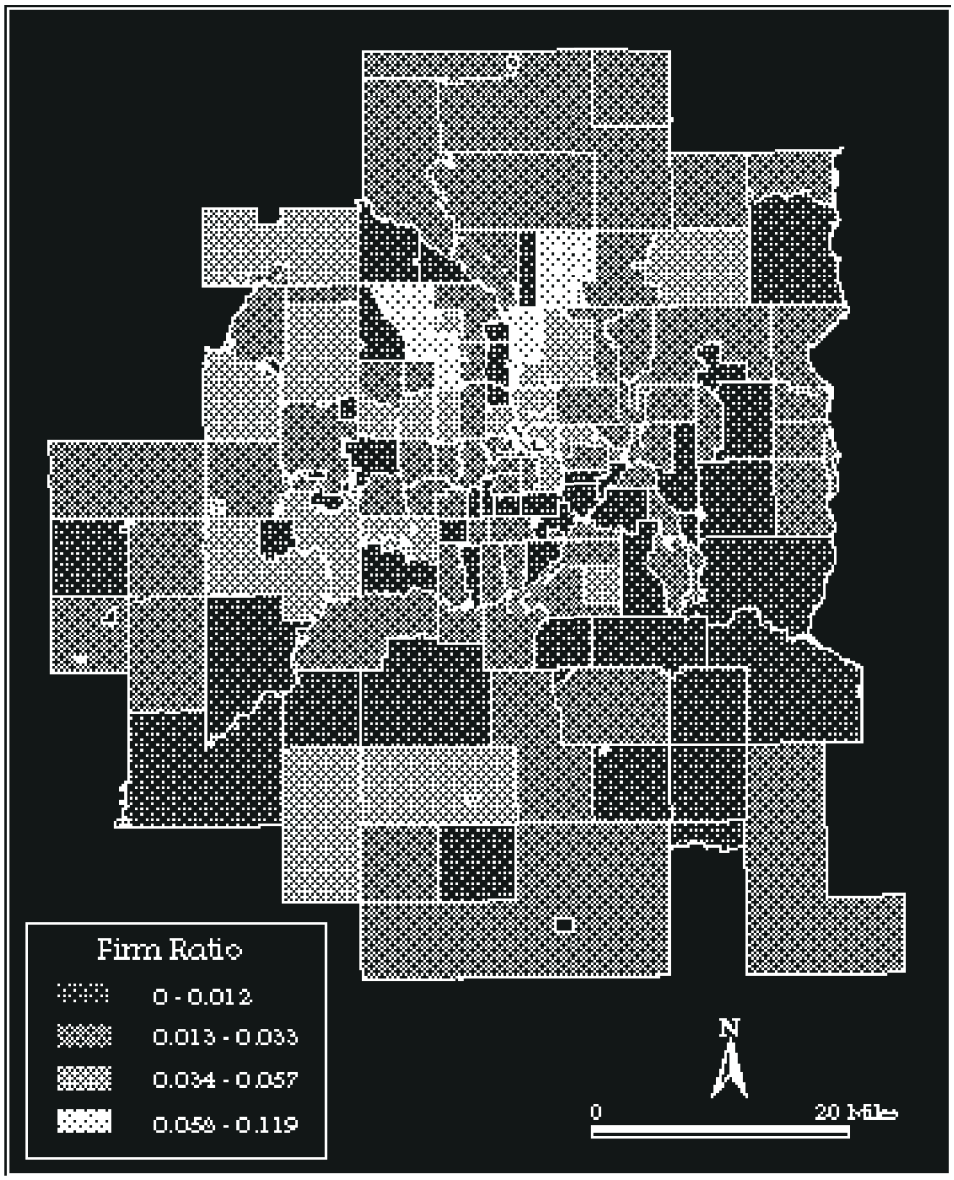

Fig. 15. Spatial distribution of the firms in target industries

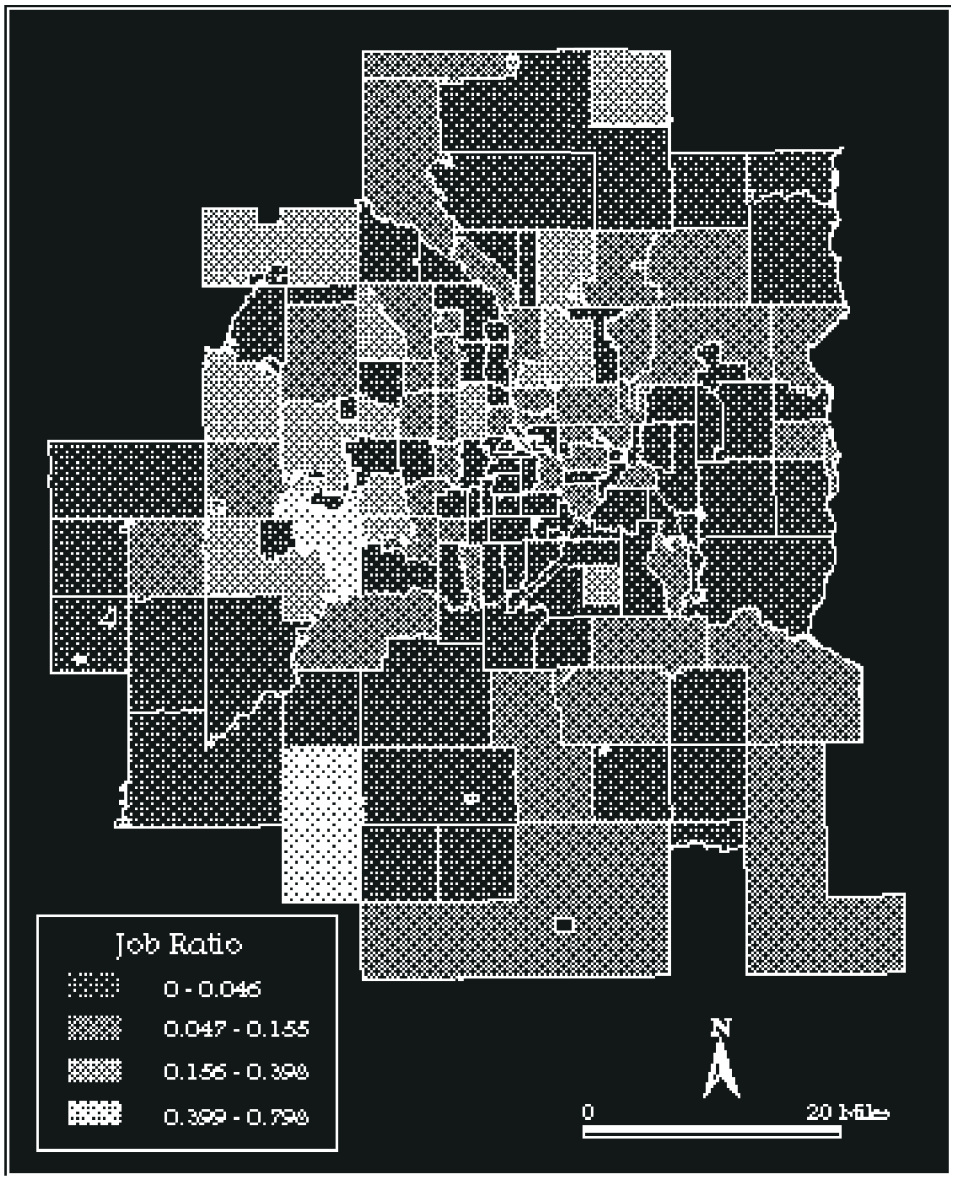

Fig. 16. Spatial distribution of jobs in target industries

interviewed, other municipalities made statements to the effect that "we don't want to become an offshoot of the airport, as far as we don't want any airport parking over here, we don't want car rental facilities here […] residents are really--feel strongly they don't want to become like an extension of the airport."

A number of interviewees also pointed out that MSP expansion will benefit farther-away municipalities simply because adjacent ones are already built out. There is little land available for new development in the airport environs, and so any new jobs and/or firms are likely to locate elsewhere, unless cities invest heavily in redevelopment. One exception is Inver Grove Heights, to the east of the study area, which has few residents affected by noise but is hopeful that its good ground access to the airport will lead to increased economic development. However, the type of development may not be what municipalities want, or it may not be what is trumpeted as being airport-related (e.g., office development). An official from Mendota Heights, immediately to the east of MSP, noted that CEOs tend to locate their companies near where they live, and they are not likely to want to live with airport noise. Additionally, high quality office space is rare in the airport environs: "the quality of office buildings and all of that is like a grade B/C, compared to the western suburbs that would be like a Grade A. You'll see that we do not have the high-grade kind of buildings at all. So the airport is not benefiting us." St. Paul echoed this comment, noting that as part of a redevelopment project immediately across the Minnesota River from MSP, "we did our market analysis […] [and] you don't have a lot of office developers saying there's a market to have an office right next to an airport." Though past research suggests that office development is drawn to the airport environs (e.g., [135]), these results suggest that such a conclusion depends on the metropolitan area under study (see [27]).

Land use near MSP

So if direct and indirect economic development are not concentrated near MSP, what land uses are located there? MSP is unusual in that approximately half of the land around it (to the north and west) was built up before the jet age, and half was developed afterwards (to the south and east). Municipalities are thus affected in very different ways based on whether they have historically been able to plan their land uses with regards to the airport or not. A short description of each municipality and its adjacent land uses follows, and Figure 17 shows the study area municipalities in relation to the airport and the estimated noise contours based on the expansion plan.

Minneapolis.

Though Minneapolis was founded in 1852, the neighborhoods nearest the airport were not settled until the 1920s. However, 85 percent of the land was developed residential, with commercial uses located along the main thoroughfares. Richfield and the airport itself form the southern border. The border of the city is paralleled about a mile to the north by Minnehaha Creek, making the area desirable for residential uses. Minneapolis has had a strict policy against home buyouts as a form of noise mitigation, supported by residents in order to preserve these high-quality neighborhoods. Incomes in this part of the city are well above average; at the same time, more residents are exposed to airport noise in Minneapolis than any other city in the metropolitan area (Figure 18). These two

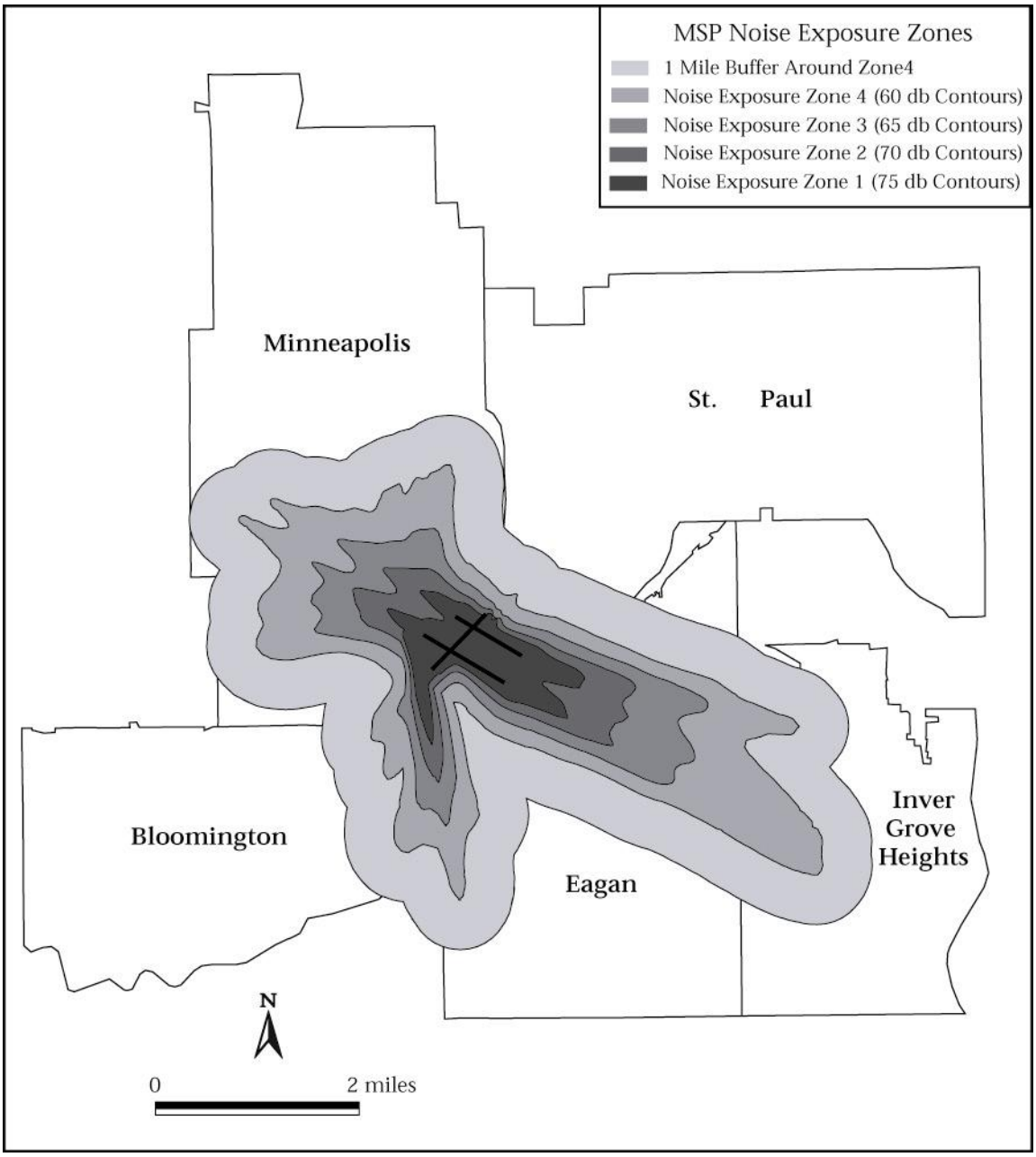

Fig. 17. MSP and study area municipalities, including estimated 2005 noise contours

Fig. 18. Sound mitigation program in South Minneapolis

factors have translated into increased political activism, one of the reasons why the MAC is one of the most responsive airport operators in the country.

St. Paul.

St. Paul is only slightly affected by airport noise. The crosswind runway points directly at the residential neighborhood of Highland Park, but is rarely used. The city is more affected by ancillary land uses because of its proximity to the airport, directly across the Mississippi River (Figure 17). This land is largely commercial and multi-family housing, though a large development of office, commercial, and condominiums is planned to take advantage of the river view and keep airport-related parking lots out of the city.

Mendota Heights.

Mendota Heights is located across the Minnesota River from the airport, with Eagan as its southern neighbor across I-494 and Inver Grove Heights as its eastern neighbor (Figure 17). A bedroom community for St. Paul, Mendota Heights has come into conflict with Eagan over what its fair share of overflights is, and what development should be allowed in noise-prone areas. Mendota Heights has grown at a slow but steady rate since its incorporation in 1956, from about 5,000 residents in 1960 to 11,434 in 2000.

Because of its late development, Mendota Heights has largely been able to keep its land uses compatible with airport operations. The noise contours cut the city roughly in half northwest-southeast, with the southwestern half consisting of mostly manufacturing and trucking/shipping industries. The other half of the city is largely residential, with some scattered commercial development. Along I-494, just across the Minnesota River from the airport, there is a small cluster of hotels.

Eagan.

Eagan is one of the largest cities in the study area, the size of a township. Incorporated as late as 1972, Eagan has been the fastest growing city in the state, from less than 1,000 residents in 1940 to 63,557 residents in 2000. It borders Mendota Heights to the north, Bloomington and the airport across the Minnesota River to the west, and Inver Grove Heights to the east (Figure 17). Because Eagan was developed relatively late, the city could put a great deal of effort into keeping zoning compatible with airport operations. Accordingly, the northern third of the city, under the flight tracks of the two parallel runways, consists almost entirely of commercial and light industrial development, including a large concentration of freight forwarders and shippers (Figure 19). The southern two-thirds of the city is largely residential. The new north-south runway is projected to send a significant amount of traffic over residential areas which have heretofore experienced little if any airport noise, thus thwarting a great deal of the city's planning (to be discussed in more detail below).

Inver Grove Heights.

Inver Grove Heights has the most undeveloped land of the study area municipalities. Located east of Eagan, it had a population of 29,751 in 2000 (Figure 17). Though the city is outside the MSP noise contours, as flights increase, there is concern that the contours will expand to include portions of the city. Additionally, there is increasing development pressure for residential uses. The city's comprehensive plan is designed to

Fig. 19. Industrial development in Eagan, MN. Aircraft is on approach to Runway 22L-4R.

match Met Council guidelines on land use compatibility with the airport, including the phasing of development that allows for adjustments in zoning if noise contours change.

Bloomington.

Bloomington is the largest of the study area suburbs, with a population of 85,172 in 2000. It borders the airport on the south, with Richfield as its other northern neighbor, and the Minnesota River to its south and east (Figure 17). The portion of Bloomington immediately south of the airport is essentially the "front door" to MSP, consisting of a great deal of commercial development. This includes the Mall of America, as well as numerous hotels, office buildings, and parking lots (Figure 20). A number of the buildings in this area will be removed because of the required safety zones for the new north-south runway. Airport noise has not traditionally been a problem in Bloomington; although the approach to Runway 4-22 extends over residential neighborhoods in the eastern portion of the city, it is not used very often.

Richfield.

Richfield is an archetypal post-WW2 bedroom community, a first-ring suburb with a population of about 34,000 (Figure 21). Bordering the airport on the west, its neighbors are Minneapolis to the north and Bloomington to the south across I-494 (Figure 17). About one-third of Richfield's land falls within the existing 65 DNL contour, and the new runway will be directly across the street from the city. Richfield's predominant land use is residential, though the southern border of the city, I-494, is lined with commercial development, including retail, hotels, and some office space. The eastern edge consists of apartment buildings and various commercial developments, many of which are in the process of being redeveloped as mitigation for the north-south runway.

Balance with environmental impacts

Identifying the location of the environmental impacts of MSP is considerably easier than the economic impacts. Figure 17 showed the DNL contours around the airport. Though not a perfect measure, these contours show the extent to which residents are considered by federal law to be negatively affected by noise; since the contours are based on flight tracks, they are an approximation of the spatial extent of exposure to air pollution as well.

As far as the contours are concerned, improvements in aircraft technology have led to reduced exposure to noise, despite increases in traffic. Based on updates to Part 150 studies, the 65 DNL has shrunk enough that the population within the contour decreased from 30,000 in 1991 to 12,000 in 2000, with an estimated 3,300 inside the contour by 2005 [136]. However, the FAA has requested that that MAC and other hub airport operators not shrink these contours so quickly, because of the potential impacts on land use planning. A revised 65 DNL, for example, could shrink so that a parcel that had previously been listed as incompatible for residential use became acceptable. Then in later years, increases in traffic could cause the area to be incompatible again. Additionally, the extent to which increased frequency of flights offsets quieter aircraft is unclear; though such an offset occurs in the noise models, it may not occur to people's perceptions. The Met Council found that Eagan and Mendota Heights residents are more disturbed by frequency of operations than noise level, while Minneapolis, Richfield, and Bloomington are the other way around.

Fig. 20. Commercial development in Bloomington, MN. MSP is in the rear of the picture.

Fig. 21. 1950s-era housing in Richfield, MN. MSP is in the rear of the picture.

On the other hand, a survey done in 1986 found that roughly equal numbers of residents were disturbed by noise level and frequency of operations within each of the six municipalities surveyed [137].

The question also remains of balance between airport users and those who suffer the environmental effects. Since MSP is a major hub, most of the passengers who fly in and out are not from the Twin Cities. In fact, just over half of the travelers at MSP are connecting to other destinations [138]. A 1998 study found that of residents in the metropolitan area, only about half use MSP [26]. In another survey, among residents in the six municipalities closest to the airport, 32 percent did not fly in the previous year, and another 30 percent only flew once [137]. Only 15 percent flew more than once a month. Additionally, only 2 percent worked at the airport, indicating that the people who benefit from airport-related jobs are not those who are adversely affected by airport operations.

An imbalance between airport users and airport neighbors could be easily solved with an increase in the PFC levied on each flight, with the extra proceeds going to additional soundproofing or home buyouts, for example. An imbalance in terms of economic development, however, is more difficult to remedy, particularly when the most obvious types of development such as park-and-fly or car rental lots are undesirable to some neighboring municipalities. Minneapolis-St. Paul is unique in the U.S. in that 40 percent of property taxes on commercial and industrial properties are redistributed throughout the metropolitan area, alleviating this imbalance to some extent [139]. However, since the redistribution is done with regards to all municipalities in the seven-county area, not on the basis of airport-related development, it does not entirely even out the balance.

As previously mentioned, the expansion of MSP is estimated to bring as many jobs to the metropolitan area as the construction of a new airport would have. However, because the municipalities adjacent to the airport are largely built out, most of these jobs will go to other municipalities in the metropolitan area. As Figures 15 and 16 suggest, these jobs will probably go to the parts of the region that are already growing. Commercial redevelopment in the vicinity of the airport will provide additional jobs, but those are not the type of jobs that the opening quote by the Met Council refers to as requiring the infrastructure to support extensive air transportation connections.

Implications for municipalities

While to some extent a scalar mismatch of benefits and negatives still exists within municipalities (i.e., a municipality may benefit from economic development while individual residents are still annoyed by noise), the municipality is the unit that makes land use decisions with regards to planning and zoning. There are also certain characteristics of municipalities that are an important part of the airport-land use compatibility issue. Despite the presence of a relatively strong regional government in the form of the Metropolitan Council, area municipalities still have to act with regards to their own interests when it comes to land use planning, and airport compatibility may not be the highest issue on their list. Furthermore, the FAA's policy is that land use planning should be left up to municipalities, with safety restrictions the only federal limit allowed. However, airport operations are subject to change; whether that consists of the

construction of new runways or a shift in operations, municipalities are not able to adjust their land uses to match, meaning that foresight and planning may not be enough.

The Met Council introduced land use controls in 1969, after the failed attempt to site a second airport, which were intended to keep future development from being incompatible with any airport in the system. The FAA even included these controls in their 1970 system plan as an example of how to maintain airport/land use compatibility. "Did we ever get to use them? No, the cities felt it took away too much of their authority" [124]. Despite the regional authority's attempt to plan with regards to the "major system element" of MSP, the most it has been able to do is lay out a set of guidelines for development. There are four noise zones, the first three corresponding to the 75, 70, and 60 DNL contours, and the fourth a buffer zone one mile beyond the 60 DNL. Different recommendations are made regarding the allowability of a particular land use and the need to meet structural performance standards. Municipalities incorporate those guidelines into their comprehensive plan and give them the authority of zoning or building codes (including the implementation of model ordinances). Because the Met Council has the authority to approve comprehensive plans, they can require municipalities to take these guidelines into account if they have not done so; Mendota Heights is one city that has had to revise its plan to meet with the Council's approval [*ibid*.].

Municipalities have to balance the compatibility of land uses in areas affected (or potentially affected) by airport noise with their own fiscal needs and the needs of their residents. For example, a planner from Bloomington stated, "there's a delicate balancing act between MAC and the city. MAC would like the city to make very aggressive decisions that maintain use compatibility. But the city and the city attorney are concerned that some of these decisions could put the city at, ah, a position of liability for inverse condemnation of the property […] the city *will* cooperate to use controls to achieve and improve land use compatibility, *but* will only go so far based on what our liability to that property owner would be."

As mentioned above, a number of the cities neighboring MSP expressed a strong desire not to be "a parking lot for the airport." While ancillary uses such as park-and-fly or car rental lots may provide direct economic benefits from the airport, they also result in an unattractive pattern of land use, particularly when adjacent to residential neighborhoods. Municipalities are willing to take economic development of a perceived higher quality, such as office space, but as noted above, office developers are often attracted to different geographic sectors. One form of economic development that can be found in close proximity to the airport is freight forwarding and/or industrial parks. Both Eagan and Mendota Heights have been able to zone large portions of their land for industrial parks, and many firms in these parks take advantage of the airport's proximity. However (as McAdams found for Milwaukee), many of these firms are more interested in the ground transportation related to the airport than in air transportation itself. Coca-Cola's regional distribution center is one example: Coca-Cola is shipped by truck, not plane, but the short distance to both I-94 and I-35 make Eagan a good location for the center.

These industrial parks not only provide a buffer for residential land against airport noise, but they provide tax dollars that reduce the property tax burden on residents. The area

east of MSP has traditionally been slow to grow because of its relative inaccessibility on the south side of the Mississippi River. Residential growth has been rapid since the 1970s, when I-35E provided a bridge across the river between downtown St. Paul and the airport. Newer developments are being squeezed in wherever room remains, including areas that are borderline in terms of being compatible with the airport. Mendota Heights in particular has come into conflict with the MAC a couple of times for proposing (and building) subdivisions in areas that are on the edge of the 65 DNL contour but in an otherwise ideal setting (Figure 22). The city maintains that it has the right to determine where development should take place within its own borders, and that these residential areas are outside of the noise contours as determined at the time of development. The problem, of course, is that airport operations are subject to change, and areas that are currently compatible may not be in the future. Additionally, there are fiscal implications for municipalities with regards to airport noise. Minneapolis, for example, has found that property in the neighborhoods nearest the airport appreciates at a slower rate than the rest of the city, costing an estimated $1.6 million in lost property taxes every year [134]. On the other hand, this lower rate of appreciation makes housing in these neighborhoods more affordable to new residents than it might otherwise be. Industrial and office properties are generally not affected by airport noise, so they retain their value for tax purposes.

Because of the rapid growth in the area, municipalities may have higher priorities than avoiding potential future conflicts. Inver Grove Heights in particular currently has few residents affected by noise, though that number is expected to grow as the population increases. Unfortunately, it is likely that airport noise will not be a problem until it is too late to take into account in land use planning. A city official said, "because we're located where we are on the periphery of the dense noise area, it hasn't become a big enough issue where the city council, the decision-makers, have really empowered [the city's airport noise abatement commission] with what it takes to get things done […] And I think it's just a matter of you don't have the complaints and you don't have the perceived problem you do in other cities." Because municipalities, particularly fast-growing ones, have higher priorities than dealing with problems that do not yet exist, relying on their land use plans to remove the possibility of future conflict is not sufficient.

The other factor that needs to be considered with regards to municipalities and land use planning is that airports are not static entities. Though airports are often treated as if they are unchanging, the fact remains that changes in airport operations (whether officially termed "expansion" or not) are quite frequent. Part of this is due to the long-term nature of airport construction projects; new runways are currently averaging ten to fifteen years from start to finish [140]. Additionally, the rapid rate of growth of air traffic, not only since deregulation but since the inauguration of air travel, means that future expansions may have to be planned while current construction projects are still ongoing. In fact, Northwest has recently asked the MAC for additional gates for its regional jets before the current construction program has even finished.

Fig. 22. Augusta Shores, Mendota Heights, MN. On takeoff from Runway 15L-33R.

The built-up cities around MSP are a prime example of the difficulties municipalities face in planning for airport growth. When the residential neighborhoods in Minneapolis that are in the 65, 70, and even 75 DNL contours were laid out and built in the early- to mid-20th century, aircraft were small and quiet, and flights were infrequent. Even when Richfield was built in the 1950s, propeller planes predominated at MSP, and so houses were built a few blocks away from the airfield. These cities had no way to predict that jet aircraft would come in the late 1960s, producing more noise and requiring longer runways. Additionally, the increase in jet traffic brought about by deregulation further increased noise over neighborhoods that had existed for decades. In fact, census data from 1990 show that of Minneapolis and Richfield residents living in the 65 DNL or higher, about 60 percent moved in before 1985, when the merger of Northwest and Republic changed MSP to a major hub and greatly increased traffic and noise. Furthermore, nearly 30 percent of the residents of these neighborhoods lived there before 1970 (jet aircraft arrived at MSP in the early 1960s but did not increase in number until the end of that decade). This compares to 24 percent of residents near O'Hare and 17 percent of residents near Logan. Thus, residents' claims that "we were here first" have more validity than they might in other places [132].

Changes in aircraft technology may widen the impact of the airport, making more land non-compatible. However, changes in airport operations may shift the land area that is affected, making it even more difficult to keep land uses compatible. The following section will discuss anticipated changes from the current expansion plan, though new runways are not necessary for operational shifts. Mendota Heights, for example, charges that the director of the FAA's Minneapolis air traffic control tower instituted an Operations Order in the 1970s that westbound flights taking off to the east were to turn away from his home in Eagan, and over Mendota Heights to the north. The city also claims that these westbound flights turn earlier than they should, flying over residential areas that were planned to be outside of noise-affected areas. Another operational change that would have put more traffic on the crosswind runway as a way of alleviating noise over Minneapolis and Mendota Heights was strongly opposed by Bloomington because of the increased noise its own residents would experience. One of the consequences of such operational changes is that it makes it more difficult for municipalities to work together when it is in their own best interests to shift noise to someone else. As an Eagan official said, "The problem is that when you're going through these land-use decisions, somebody's ox is always going to get gored […] it's hard for communities to collaborate on an issue where it seems like somebody's a loser and somebody's a winner. You're never creating a win-win situation, it's always a zero-sum game. And so that has been the most frustrating aspect of this so far."

Implications of MSP expansion

There are three main types of land use effects that will be felt from MSP expansion: redevelopment immediately adjacent to the airport, new incompatibilities created by the alignment of Runway 17-35, and temporary shifts in land use brought about by the construction process. The redevelopment is limited to two municipalities: Bloomington, where federal and state safety zones mandate the removal of certain buildings, and Richfield, where increased noise and vibrations have led the city to seek redevelopment

of the area that will be literally across the street from the new runway. Of the study area municipalities, Eagan and Bloomington will also be affected by noise over portions of their cities that have not previously experienced airport noise (see Figure 17).

The eastern portion of Bloomington will be most strongly affected by the expansion plan. Federal and state safety restrictions mandate the removal of ten to twelve properties immediately south of the airport, with a tax capacity of $1.3 million [141]. Redevelopment on those sites is limited; within the federal zones, no development is allowed, and within the state zones, there are restrictions on height and density of use. Farther south, approximately forty homeowners have agreed to be bought out because their houses will now fall within the 70 DNL. Redevelopment will likely consist of light industrial and office space, similar to that which is already in the area. Another 115 single family homes and 254 multi-family units are now eligible for soundproofing because they will be inside the 65 DNL. While Runway 4-22 previously affected portions of Bloomington, the infrequency of flights meant that few residents were eligible for soundproofing.

While no Richfield property is directly affected by safety zones for the new runway like in Bloomington, the runway's proximity to housing creates a de facto requirement that redevelopment take place. As described above, Richfield is largely a residential community. In the past, the city has lost land to the airport, leading to the 1968 state legislation that forbade any further westward expansion. In 1995, an agreement was reached to buy out the two neighborhoods that still existed on the east side of Cedar Avenue, New Ford Town and Rich Acres. Part 150 funds were used for the approximately 425 units of primarily single-family housing that were purchased and razed, with a total loss of $375,000 in tax capacity. A considerable number of houses have already been soundproofed in the city as well. Importantly, these buyouts were done while the dual-track process was going on; if a new airport were to be chosen, these neighborhoods would not be experiencing airport noise within a decade, while if a new runway were built, they would be bought out for runway construction. The MAC's willingness to pay for these buyouts under such uncertainty about the future is something many airport operators would not do.

Mitigation for MSP expansion raises different issues in Richfield than in any other municipality. City officials note that at its closest, Runway 17-35 will be 1200 feet from existing homes, closer than any runway has ever been built to an existing neighborhood [123]. Because of the alignment of the runway, noise will be directed largely north-south, not to the west. However, the city is worried that low-frequency noise will be felt by residents because of the runway's proximity. The FAA does not recognize low-frequency noise as impacting residents [143], so the PFCs that go towards buyouts or soundproofing in other neighborhoods as part of the Part 150 process would not be available for all affected properties. Furthermore, insulating houses against vibration is much more difficult than insulating them against noise; installing new windows and air conditioning is not sufficient. Richfield determined that housing would have to be removed three to eight blocks in from the city's boundary with the airport and replaced with a more compatible use.

The problem in carrying out this redevelopment has come from funding constraints. Richfield estimates that a total of $63 million is necessary to acquire all of the residential property, far beyond the city's means. One of the city's biggest frustrations (shared by others) is that while the state legislature was able to mandate the expansion of the airport, they have not been forthcoming with funds to mitigate the effects of that expansion. As a city official said,

> "And now all it is anymore is the state's telling the MAC and the FAA, "Hey, it's your responsibility, you pay for it," and then the MAC says back to them, "No, you wanted us to stay and expand, you pay for it," and they just keep passing the ball. And in the meantime, we sit here and we're not very far with getting people out that are going to be the most severely impacted."

The state did provide $5 million in 2000, which was enough to purchase 26 out of the 200 single-family homes the city wants to buy out, and $10 million was obtained from the federal government. However, because the federal money was granted under the restrictions of the Part 150 program, and low-frequency noise is not recognized under Part 150, Richfield has reached the limit of federal funds that it can use. The rest is up to the state or the municipality itself, and attempts to legislate a long-term funding source for this mitigation have thus far been unsuccessful.

On the south side of the Minnesota River, municipalities are faced with a different issue, not an increase in the intensity of airport noise, but the presence of noise where there previously was little to none. Burnsville and Eagan are the two municipalities most affected. Because of its distance from the airport, Burnsville is unlikely to be eligible for much soundproofing. All of the land inside the 65 DNL is zoned commercial, and of the 300-some residents inside the 60 DNL, it will probably be years before they receive any mitigation [141].

Eagan is particularly unhappy with the new runway because of the city's past efforts to make its land uses compatible with the airport.

> "[L]ooking retroactively at what we've done, I think we've done very well. But obviously the expansion of the airport is going to throw those plans all akimbo […] One of our goals here has to been at least carve out an area of the community that is essentially free from overflights. And [the expansion] plan doesn't give us that opportunity."

Eagan's new overflights will come from flights that turn eastward after taking off to the south (Figure 17), fanning out over a broad area much the same way that northwesterly takeoffs are now dispersed over Minneapolis and Richfield. The noise will not be as severe as in northern Eagan, where industrial parks were placed to be compatible with the noise contours. However, the fact remains that nearly the entire municipality was deliberately planned to keep residential land uses away from overflights, and that planning has now been undermined by the changes at MSP. The city is currently trying to get MAC to use the increase in noise rather than the amount of noise as a basis for sound mitigation. Since FAA guidelines do not allow such flexibility, Eagan seems unlikely to get its way.

Finally, some area municipalities have experienced a temporary shift in land use patterns brought about by the construction process. Part of the expansion project included moving the car rental facilities within airport property to a newly built garage, while two new concourses were built where those facilities had been. During construction, those facilities had to be moved to adjoining neighborhoods. According to a city planner, St. Paul was "infiltrated" by car rental and park-and-fly lots starting around 1997 because of its proximity to the airport. This prompted the city to consider a development moratorium in the area, and then to begin a small-area planning process to determine what to do with the land in question so it did not become the site of ancillary airport uses. Now that the car rental facilities at MSP have been completed, those uses have moved back out of the neighborhoods, and development plans are underway to make sure they do not return.

Conclusion

Regional economic benefits of MSP are not equitably distributed around the region. While these results are not comparable to Hoare's findings that within ten miles of Heathrow there is actually a negative economic effect, they do throw into doubt arguments that airport expansion benefits all parts of the Twin Cities. Nor are these benefits in balance with the environmental effects of the airport, making the question of balance even more important with regards to municipalities neighboring the airport.

Part of the imbalance between airport benefits and disbenefits comes about because of scale, specifically the size of the jurisdictions in question. Whereas municipalities are responsible for keeping their land uses compatible with airport operations, they have no means of controlling those operations. Since airports are not static entities, even municipalities that plan their land uses with regards to current runway layouts may be negatively affected in the future. Because of the physical size of the airport, the municipality is too small a unit to take a *changing* airport into account in its land use planning. Regional scale planning does not solve the problem because a balance of residential and commercial/industrial uses is normally needed within each municipality.

Another type of imbalance concerns authority and responsibility with regards to airport decisionmaking. When the state legislature claimed the power to decide that MSP should be expanded, it did not take any of the responsibility to mitigate the effects of that expansion. If the airport truly does benefit the entire state (and it does at least in the form of state taxes, regardless of connections to the global economy), then the responsibility of mitigation lies at the state level as well. Even with regards to the metropolitan area, the MAC has not taken advantage of its power to levy property taxes. Again, if the airport truly is a regional benefit, then the entire region should be compensating the municipalities and individuals who bear the negative effects.

These imbalances will affect the future of the airport when the expand/build question recurs. While the current expansion plan is expected to handle demand until 2020, because of the long time it takes to plan and carry out expansion projects, the issue should be raised again soon. While the recent downturn in traffic alleviates the issue somewhat, experts estimate that the end result of 9/11 on air traffic will be a three-year setback [143]. In other words, MSP's capacity will last until 2023, not 2020. The additional investment that Runway 17-35 represents at the existing site makes it unlikely

that a new site will soon be chosen. However, there is no further room to expand on the existing footprint, and any extension of airport property would be strongly opposed by neighboring municipalities. The balance of economic and environmental effects and the ability of municipalities to keep their land uses compatible would probably intensify with further expansion (as they would be with a decision to build a new airport).

One other option that has been considered beyond the build/expand debate is the regionalization of air traffic in Minnesota. The Minnesota Department of Transportation is currently sponsoring a study on how the regional airports in Minnesota and western Wisconsin might be connected to the national air transportation network without going through MSP first, thus reducing demand at the hub. There is also interest in a high-speed rail network in the Midwest, as well as utilizing airports in nearby Rochester and St. Cloud either for cargo operations or to attract Southwest Airlines. The next chapter describes the consequences of this type of regionalization in New England, including impacts that might be translated to Minnesota were a similar approach to be tried there.

CHAPTER 6

BOSTON AND REGIONALIZATION

> "The New England states no longer compete with each other. New England competes on a national and international basis" (Governor Lincoln Almond, Rhode Island, 1999; [144]).
>
> "The *so-called* regionalization […] it's completely bogus" (Selectman Peter Enrich, Lexington, MA, 2002, [80]).

Starting in 1995, Massport and other airport operators in New England have been co-operating to market the six New England states as having one air transportation system. This cooperation across not only city but state lines is unique in the U.S., brought about by the inability either to expand Logan International Airport or to construct a second major airport in Massachusetts. The story of regionalization therefore includes implications of going beyond the build/expand debate, which both Chicago and Minneapolis-St. Paul have been unable to do. Inspired in large part by an FAA study in 1995, Massport and the other airport operators have jointly marketed their facilities and actually discouraged travelers from using Logan. The result has been a dramatic increase in traffic at two of the regional airports, with Manchester more supported by airport neighbors than T.F. Green, and slight increases at the other two, with Worcester supported by the neighboring municipality and Hanscom neighbors vehemently opposed.

One of the consequences of the increase in traffic has been airport improvement plans of one sort or another at each of the five airports. There is strong debate in some places as to whether these plans consist of "expansion" or are simply improvements. Massport, for example, wants to build a new runway at Logan to reduce the delays that currently exist under certain wind conditions, though Massport argues that the runway will not increase capacity. Airport operators at Manchester and T.F. Green are attempting to extend runways, while the fleet mix at Hanscom is changing in such a way that airport noise is increasing, even if the airport itself is not physically expanding. And the question of ground access is the biggest "expansion" issue in Worcester. The different issues at each of the airports feed back into the regional system, affecting traffic at Logan and perhaps affecting Boston and New England's relations with the global economy.

Concerning the quotes above, regionalization has neither led to New England functioning as a single economic unit, nor is it completely bogus. Regionalization for the most part has taken the same positive and negative effects felt around Logan and replicated them at the regional airports. But because each of these airports has a unique geographical and political setting, those effects have been felt differently at each place. Economic development has been spurred in some sub-regions rather than others, and competition has not vanished among these places. Critics argue that the regional long-distance transportation system needs to include more than just air; investment in rail is needed, as well as non-travel technologies such as videoconferencing. The fact that the build/expand debate is being replayed at many of the smaller airports indicates that regionalization is not a long-term solution to the problem of capacity.

This chapter consists of four sections. The first describes the history of each of the five study area airports: Boston's Logan International (BOS), Hanscom Field (BED), Worcester Regional (ORH), T.F. Green in Providence (PVD), and Manchester (MHT) (described in Table 5 and shown in Figure 23). Airports in Connecticut, Vermont, and Maine are also part of Massport's broad regional approach; however, since they are outside of Logan's travelshed, they were not considered in the current project. This introduction is followed by three sections answering the three research questions for Boston: the history of regionalization in New England, a discussion of how the process has been interpreted by citizens and municipalities, and the impacts of regionalization for Logan and each of the other airports in order to determine how successful regionalization has been.

History of New England airports

This section describes the history of each of the five New England airports under study, up to approximately 1995, when the study that is generally considered to have been the impetus for regionalization was conducted for the FAA. This background is necessary to understand the context in which initial discussions about regionalization occurred and the different impacts at each place. Additionally, in a number of cases friction between the airport and surrounding municipalities and/or residents is rooted in past situations, not present conflicts. As a regional airport director who formerly worked at Logan commented, "Instead of just being able to communicate and talk about issues of the day, I think places like Boston are continually trying to overcome history before they can finally get to what are the real issues." Because of Logan's influence on the region and its complicated history, a disproportionate amount of this section is devoted to that airport.

Logan International Airport (BOS)

Logan International Airport is one of the oldest airports in the country. For over forty years, it has also been the site of some of the most acrimonious fighting between the airport operator and nearby residents. A history of poor conduct by the airport operator, Massport, has led to an unwillingness on the part of residents to accept that things might have changed, and thus history stands in the way of compromises over the current airport improvement plan.

Logan enjoys closer proximity to downtown than almost any other major U.S. airport (Figure 24). The land on which Logan now sits is almost entirely landfill. Four islands were connected to each other and to the mainland over a period of a hundred years, with most of the airport land built between 1930 and 1950 [145]. In 1923 Boston Airport was dedicated on 189 acres of land that was paid for by state, city, and private funds. Commercial air service followed in 1927, and the city took ownership in 1928.

By 1945, the governor told the state legislature that while Logan had to be expanded in order to attract more than the two airlines that currently served it, the city of Boston was not able to fund that expansion. Therefore, the State Airport Management Board was established by the Legislature. The Board was part of the state government, under control of both the governor and the legislature, with its funding coming from taxes. By the mid-1950s, the Board was $42 million in debt. So the Legislature created a new system of airport governance [146]. In 1956, the Massachusetts Port Authority was set up as an independent authority, to operate both Logan Airport and the Port of Boston.

Table 5. Passengers and operations at New England airports

Year		Logan	Hanscom	T.F. Green	Manchester
1990	Operations	425,000	233,000	34,000*	13,000*
	Passengers	22.9 mill.	0	2.3 mill.	0.8 mill.
1995	Operations	466,000	190,000	27,000*	10,000* **
	Passengers	24.2 mill.	0	2.2 mill.	0.8 mill.
1998	Operations	507,000	183,000	43,000*	N/A
	Passengers	26.5 mill.	0	4.6 mill.	1.9 mill.
1999	Operations	495,000	197,000	42,000*	32,000*
	Passengers	27.1 mill.	29,000	5.1 mill.	2.8 mill.
2000	Operations	488,000	212,000	43,000*	40,000*
	Passengers	27.7 mill.	162,000	5.4 mill.	3.2 mill.
2001	Operations	455,000	205,000	64,000*	36,000*
	Passengers	24.2 mill.	142,000	5.5 mill.	3.2 mill.
2002	Operations	392,000	218,000	62,000*	39,000*
	Passengers	22.7 mill.	72,000	5.4 mill.	3.4 mill.

* Commercial operations only (excluding general aviation, cargo, charters).
** 1996 data.
Source: Massport, RIAC, Manchester Airport, ShhAir, BTS.

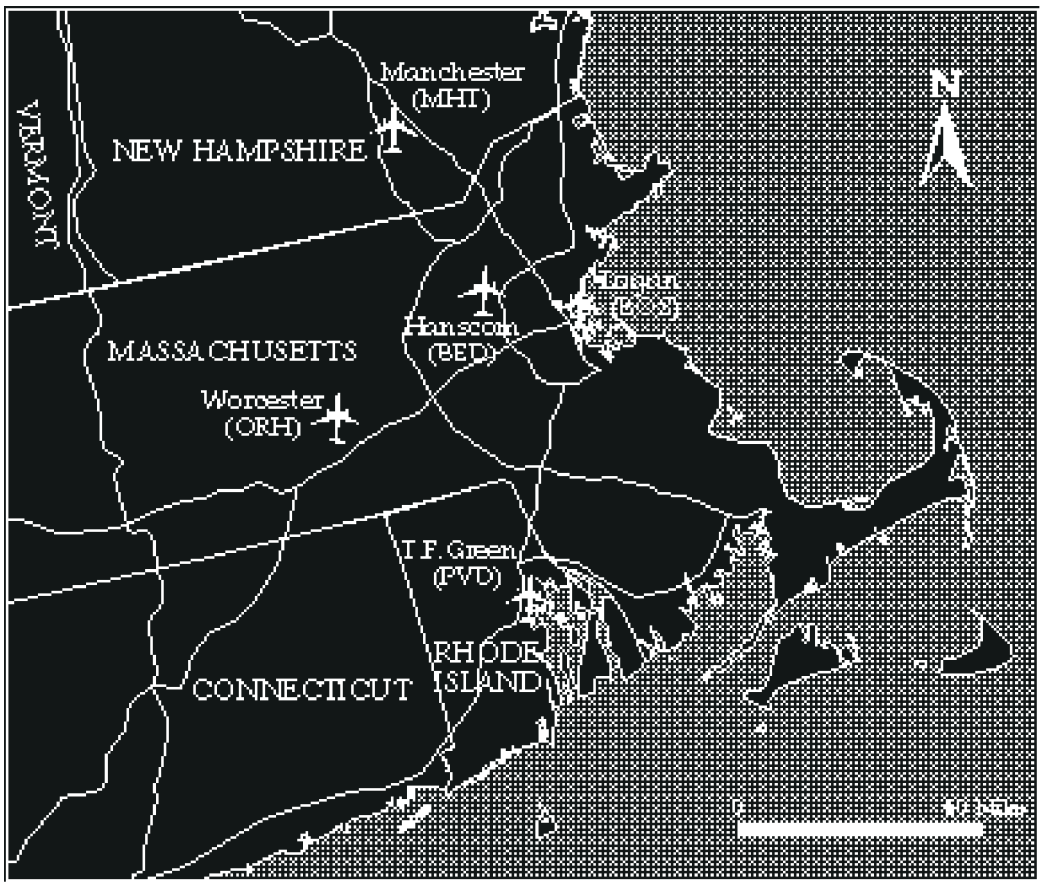

Fig. 23. New England airports in Massachusetts, New Hampshire, and Rhode Island

Fig. 24. Logan International Airport and study area municipalities

The MPA's capital funding would come from municipal bonds, removing it from its dependence on state taxes -- and its oversight by the state. Four major conflicts between this independent airport operator and surrounding communities in the 1960s and 1970s created a history of distrust that clouds today's attempts at cooperation.

The first conflict was in 1963, when the MPA applied for funds from the FAA to extend Runway 15-33, the western end of which points directly at East Boston (Figure 25). Extension of the runway would involve the removal of Wood Island Park, designed by Frederick Law Olmsted and one of the few pieces of open space in that part of the metropolitan area [*ibid.*]. In 1965, two jets overshot their runways and went into Boston Harbor, increasing the urgency for the lengthened runway. In 1966, the FAA told the authority that if it did not use the $2 million that was earmarked for the 15-33 extension, the money would be gone by the end of the year. At the same time, the governor promised that Wood Island Park would be replaced, encouraging the Legislature to authorize the extension. In April 1967, the FAA funds were received by the MPA, and Wood Island Park was graded to runway level in a single day.

As an East Boston native put it, "The biggest crime perpetrated by Massport over the years was the taking of Wood Island Park. It is something many East Boston residents have never been able to forgive" [147]. After the abrupt manner in which Massport took the park, residents became activists. The next major incident involved Maverick Street, the back entrance to the airport (Figure 25). Over six hundred dump trucks and fuel trucks a day went to and from the airport down this residential street. Residents had asked Massport to reroute the trucks, but Massport said it was impossible. So the residents literally took to the streets, inspired by civil rights and anti-war protests that were occurring in other parts of the country [148]. The protest was all the more effective because it consisted of mothers and children, some in strollers, physically blocking the trucks from passing. That week, the governor, mayor, and head of Massport met and agreed to reroute the trucks inside airport property and off of Maverick Street. "The success of the Maverick Street women and children reinforced a growing sentiment among airport activists: 'Legally we couldn't get anywhere. The only way we could get anywhere was to demonstrate'" [146, p. 85].

This sense on the part of citizens that protest rather than negotiation with Massport was the solution only intensified as the third conflict began. In the summer of 1968, Massport had asked to close 700 feet of Neptune Road, the former gateway to Wood Island Park, to put in a guidance system for the lengthened runway. This pitted the FAA, state, and airlines against Boston and the neighborhood over whether the street closure and removal of residents were necessary. The case eventually went to the Supreme Court, who refused to hear it, thus siding with Massport. The next day, Massport issued eviction notices to the eight affected families. The city's attempts at negotiation were halted the following spring when former Governor Volpe, recently appointed head of the U.S. DOT, proclaimed the closure of Neptune Road to be necessary. The remaining families were removed early one morning with the assistance of U.S. Marshals, while the street was torn up and trees cut down before any kind of protest could form [148]. These actions only intensified the residents' feeling that direct action was the only outlet open to them and that Massport could not be trusted.

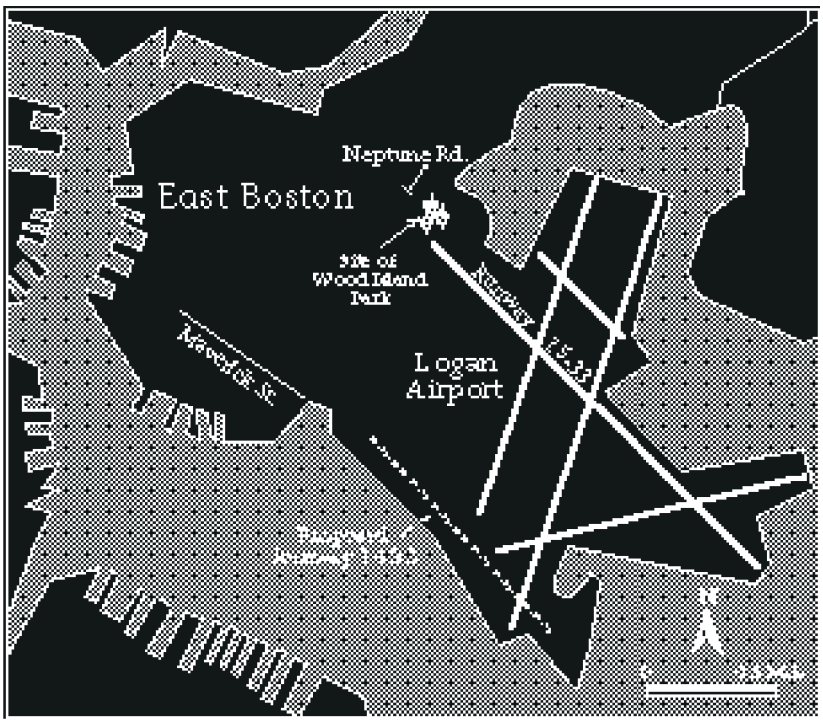

Fig. 25. Logan International Airport and East Boston

Meanwhile, as in other airports across the country, traffic had been growing at a rapid rate since the introduction of jet aircraft. Massport announced in 1970 that now that the extension of Runway 15-33 was complete, a new parallel runway would be needed, 15L-33R. The runway would be built on fill along the south edge of the airport, pointing over the harbor and over Maverick Street. In February 1971, a public hearing on 15L-33R was attended by over a thousand people and lasted an incredible ten hours. The FAA announced that an Environmental Impact Statement would be required for the runway under the new National Environmental Policy Act. Within three months, the EIS was ready, and within two more months, the city of Boston and Governor Sargent had announced their official opposition to the new runway. That summer, Massport dropped its plans for the new runway, the first victory that Boston had over the airport authority. In January 1972, Massport began studies on a smaller runway, 14-32, that would be in roughly the same location, but would be much shorter, only for propeller planes. Contracts were awarded for the runway in 1974, and construction began. The state then got a court injunction prohibiting the runway from being built because Massport had not filed an EIS for the project [146]. Massport was ordered to cover the partially-built runway with grass. The injunction still stands today, despite the EIS that has been produced and approved in the meantime, and Massport went to court in the summer of 2002 to get the injuction lifted.

Other, smaller victories for the neighboring communities began around this time. The first attempt Massport made at changing operations to accommodate neighbors was in 1968, when a preferential runway system was introduced for nighttime flights. Massport had been giving thousands of dollars to local schools for sports facilities for several years, largely because the executive director was a former professional football player. In fact, the "replacement" for Wood Island Park consisted of a series of sports fields wedged between the incoming and outgoing highway ramps at Logan. Massport's donations also influenced a lawsuit filed by the City of Boston for inverse condemnation based on noise at area schools; no teachers testified for fear of losing the money. In 1971, after Massport withdrew its plans for 15L-33R, a noise abatement committee was formed; with no authority to force Massport to implement mitigation, this committee was largely for effect. In 1972, Massport started buying out the remaining residents on Neptune Road (who wished to move by this time) and razed their houses (Figure 26). Finally, a noise complaint hotline and sound monitoring system were established in 1973.

In more recent years, Massport has actually been among the most progressive airport operators in the country in terms of mitigation, though for many nearby residents, the damage has been done. In the mid-1970s, Massport required aircraft to meet new federal noise standards more quickly than the federal law required, particularly for night flights. In 1977, the Community Advisory Committee to Massport formed to provide an opportunity for dialogue between the airport operator and neighboring communities, and the CAC continues to this day. Finally, Logan became the pioneering airport in terms of soundproofing with its pilot program in 1983 for residences and another for schools.

Fig. 26. Neptune Road in 2002. Runway 15R-34L is in the background. Note the vacant land behind the elm trees.

Hanscom Field (BED)

The distrust of Massport engendered by its actions at Logan in the 1960s has spilled over into the area surrounding one of the other airports it operates, Hanscom Field in the northwest suburbs of Boston (Figure 27). Located in four towns (Bedford, Concord, Lexington, and Lincoln), Hanscom has a less complicated history, marked mainly by fierce opposition to expanded use of the field by commercial aircraft.

Like many airports across the country, Hanscom Field began as a military installation. In 1940, the state purchased 500 acres for an airport that was to be used by general aviation and the Army Air Corps. The state retained ownership until 1952, when a portion of the site was leased to the Air Force. While there were some military jets based out of Hanscom, for the most part the Air Force used the site for research and development on radar systems, including the AWACS plane [149]. Most military flying ended by 1973, and the Air Force let its lease expire on the airfield in 1974, retaining only a small portion of land for research facilities.

Nearly all of Hanscom's traffic has come from general aviation, including two flight schools. The highest number of operations was reached in 1970, with 300,000 (Logan did not reach that number till 1983). After deregulation, there were a number of attempts by newly established airlines such as Mohawk to introduce commercial service, most of which lasted a year or less. The first attempt at commercial service by a major airline came in 1990 with Continental Express. Protest from the surrounding communities, worried that a successful commercial operation would lead to future increases in noise, led Continental Express to withdraw its plans. The next successful commercial air service came in 1999 with Shuttle America. After declaring bankruptcy in early 2001, the airline was bought out by USAir, and now operates a handful of daily flights out of Hanscom as USAirways Express. Community opposition to commercial air service has always been high, based on the worry that once Hanscom is identified as a commercial airfield, however small the planes might initially be, Massport will have carte blanche to introduce larger aircraft and make Hanscom a major alternative to Logan. In recent years, concern has grown over the impact of aircraft noise on the adjacent Minuteman National Historic Park and nearby Walden Pond (discussed in a later section).

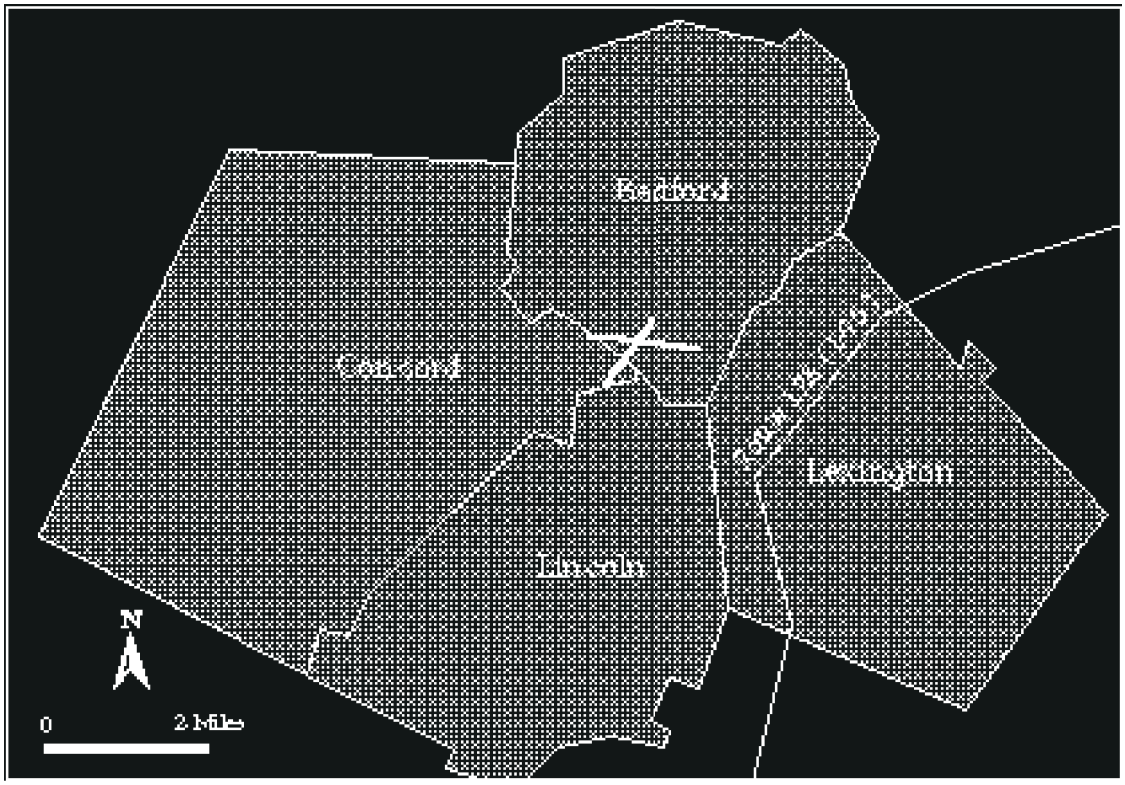

Fig. 27. Hanscom Field and study area municipalities

Worcester Regional Airport (ORH)

Worcester Regional Airport is located on the western edge of the city of Worcester, about fifty miles west of Boston (Figure 28). In 1920, as part of the airport boom that was sweeping the country, the city of Worcester, the second largest city in New England, decided that it needed an airport for economic development purposes. Two different sites were proposed, one on a hill to the west of town and one in the town of Grafton to the east. It took twenty years for the western site to be chosen, a delay that may have hurt any chance of using the airport for the economic development of the city [150]. At the time the airport was built, in 1944, federal funds were as yet unavailable for airport construction. So the city funded the entire project, taking four years to complete the airfield and another four years to complete the terminal.

Commercial service was slow in coming, and is still the biggest problem the airport faces. Worcester is a small enough market that only a few flights a day are sufficient to meet local demand. But business travelers prefer multiple options, and so are willing to drive an extra hour or two to a larger airport that can give them more flexible schedules. Without the demand on the part of travelers, the airlines are unwilling to invest in additional flights, and the cycle continues. For a brief period in 1998, there was no commercial service; by 2002, four airlines were providing service; and by mid-2003, all commercial service had again left.

T.F. Green International Airport (PVD)

Like Logan, T.F. Green is one of the oldest airports in the nation, located within the city of Warwick, RI (Figure 29). It opened in 1931 as the first airport operated by a state rather than a municipality. By 1936, the three-runway configuration that is in place today was laid out. There have been periodic extensions of the runways on about a 15-year cycle, largely to keep up with technological improvements and to attract longer-haul commercial service. The state had the opportunity in the mid-1970s to move operations to the Quonset Point Naval Air Station when its airfield was closed, but committed to Warwick instead.

By 1988, another expansion was needed, this time of the terminals. In order to get the airlines to agree to increased landing fees to pay for the new terminals, the Rhode Island Airport Corporation (RIAC) was created, an independent authority of the same type as Massport. The idea was that RIAC would be financially independent of the state, but already by 1994, the state had to rescue RIAC from $36 million of loan debt. The new terminal opened in 1996, just as Southwest Airlines arrived, and traffic has grown rapidly ever since.

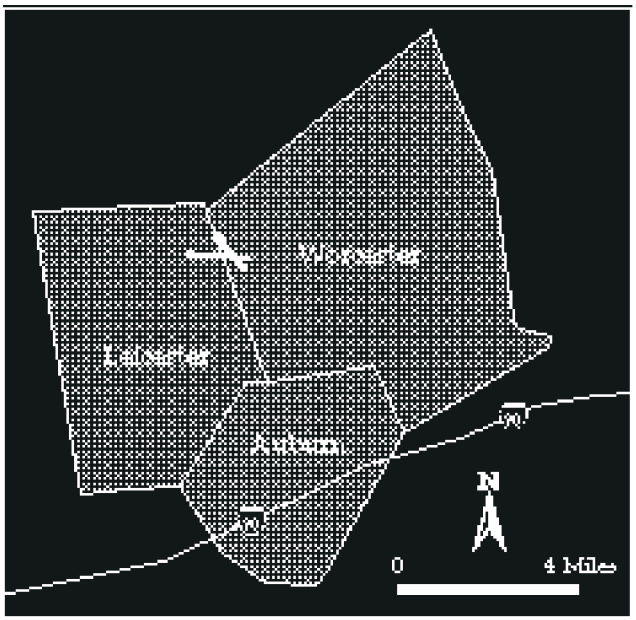

Fig. 28. Worcester Regional Airport and study area municipalities

Fig. 29. T.F. Green International Airport and study area municipalities

Manchester International Airport (MHT)

Like many airports around the U.S., Manchester has changed from civilian to military and back to civilian use throughout its history (Figure 30). Manchester was built in 1927 with money from the city of Manchester, NH. In 1940, it became an air base for the Army Air Corps and was used as a base during World War II. By 1951, the Air Force was allowing some commercial service, and by 1955, it became a joint use base. In 1959, the state authorized the Manchester Airport Authority as a city commission, making Manchester the only city-operated airport in the study area. The Air Force moved out in 1966, making it a fully civilian-operated facility, though with only limited commercial service [149].

By the mid-1980s, the major carriers were starting to become interested in serving Manchester, with United arriving in 1985, USAir in 1986, and Continental in 1990. A new terminal opened in 1994, with an international terminal in 1997. Southwest arrived in 1998, and Manchester has since experienced the same rapid growth as T.F. Green did just a few years earlier.

History of regionalization in New England

The planned regionalization of air travel in New England has come about because of three factors specific to that region: population density, lack of undeveloped land, and the concurrent inability to site a second major airport for the Boston area. A study in the late 1980s by the Massachusetts Aeronautics Commission attempted to identify a site for a second major airport, but determined that obtaining and clearing the necessary amount of land within the state was not feasible. As air traffic continued to grow, a solution was necessary to reduce the delays that were building up at Logan International Airport. This is when cooperation began among the five study area airports.

Airport officials generally agree that regionalization developed out of a need to meet New England's demand for air travel at more than just Logan. The FAA predicts that by 2020, there will be an additional 23 million passengers in the New England region, roughly equivalent to the number of passengers that traveled through Logan in 2001 [36]. This prediction was based on population growth in the area, as well as the demand for travel from businesses. As discussed in the literature review, there is a significant connection between high-tech businesses and air travel, and Boston has been known as a high-tech center since the mid-1980s. Recent trends in the economy indicate that the FAA's predictions may have overstated the actual demand for air travel in 2020. Nevertheless, demand is still expected to grow.

After the failure to site a second major airport, Massport determined that a significant proportion of growth in demand for air transportation was being produced outside of the Boston metropolitan area, and it made sense for the growth to handled elsewhere as well. There were therefore three main goals to be achieved by promoting regionalization. First, Logan would benefit from reduced congestion, both on the ground and in the air. If travelers remained in Rhode Island or New Hampshire to use airports there, there would be fewer vehicle trips through Boston, as well as less congestion at the airport itself. On the other hand, runway proponents argue that airside congestion may not be relieved if airlines simply reduce the size of their planes rather than eliminate flights, in order to meet the demand by business travelers for frequent service (e.g., [150]). Secondly,

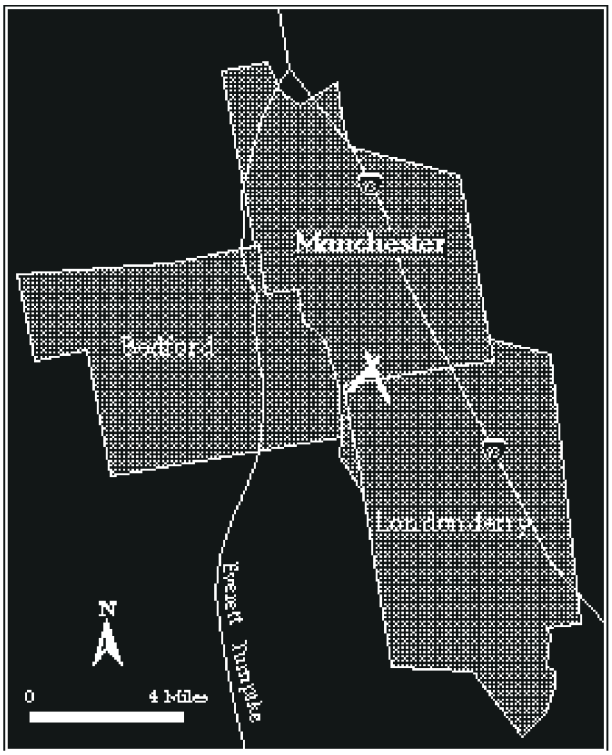

Fig. 30. Manchester International Airport and study area municipalities

sub-regions would benefit from having improved air service both in terms of economic development and in terms of convenience to passengers. Regionalization would make better use of infrastructure already in place rather than investing billions of dollars in a new airport. Finally, by spreading out air traffic to multiple communities, the negative aspects of air travel would be absorbed by more than one place, "sharing the burden" as Massport termed it.

However, just because an airport plan makes sense from a metropolitan or regional point of view, it doesn't mean the providers of air service see it that way as well. Massport and the FAA funded a regional airport study in 1995 that was meant to show the major airlines that there were underserved markets around New England's regional airports. For Manchester in particular, the study found that of the 3.6 million passengers within the airport's market area, only 25 percent used Manchester rather than traveling the longer distance to Logan. This kind of market leakage was what Massport wanted to reduce by encouraging the airlines to increase their service to the regional airports. Convinced by the study, airlines began to lower their fares in order to encourage more traffic; the six New England governors agreed to promote each other's airports to business travelers and tourists; and traffic began to increase at Manchester and T.F. Green. Furthermore, Massport began a marketing program that included billboards outside Logan advertising the regional airports. Massport officials term this marketing a "dramatic and radical and important […] paradigm change" [36], not only because they were encouraging travelers to use airports in other states, but *dis*couraging them from using Logan by means of advertising that highlighted ground traffic congestion.

The major reason for the increase in traffic at regional airports, however, had little to do with the careful planning and marketing of Massport, something that they themselves recognize. The same research on leakage and regional market areas was simultaneously being conducted by Southwest Airlines. In 1996 they began serving T.F. Green and in 1998 Manchester as means of accessing the Boston-area market. The so-called "Southwest Effect" has been established by the FAA and academic researchers as the drop in airfares and increase in passengers when Southwest starts service to a particular airport (e.g., [151]). Table 5 shows the results of the Southwest Effect in terms of traffic growth at Providence and Manchester.

General trends in the transportation industry also account for some of the growth in regional traffic. For one, the rapid increase in the use of regional jets meant that smaller airports such as T.F. Green and Manchester could have jet service rather than turboprops, which passengers consider to be less desirable. Regional jets have also encouraged more point-to-point service by airlines rather than strictly relying on the hub-and-spoke system. In fact, the hub-and-spoke system is less relevant to New England overall because of its location at the edge of the continent. Not only do no airlines use Logan as a hub, but only 10 percent of people who fly to Logan are connecting to other flights. "So we are a very different type airport here in that if we as a region don't meet that demand, we're hurting ourselves, in a very direct way" [36]. It also means that pressure for increased capacity comes predominantly from within the region, unlike O'Hare. Most importantly, a single airline can not block development plans if those plans are not advantageous to its own development strategy, as has happened in Minneapolis-St. Paul and Chicago.

Other non-aviation trends are important as well. Improved train technology has made higher-speed rail travel possible in the Northeast Corridor, reducing demand for the heaviest route from Logan, Boston-New York, by nearly 20 percent [*ibid.*]. The events of September 11, 2001, discouraged air travel at Logan in particular. This is partially because two of the hijacked planes left from Logan, but increased security has encouraged travelers to use smaller airports with shorter screening lines. As of June 2002, traffic at Logan was still down 20 percent over the previous year [152]. While nearly all U.S. airports experienced a decrease in traffic in 2001 (Manchester being one of the few exceptions), Logan's was one of the worst.

For the most part, airport operators agree on the goals of regionalization, as well as its success in terms of drawing the increase in traffic to the smaller airports rather than Logan. What they disagree on, however, is the form that regionalization is taking. Massport sees the New England airports as part of one large system differentiated by function. Logan will continue to handle international and long-haul domestic flights, Manchester and T.F. Green will handle short- and medium-haul flights (except for those in Logan's immediate market) as well as more cargo traffic, and Hanscom will handle general aviation and limited commercial service. Worcester has not attracted as many passengers as Massport would like, and its future role is unclear.

At Manchester and T.F. Green, however, both directors see the system as differentiated by market area rather than by function. Manchester is currently lengthening its main runway to 9000 feet to make possible non-stop flights to the West Coast. While Phoenix is the farthest-away destination that can currently be served non-stop, four of the top ten Manchester markets are on the West Coast [153]. Manchester officials would also like to rearrange the New England air network, so that airports in Maine and Vermont connect through Manchester rather than Logan with their commuter service. Increasingly, however, regional jets have made it possible for these airports to have non-stop service to the same major hubs as Manchester does. While T.F. Green will have a harder time making its runways long enough for non-stop long-haul flights, the airport still believes that passengers are willing to take connecting flights (as many of them have to do from Logan) to reach far-away destinations. Both airports agree, however, that Logan will remain the international airport for New England.

Reactions to regionalization

Both municipalities and residents in proximity to New England's airports have a more skeptical view of the regionalization of air transportation. When asked what they thought of the recent push towards regionalization by Massport and other airport operators, some airport neighbors used words such as "bogus," "a sop," and "political." Others saw regionalization as a boon to communities around Logan, if not the other airports, and a way to provide better service and economic development to the rest of the region.

The municipalities in support of regionalization tend to be those located next to Logan. A planner from the city of Revere, for example, stated that growth in New England air traffic has to take place somewhere besides Logan, or the consequences for the communities neighboring Logan would be too great. Boston itself perceives the Providence and Manchester metropolitan areas as eagerly welcoming the increase in traffic because of anticipated economic development. Municipalities near T.F. Green and

Manchester are to some extent supportive of growth for economic reasons, and they are also aware that the growth in demand for air travel throughout New England means that their metropolitan areas are contributing to that growth, and should provide for it accordingly. However, these municipalities are wary of the problems near Logan being replicated in their towns if growth is not handled carefully.

On the other hand, when asked what the town of Bedford, MA, (next to Hanscom Field) thought of regionalization, one official's reply was, "Is it a surprise that regionalization of airports is supported primarily by those living adjacent to existing large airports and their legislators? What you hear from those who would be affected by expansion of their nearby small regional airports is both opposition and a recommendation that the expansion of general transportation such as rail should occur." This comment reflects those of many municipalities and residents who think that instead of a regional approach to air transportation, Massport and other agencies should be looking at a regional approach to *transportation*. In the words of a Boston official, "If we just keep building runways and highways, whenever we become filled, we'll just build again, and then what do we do? When we reach capacity 10 years from now, do we build more runways, do we build more taxiways, do we build more highways? Let's try to change the mindset."

Part of this frustration with the air-only approach to long-distance transportation comes from opposition to a proposed new runway at Logan. A section above described the attempt by Massport to build Runway 14-32 without filing an EIS in 1974. In 1999, Massport proposed a new 14-32, a 5,000 foot runway that would be used for commuter planes and smaller jets. Though pointed at the Maverick Street area of East Boston, the runway would be unidirectional, allowing for takeoffs and landings only over the harbor. Though Massport has completed the requisite environmental studies and the runway has been approved by the state and conditionally by the FAA, the court injunction from 1974 still stands (and will not be decided upon until 2003).

The main conflict between Massport and its neighbors over Runway 14-32 is whether the runway will do what Massport says it will: reduce delays under certain wind conditions, not provide more capacity at the airport. According to Massport, the need for the runway stems from Logan's unique wind conditions. When winds are blowing from the northwest (as they do a third of the time in winter months and less frequently the rest of the year), the usual three-runway configuration is not viable because of crosswinds. Air traffic controllers thus have only two runways to work with, or one under the strongest winds. Logan operates at its maximum capacity of 120 operations per hour for most daytime weekdays; when forced to use two runways, the airport can not achieve more than 80 operations an hour, leading to delays. By providing a second northwesterly runway, the capacity of 120 operations an hour can be maintained more often, reducing delays by an estimated 32 percent over the course of a year [36].

Massport sees a second benefit from this runway, related to the distribution of air traffic over surrounding areas. In the mid-1970s, as part of its attempt to improve relations with its neighbors, Massport and a number of citizens and municipal representatives agreed on a preferential runway use system that would more evenly distribute noise. For example, residents from neighborhoods in the southwest part of Boston agreed to receive 18 percent of the traffic. However, they have never actually received that amount [152].

The runway configuration that sends traffic over southwest Boston consists of two, not three runways. As traffic grew at Logan, it was not possible to use the two-runway configuration without suffering delays. So because these areas have received less noise, neighborhoods to the north and south of the airport have received more than what was agreed upon. The new runway would allow for an alternative three-runway configuration that would enable the air traffic controllers to meet the preferential runway use goals and more equitably distribute noise.

As is to be expected, the municipalities to the southwest and west of the airport oppose the proposed runway because of the increased noise they would receive, even though they currently receive less than they agreed to in the 1970s. One would then expect the towns north and south of Logan to support the runway because of the decreased noise they would receive. But because of the mistrust of Massport that remains from the authority's actions in the 1960s, there is only one municipality that supports the runway (located over ten miles away), and over twenty opposed. As a Boston official said, "I feel bad seeing people opposed to this runway, but they don't understand the issues. They don't understand how an airport operates. And what makes matters worse is they *don't* want to discuss it. They don't want to talk to the Port Authority, they don't trust them!" Activists also claim that the runway is a case of environmental injustice, that the neighborhoods that would receive more noise have a disproportionately large number of poor and minority residents.

As of June 2002, the question of noise distribution via the new runway was made moot. The head of the FAA, Jane Garvey (whose previous job was executive director of Logan), decided to approve the runway but under the compromise that it be used only when northwest winds are strong enough to prevent the usual three-runway configuration from operating. However, there are still two lawsuits pending against Massport to stop the runway, and the issue will not be settled until at least the summer of 2003. One of the main issues is whether the new runway counts as "expansion" of Logan. Massport insists that new capacity is not being created, that the runway will only ease existing delays. Opponents consider any addition of runway space to be an expansion, thus gaining a discursive tool by tying Runway 14-32 back to previous expansions of Logan that harmed nearby neighborhoods.

As stated above, one of the major criticisms of regionalization is that it focuses solely on air transportation. A number of municipalities and citizens' groups claim that Massport is only superficially promoting regionalization to gain support for Runway 14-32. These people argue that a multi-modal, multi-state transportation plan is necessary before any improvements such as a new runway should be considered. The neighbors of Hanscom Field are particularly vocal in their call for more emphasis on high-speed rail rather than air travel.

While runway opponents see regionalization as an alternative to the runway, Massport sees both as necessary: Runway 14-32 will not create more capacity at the airport, but simply reduce delays under certain wind conditions. Because Massport continues to advocate the new runway, opponents claim they are not sincere in their commitment to transportation regionalization. One example is the argument by neighbors of Hanscom Field that Massport should be encouraging train travel to New York rather than allowing

commercial service from Hanscom to LaGuardia. Massport counters by noting that even though New York is the most popular destination for Logan travelers, it is still a fraction of total flights, and the train is not competitive for trips farther than New York. Massport insists that the runway and the train and the regional airports are all needed to add up to the capacity that a second airport could have brought to the region, while opponents claim the train and other methods such as teleconferencing are enough.

Meeting the goals of regionalization

The second research question concerning the Boston area is, "has regionalization been successful?" While there is certainly room for debate over the meaning of "successful," it makes sense to measure the success of regionalization by the goals listed above: reducing demand at Logan, providing air service and economic development to sub-regions of New England, and sharing the burden of air transportation throughout the region. The overall goal of meeting the projected increase in New England air traffic has yet to be seen; while it seems unlikely that regionalization will provide capacity equivalent to a second major airport, the recent decline in air traffic means less capacity is necessary. Each of the five New England airports have experienced the impacts of regionalization in a different way, in part because of their individual contexts and in part because of the role each has been asked to play in a regional air transportation network. It is clear that while the benefits of expanded air service have been felt throughout the region by travelers as well as municipalities, the negatives have been dispersed as well.

Logan International Airport

To some extent, regionalization has benefited Logan. The number of operations dropped by 4 percent between 1998 and 2000, while nationwide operations increased by 7 percent over that same time period [72]. So one would expect delays to have diminished in length with fewer planes around. However, the number of passengers has increased over that same time period, also by 4 percent. Therefore, the hoped-for decrease in ground congestion around Logan failed to come about.

At the same time, it does seem that the plan for shrinking the market or catchment area for Logan has been successful. In a letter to the FAA encouraging the approval of additional commercial service at Hanscom Field, a number of Boston-area state Congressional representatives noted that from 1996 to 1999, 1.5 million fewer passengers traveled from outside I-495 to use Logan. Outside this 25-mile distance, passengers were presumably traveling to T.F. Green, Manchester, or Worcester instead. These numbers would suggest that the strategy of dispersing New England's growth to the regional airports is, indeed, working.

A planner from the city of Boston notes that citizen complaints have decreased to some extent, though this is largely a function of the changing demographics of East Boston:

> " [T]here's a lot of bitterness, still. It's just that the numbers of people who feel bitter have decreased. There's been a sort of metamorphosis over the last 10, 12 years. Where it was predominantly, 90 percent Italian. Now you have maybe 40 percent Italian, and now you have 50 percent Hispanic population […] And the new arrivals really haven't, I think they're more concerned with getting a foothold in America, creating a way of life,

> getting a job, supporting a family […] I don't think the times are as sensitive as they were back then. I mean 40 years ago, you had houses being knocked down, it was very very scary. It was very frightening. Today, they come here, and there's an airport there. So what? There's an airport there, they know that […] Why do they want to fight the airport for? A lot of them work there."

Nevertheless, Boston's official position is still opposition to the runway and in favor of a stronger regionalization program that includes a greater emphasis on rail and regional airports, because of the strong anti-Massport attitude that still exists in much of East Boston.

Because of the limited land available at Logan, Massport has been working to move some of the ancillary uses that are currently on airport property to surrounding municipalities. Responses from those municipalities have been mixed. Boston planners describe this ancillary development as "infiltrat[ing] the community," whether freight forwarders with their concomitant truck traffic, or park-and-fly lots using valuable land for parking. The city of Boston went so far as to rezone the entire neighborhood so no future ancillary development could come in, and over time has persuaded the airport to take back most of the parking spaces. The city of Chelsea, to the west of East Boston, has welcomed ancillary development for economic reasons, after being in state receivership in the early 1990s. An employee parking garage is located in the city, as well as a number of freight forwarders. Revere, to the north of the airport, laments the fact that though more of its citizens are affected by noise than Chelsea, Chelsea has received the bulk of the economic activities that Massport has shifted off of airport property. Both cities hope for more airport-related hotel and office development, without any more parking or car rental lots. However, both Chelsea and Revere are opposed to Runway 14-32, Chelsea because it would increase noise for the city, and Revere because they see it as an expansion that would harm the city in the future. Winthrop, located north and east of the airport, sees no direct economic benefits because of its residential character (though it does benefit from the property taxes of airport and airline employees), and is opposed to the runway because they perceive it as an expansion. Furthermore, other parts of Massport's proposed project, including a new taxiway between the parallel runways, would affect Winthrop directly and are more strongly opposed by the town.

Hanscom Field (BED)

At first glance, the opposition to commercial service at Hanscom Field is a classic NIMBY situation (Figure 31). The four towns surrounding the field (Bedford, Concord, Lexington, and Lincoln) have the highest per capita incomes of any municipalities in this study. Route 128, Boston's high-tech corridor, runs right through these towns, and the positive relationship between frequency of air travel and both per capita income and high-tech employment has been well established. These relationships suggest that while the residents of these towns are frequent users of air service, they do not want the negatives of air travel to appear in their back yards. However, there are other issues, notably the presence of nationally important historic and cultural sites, that make the question of Hanscom Field more complicated. Additionally, as corporate jets become

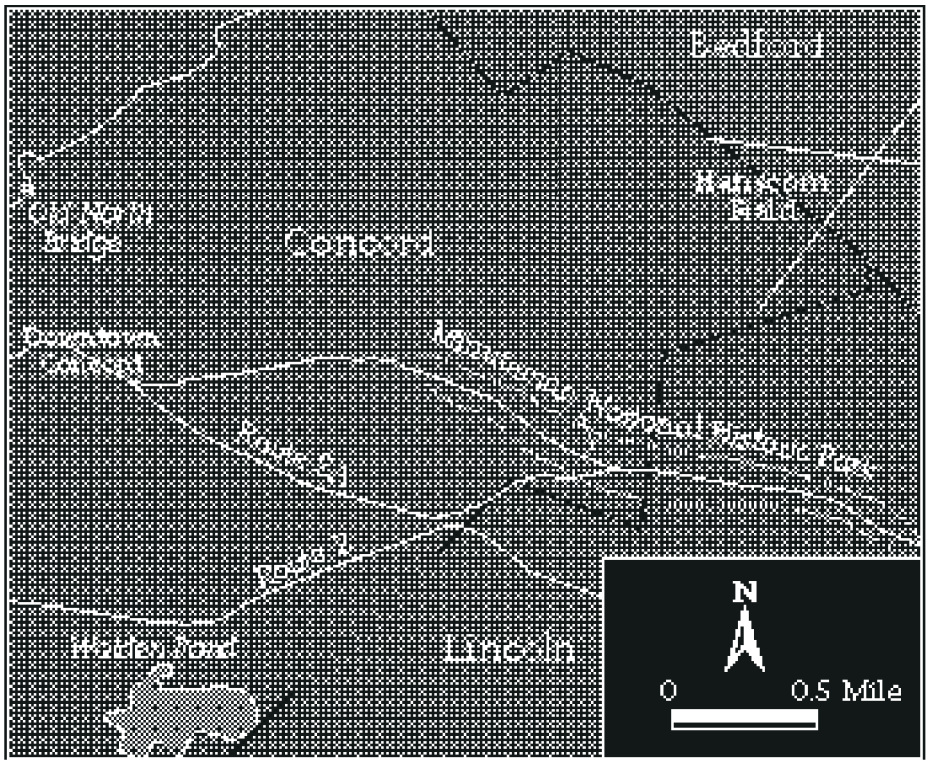

Fig. 31. Hanscom Field in relation to Minuteman National Historical Park and Walden Pond

larger, the fleet mix at Hanscom is changing, questioning the definition of "expansion" in a different manner than at Logan.

Massport maintains that the role of the airfield within its system is to serve as a general aviation reliever for Logan, with some commercial service (limited to planes with 60 seats or less). But Massport's perceived history of breaking promises at Logan has made Hanscom-area residents wary of trusting them. For example, because of the often exploratory nature of proposals for commercial service at Hanscom, Massport has not always informed the four towns when an airline is considering service. Thus, residents may see an announcement in the newspaper before hearing official word from Massport. As a local official said, "I think it's fair to say that the perception in the towns is that Massport people who interact with us, with a *couple* of exceptions, are either dishonest or incompetent, and it's hard to tell which."

Another issue involves the fact that Hanscom's surroundings are markedly different from Logan's. The four towns, while largely suburban in character, place considerable emphasis on preserving open space; Concord and Lincoln, the two farthest out, are particularly proud of their rural landscapes. The Concord-Lexington area is home to some of the nation's most historic sites, including the Battle Road on which the British retreated back to Boston in 1775 after the first battle of the American Revolution, as well as Walden Pond and the homes of Ralph Waldo Emerson and Louisa May Alcott. Residents fear that the experience of visitors to these sites will be lessened by airplane noise and increased ground traffic: "Hanscom Airfield is in *direct* conflict with the legislative intent in the creation of Minuteman National Historical Park," said a selectman from Lincoln. Massport counters that residential and commercial development within the four towns has produced far more ground traffic than the few commercial operations at the airfield, and that ground traffic is just as harmful to visitors' experiences.

Nevertheless, there have been some local benefits realized as part of regionalization. Shuttle America has estimated that 30 percent of its customers come from the four towns, indicating that there *is* local support for commercial service, however quiet that support may be. Economic development benefits are different from those of other airports because of the small percentage of flights that carry passengers. Massport's The State of Hanscom annual report estimates that Hanscom contributed $110 million to the regional economy in 2000 (comparable to Manchester before the arrival of Southwest). Of this, about 55 percent was attributable to direct expenditures at the airport, a lower than average percentage because of the small amount of commercial service. Local officials note a minimal impact in terms of economic development despite the number of firms with corporate jets based at the airfield, like this selectman from Lexington: "I talk with our economic development officer with some regularity, and I'm not aware of any business ever raising the civil side of Hanscom as a plus factor in their decisionmaking." For Lincoln in particular, most of the town's revenue comes from property taxes, and thus any perceived drop in property values due to overflights at Hanscom has potential fiscal impacts for the municipality as well as homeowners. Hanscom Air Force Base is another story: an R&D facility rather than a base for aircraft, the base has played a major role in the high-tech development along the Route 128 corridor. The towns are quick to

acknowledge that they have no quarrel with the base and are appreciative of its economic impact.

Because the adjacent towns are some of the wealthiest in the area, the question of "sharing the burden" is often raised by neighbors of Logan. The organization titled Save Our Heritage, devoted to preserving the historic sites around Hanscom, has been nicknamed Save Our Property Values in Boston newspapers (e.g., Carr 2001). Boston's mayor, Thomas Menino, has taken up this argument, asking, "Are their historical parks better than our historical parks? I doubt it…the people near Hanscom want to live first class and they want [Boston] to live coach class? That's basically what it's all about" (Hiller 2000). The question of environmental justice has been raised because the residents nearest to Logan are lower income and higher minority than those near Hanscom. Not only is the distribution of environmental effects uneven because of the location of the airport, but those who produce those effects, i.e., fly, are more likely to live near Hanscom than Logan. "And so the reality is no matter how they phrase it, they don't really want people flying over *their* homes, but they will continue to fly over somebody else's. Either Green, Manchester, or Logan. And drive through other people's neighborhoods. But they don't want it happening in their neighborhood," said a Massport official. Another example is the use of middle-income housing by the town of Lincoln as a "buffer" near Hanscom Field, where the town met state requirements for affordable housing by locating a development adjacent to the airport entrance (albeit with soundproofing built into the units).

Hanscom opponents decry this argument as "class warfare," accusing Massport of setting communities against each other in order to further their own agenda. They defer the question of equity by arguing for multi-modal regionalization, handing out Acela train schedules as part of regular picketing at Hanscom (ShhAir 2002), and note that plenty of well-to-do Bostonians are affected by noise at Logan as well (SOH 2002). They also argue that their situation is different, that the national and state parks around Hanscom require quiet surroundings for visitors to achieve the full experience.

Despite these differences, the organizations fighting Massport at Logan have pledged to work with organizations fighting expansion at Hanscom at least as a political strategy, since they have a common enemy. "[W]hat we said was we need to support each other politically as, so that one, we don't have politicians worrying about, you know, if I go with the Logan group I'm going to [anger] the money people at Hanscom, 'cause Logan is not big, deep pockets and Hanscom is," said a representative from the anti-Logan group CARE. Such an alliance is tentative, however, and is prone to splintering if air traffic is seen as a zero-sum game between Logan and Hanscom.

Finally, the acceleration of regionalization after September 11 has affected Hanscom because of its role as a reliever airport for Logan. The number of business jets has increased dramatically, up 50 percent over the same month in the previous year throughout 2002, and a three-fold increase from 1995 (SOH 2002). Additionally, fractional ownership is becoming more popular, where businesses own a small share of a private aircraft, thus making corporate air travel available to businesses that can not afford a jet of their own. This trend was already starting before September 11, 2001, but has accelerated because of security concerns (both personal safety and time spent in line

at the airport) and the recent economic downturn. Because of the increase in fractional ownership, larger corporate jets are flying out of Hanscom. As more of these jets come in, the touch-and-go flights conducted by the two flight schools based at Hanscom are shifting to smaller airports in the region. The fleet mix at Hanscom therefore shifts away from single-engine planes to full-size jets, exacerbating the noise problem. Hanscom opponents are particularly worried about this expansion in the form of changing fleet mix for two reasons: it is more difficult to fight than the introduction of commercial service, and after nine months, the trend shows no signs of slowing.

With regards to the three goals of regionalization, Massport has been only somewhat successful at Hanscom. By acting as a reliever for Logan, Hanscom provides runway and hangar space for aircraft that are much smaller than the average jet, allowing for more passengers to make use of Logan's limited runway space. As far as providing more service to the Route 128 area, Hanscom opponents feel they have succeeded in discouraging their neighbors from using such service as is provided. For example, Save Our Heritage notes that while service to Philadelphia and Trenton has been somewhat successful, that is largely because of inward-bound passengers using Hanscom to access Route 128. Shuttle America's brief and unsuccessful service to Martha's Vineyard in the summer of 2002 suggests that peer pressure within the four towns is strong enough to discourage Hanscom neighbors from using the airfield. Because of the lack of commercial service, then, it is difficult to say that Hanscom contributes towards "sharing the burden" of air transportation, though the demographics of the four towns suggest they do contribute towards creating that burden. On the other hand, Save Our Heritage notes that its executive director actually refuses to fly on principle. Other members use T.F. Green or Manchester rather than Logan or Hanscom, much to the dismay of neighbors of those regional airports (see below under T.F. Green). Airport operators thus are further ahead of airport activists in terms of regional cooperation.

Worcester Regional Airport (ORH)

The third airport under Massport's jurisdiction, Worcester Regional, has the opposite problem as Hanscom: not enough airline service. Here, too, residents are wary of Massport, who only recently took over operations. The biggest conflict at Worcester has been over access *to* the airport, which is currently via residential streets. Residents are concerned that a major road is not necessary when there are barely enough passengers using the airport to convince airlines to serve it. As of February 2003, in fact, the airport has no commercial service.

Worcester tried to join the airport regionalization that was already starting to benefit Providence and Manchester in the late 1990s, but was unsuccessful. The main reason, airport operators thought, was the difficulty of ground access. The interstate highways that serve Worcester are not adjacent to the airport, requiring miles of travel down congested local roads. So planning began for an airport access road to connect from I-90 along the south edge of town, or I-290 along the eastern edge. This road has been the source of the strongest anti-airport activism in Worcester, because of its potential routes through neighborhoods. Like East Boston, the city has a history of being torn apart by transportation infrastructure improvements, namely I-290, and is wary of any new highways (Dempsey 1999).

Besides commercial service and road access, the other main issue at Worcester has been the question of governance. As early as 1996, Massport began talking about taking over operations, since the city-operated airport was experiencing budget problems. The city was wary of handing over control, worried that a state-level agency would simply override local concerns (as was their history in East Boston). But budgetary constraints won out, and in January 2000, Massport began operating Worcester. Within six months, Delta and American had resumed service, and Massport began a big marketing campaign both locally and within the region. Traffic was slowly beginning to increase until September 11, 2001, after which Worcester became one of the victims of airline route cuts and has now lost all of its commercial service (Brelis 2003).

In 2002, the Worcester City Council voted against the proposed route for ground access. This vote has made Massport question the viability of Worcester, and since they agreed to operate the airport for only a five-year term, it seems likely that they will turn the airport back to the city in 2005. Opponents to Logan and Hanscom expansion claim this shows that Massport is not seriously committed to regionalization, but others contend that it does not make sense for Massport to run an airport that is losing money and is not fully supported by the city.

Worcester is an example of how the plans that seem logical from a regional point of view in terms of redistributing air traffic are not as logical from an airline or a local municipality's point of view. Demand within the Worcester metropolitan area itself is not large enough to justify the frequency of service that is necessary for business travel, so passengers need to be attracted from the western edge of the Boston metro. In order for them to get to the airport, however, there needs to be better ground access, and the municipality is not willing to sacrifice its residents' homes for that to happen. While Worcester and Massport have been criticized for not having the political will to make the airport successful, it might just be that they are choosing to obey the wishes of those who would be most affected by airport expansion.

T.F. Green (PVD)

T.F. Green Airport in Warwick, RI, has been the most successful case of the regionalization that Massport is now trying to encourage, at least in terms of drawing air traffic away from Logan. While planning and marketing had a lot to do with this, the arrival of Southwest Airlines in 1996 was the most important factor. As a result of its rapid growth, T.F. Green is experiencing many of the same problems experienced by other, larger airports, largely because of the history of land use nearby.

In 1996, Southwest entered the market at T.F. Green, resulting in a rapid increase in traffic and a concomitant decrease in average fares. As has been observed across the nation, these changes were not only due to existing travelers switching to Southwest, but from other carriers matching their prices, and from new travelers taking advantage of the increased (and cheaper) supply of flights, including travelers who had previously driven to Logan from southeast Massachusetts. After a year's time, traffic at T.F. Green had increased by 80 percent, the first international flights were in operation, and the next plan for expansion had been approved.

As might be expected, 1997 was also the time when citizen activism began to grow (though it had existed prior to this time). There had been a soundproofing program in place since 1992, but the rapid growth in traffic was overwhelming the program. The only concrete step the Rhode Island Airport Corporation (RIAC) had taken to work with airport neighbors was to sign a Memorandum of Understanding that airport noise would be kept to a minimum, with no specific agreement on how that would be done. In 1997, RIAC announced it would conduct a new Part 150 study due to the rapid growth in operations, and unlike most Part 150 studies, it would be based on actual flight tracks rather than computer models. By June 1998, the preliminary results showed a 23 percent increase in the number of residents in the 65 DNL, at a time when most airports' noise contours were shrinking due to the introduction of Stage 3 aircraft. But when the final study was released in March 1999, it showed that the changeover to Stage 3 aircraft would reduce the number of affected residents to what it was before the 1996 traffic increase, thus requiring no increase in the soundproofing program.

Meanwhile, the growth in operations continued, as did more serious attempts at mitigation. By October 1998, T.F. Green carried over 0.5 percent of all enplanements in the U.S., moving it from Small Hub to Medium Hub status, and reducing the portion of its projects that would be paid for by the federal government (DePaul 1998). Traffic had increased from 1.25 million passengers in 1995 to 5.1 million in 1999. In March 1999, RIAC finalized plans with a group of twenty-seven homeowners to buy their homes and replace them with a more compatible land use. In February 2000, a plan was announced to buy out another 264 houses at the request of residents, while approximately half of the remaining 1,800 houses in the 65 DNL had been soundproofed. Compare this to 7,358 units around Logan and 584 around Manchester (Massport 2002, Lazar 2002). Operations changes have been largely ineffective; those that shifted the noise to other areas were opposed by residents in those areas, while attempts to make pilots approach over a less-populated area were unsuccessful because of the shorter length of that runway.

In July 2000, another runway extension was proposed for the crosswind runway to enable a shift of operations. The extension would have removed some wetlands at the southeast corner of the airport in the city of Warwick. Under Rhode Island state law, a municipality has the right to veto any proposed development if it would damage wetlands within the municipality's borders (Section 2-1-21). In the words of the airport's executive director, "the local municipality can unilaterally veto your permit from the -- not based on science or anything, maybe because they don't like my haircut and will veto. And that is what they intended to do." The city of Warwick, opposed to any airport expansion, did indeed veto the runway extension in 2001. RIAC then went to the state legislature to try to have the law amended to exclude T.F. Green, but was unable to do so during that legislative session. The airport planned to try again in 2003 with both the runway extension and the amendment to state law.

If one of Massport's goals in regionalization was to "share the pain," that has certainly been achieved in Providence. Citizens complain not just about noise, but about health concerns, including increased cancer rates (not formally documented) and "black gunk" on their houses (CAN 2002). Houses are located literally across the street from the runways, leading to some of the most extreme effects of airports on residents anywhere in

the country. According to airport officials and activists, however, a large portion of the blame for this lies with the neighboring municipality of Warwick for continuing to allow the building of houses next to the airport as late as the 1970s (Cheston 2001). "When this [airport] was first laid out, it was surrounded by undeveloped land […] at no time was the airport addressed" (CAN 2002). While home buyouts over the years have reduced the number of residents affected, there are still over 600 housing units inside the 70 DNL, comparable to MSP rather than similiarly-sized airports such as Manchester.

In addition to local land use conflicts, Rhode Islanders seem resentful of anyone coming from outside the state to use T.F. Green, in contradiction to their governor's statement at the beginning of this chapter. "[M]ost of our passengers still come from -- I was going to say Rhode Island and I shouldn't. Because it's a *county* […] There is this myopic view of this little Rhody state as a -- as we should close our borders down, the only people who can use this airport are Rhode Islanders," observed the airport director. As an activist said, "[A]ll we need is a mid-sized airport. Competing with other area airports for those flying out of Massachusetts and Connecticut was not part of the plan " (Murphy 2000). Indeed, a 1998 survey of airport users found that only 48 percent were traveling to or from Rhode Island, while 36 percent were traveling to or from Massachusetts, 9 percent to or from Connecticut, and 7 percent were connecting passengers (WSA 1998).

Citizens admit that Rhode Islanders do tend to be parochial in their concerns because of the small size of their state, but they note bitterly that Logan opponents have promoted the use of T.F. Green as much as Massport has, again suggesting that regionalization has not taken hold among activists in the same way it has among airport operators. "[T]hey had studies done in Boston showing the damage [Logan's] causing to the environment there. So they've been fighting it for 20 years. So they're saying, "Well, go somewhere else instead." And we have the people who are fighting Boston, coming down and working for the airport to push it here […] It's like you know, we're like the biggest saps in the world!" (CAN 2002). If one of the goals of regionalization is to placate Logan opponents by encouraging sub-regions to use their own airports, it appears that the same issue of out-of-towners polluting airport neighborhoods also exists at the smaller airports.

Citizens note that the economic development benefits of the airport are generally considered to outweigh its negatives, as far as both municipalities and individuals are concerned, and that it is difficult to get people to pay attention to the negatives. "The problem is, the people that *are* benefiting […] *don't* live with this so it doesn't bother [them] […] And it's like, it's amazing, it's almost comical: why are people not outraged? There's no outrage about this; there should be" (CAN 2002). Warwick, the city where T.F. Green is located, is generally working-class or middle-class, and so airport jobs are important to the local community (though they are typically minimum wage).

T.F. Green's director sees it as "part of the answer for the overall 23 million coming [to New England] in the next 20 years," though "at some point we'll just run out of room and space, and unless the political environment in this state changes significantly, I don't see us going much beyond the borders" (Cheston 2002). While the theoretical capacity of the airfield extends to 16 or 18 million passengers (from a level of 2.5 million in 1999), 10 million seems to be the limit in terms of ground infrastructure and community acceptance. A new Master Plan is currently being completed, but citizens are arguing for

a baseline environmental report on the effects of the airport on residents' health before a new plan proposes changes that might increase those effects. The airport is largely unwilling to go beyond the bounds of what is required by federal law in terms of environmental review, further exacerbating airport-neighborhood relations. By the measure of air traffic, T.F. Green has played a successful role in the regionalization of air transportation in New England; on the other hand, the same airport-neighborhood conflicts that have plagued Logan have simply been repeated at another location.

Manchester (MHT)

Southwest's success in Providence led to its decision to start service to Manchester in 1998, with the expected growth in traffic following. From 58,000 passengers in 1985, the airport handled 1.3 million in 1998. Manchester reports that as of 1999, the percentage of New England travelers coming from outside New Hampshire has increased from 7 percent to 20 percent (Leigh Fisher Associates 1999), indicating that Manchester has been successful in drawing travelers away from Logan. Furthermore, the percentage of travelers flying into Manchester from outside New England has increased from 33 to 41 percent, indicating that efforts to market regionalization outside the six-state area have worked as well. The airport has also been successful in terms of attracting benefits and diluting negatives from the Boston area, meeting the second and third goals as well.

The tremendous increase in traffic at Manchester has not led to as much citizen opposition over noise as in Providence, largely because the area surrounding the airport is still largely undeveloped (and perhaps because the increase in noise is so new). A Part 150 study was carried out as early as 1989, and a soundproofing program began in 1993. In 1994, the FAA approved $1.76 million for voluntary buyouts of homes. Like MSP, Manchester has pursued federal funding for soundproofing beyond the 65 DNL, though there is some concern on the part of local municipalities over how this might affect future residential development. The airport has been proactive with regards to community relations, with the executive director attending quarterly meetings in the adjacent towns and keeping the towns informed of upcoming activity changes at the airport. The airport director notes that this has established an important level of trust missing from other airports such as Logan: "the community […] may not necessarily like what I have to say all the time, but they're going to believe me." He also found that the same citizens who complain about noise later ask for service to additional destinations, indicating that they are aware of the benefits as well as the costs of increased air service, something that is not always true of airport neighbors.

The opposition that has come, and has led for calls for state rather than municipal control of the airport, mostly has to do with ground access. Currently, there is no limited-access road that connects to the airport from the south, making it difficult for travelers from the Boston metropolitan area to access the airport. A route for a southern access road was first approved in 1990, but was deemed unacceptable. A new route was proposed in 1997, but a pair of bald eagles was later discovered to be nesting along that route. The ensuing controversy halted construction of the road, but by early 2002, the eagles had left, and construction began on the access road (Capone 2002).

One of the other reasons why there has been much less opposition at Manchester than any other of the study area airports has to do with economic development. The airport

director notes that as "the premier airport for the entire state of New Hampshire (which is a very small state), really, the emphasis that this airport gets is amazing […] people *appreciate* Manchester Airport. It's been quite a change for me quite frankly, going from New York and Boston to a place where people really seem to understand the importance of the airport and what it does to the local economy." In contrast to MSP, then, where the regional benefits are spread over a much larger area than the negative effects are, the state of New Hampshire is small enough that economic benefits are felt over a fairly small area. Interviewees cited Fidelity Investments as a company that has moved to the area because of the air transportation access. The German water filter company Brita located its North American headquarters adjacent to the south side of the airport, and the Segway transporter company located across the Merrimack River, for the same reason. The neighboring municipality of Londonderry is looking forward to even more development to balance out residential property taxes as the town continues its rapid growth.

These clearly identifiable economic development benefits, coupled with a relatively small number of affected residents, make Manchester an example of the positive side of regionalization, in contrast to other study area airports. However, the emphasis is more on attracting development to New Hampshire rather than sharing the regional burden of air travel. The airport director spoke of competition between Manchester and Logan for passengers in the northern Boston metro, underlining the sometimes uneasy alliance between Massport and the regional airports. The increased air service has benefited individuals and firms alike, though as with T.F. Green, the discussion is largely limited to the state level. Finally, while there is little evidence of citizen opposition, this may be because the neighboring municipalities officially support the airport and no activist organizations have yet formed. Dillon noted that now that residents are aware of the consequences of the 3.5 million flights per year the airport currently handles, discussions of doubling that amount might lead to more opposition.

Conclusion

Returning to the original research questions, regionalization has come about from a number of factors that for the most part are unique to New England. Unlike most of the rest of the country, the region is too densely populated to have enough undeveloped land available for a new major airport. Yet, the region is not only growing in population, but is known for its high-tech jobs, which correlate strongly with air travel. The FAA and airport operators have worked together to divert some of the projected demand from the region's major airport to smaller, regional airports, and user statistics show that they have succeeded in this regard. Some of this diversion has occurred from the supply side as well, with Southwest Airlines altering the travel patterns of those traveling to and from New England. And with the large number of sub-regional centers throughout New England combined with the suburban sprawl of Boston, population is dispersed enough that using a multi-airport system is more feasible here than in many other parts of the country.

Despite the motivations for regionalization, there are some impacts that would translate to any other region considering the same approach. First and foremost, the positives and negatives of the major airport are repeated at a smaller scale at the regional airports. As was noted for Manchester, it may be easier to identify the economic benefits of an airport

to a state when the area under consideration is the size of a metropolitan area in other parts of the country. Travelers are benefiting from shorter travel times to alternative airports that often have cheaper fares than Logan. Citizen opposition is apparent at all of the four regional airports, though it is louder in some places than in others. This opposition is predominantly concerned with noise, though there are also concerns over health and ground traffic. There is, however, resentfulness on the part of airport neighbors that people from the catchment areas of other airports are not staying in their own backyards, as it were, to catch a plane. It seems unlikely that this uneven distribution of negative effects can be fixed without placing airports at a density too high to preclude their use. A more equitable means of balancing the negatives with the positives is necessary to make airports acceptable to their neighbors.

Increasingly, the list of destinations from the regional airports matches that of Logan: airline hubs and major East Coast cities. The system is not an interconnected network so much as an ever-growing collection of spokes. This network structure belies Governor Almond's statement at the beginning of this chapter that New England is acting as a single unit without international competition, as do comments made by interviewees who neighbor regional airports. If processes of globalization are making the region increasingly important as an economic unit, it appears that sub-regions are growing in importance, too.

There are a number of ways in which the local experiences of the regional airports are feeding back into the system as a whole. T.F. Green and Manchester already foresee reaching their capacity limits within a couple of decades, despite the expansion projects that are underway or planned. It is unclear as to where future growth might be accommodated after 2020. The zero-sum nature of accommodating air transportation growth is responsible for tensions among anti-airport groups, who thus far have been able to share information and limited political support, but have not been able to form regional networks in the same way that airport operators have. If this were to happen, the limits on growth might be achieved even earlier than the airports themselves predict. Additionally, Massport's experience at Worcester highlights the difficulties in getting the profit-driven airline industry to act in a manner that fits with a regional air transportation framework.

Finally, opposition at the Massport-operated facilities in particular has led to calls for a regional transportation approach that goes beyond airport capacity, potentially the most exciting development to come out of New England regionalization. It is unclear as to whose jurisdiction such an approach would fall under, and indeed that is one of the problems with starting such a movement. Proponents are optimistic that federal legislators are increasingly interested in rail as a means of short-haul transportation, and that the potential exists for serious investment in rail such has taken place for roads and air travel for the past several decades.

CHAPTER 7

PLANNING AND PUBLIC PARTICIPATION

> "But when you work in City Hall they rely on you for a *lot*, because they look at you as big brother who's out there to protect their interests, the taxpayer. And they can be very very very…overwhelming […] We have to fight this runway with 100% of everything that we've got. Because if you don't, you're going to have to find a job. It's all perception" (Bob D'Amico, Boston, MA, 2002, [152]).

> "[L]ocal politics can and has prevented the improvement of the national airspace system. And that *where* runways get built has nothing to do with the needs of the system, it has everything to do with whether the local entities want economic development or not" (Director of Planning Betty Desroisers, Massport, 2002, [36]).

> "And people accept that 'they' are always going to do what they're going to do, and they're always going to get their way, so what's the point? Why waste my time? […] Since we have not gotten the airport to say, 'We're not going to grow, you win,' essentially in [residents'] eyes we lost" (Concerned Airport Neighbors, RI, 2002 [154]).

> "The anti-runway folks are using this kind of regional airport thinking to stop everything…until this multi-state, multi-modal plan is in place, and *then* begin--as if, you know, plans are static things, rather than evolving things" (Director of Planning Betty Desroisers, Massport, 2002 [36]).

Though the above quotes are all from the Boston area, they reflect the four main issues concerning public participation and planning that were found throughout the study areas. First, municipalities need to act in the best interests of their constituents or citizens, as part of their governmental function and possibly for personal gain as well. These constituents include economic as well as residential interests, resulting in a balancing act on the part of the municipalities, in terms of what they say as well as what they do. Secondly, the process of airport expansion, though not necessarily the decision whether to expand or not, is determined locally by municipal power and politics. Localities and citizens *do* have the power to affect airport expansion, though it is perceived as power to delay or stall the inevitable rather than to be part of the decisionmaking process. Increased power sharing leads to greater cooperation and compromise, which ironically may hasten further expansion. Next, there is a difference between the scope of airport and municipal planning in terms of both time and space, and this difference has a huge impact on their respective planning processes. Municipalities may not be large enough to keep their land uses compatible with airport operations. Additionally, the long time scale and the necessity of keeping airport plans flexible further reduces municipalities' ability to take the airport into account in their own planning. What is seen as flexibility on the part of airport planners can translate into uncertainty for municipal planners. Finally, the nature of planning and public participation were called into question by a number of respondents, reflecting a divide between citizens and officials as to the meaning of each.

Most prominent was the issue of whether following regulations constituted sufficient mitigation, as well as the question of whether "participation" meant providing input that was incorporated into the project or simply receiving information as the project progressed. This chapter explores each of these issues in turn, using material from all three case studies.

Chapter 2 reviewed the literature on the politics of scale, including Cox's theory on spaces of dependence and engagement. To review, the space of dependence is the area in which a group of persons or political unit conducts the activities that ensure their economic and social reproduction. For example, the basic elements of an individual's space of dependence would be their home and workplace. The space of engagement is where politics take place that ensure the space of dependence is maintained. For individuals, this might include the municipality that levies property taxes and the school district where their children attend school. Because of the complex, multi-scalar nature of airport expansion issues, these spaces of dependence and engagement are a useful mechanism for thinking about the actors and politics involved.

Municipalities as political units

The local unit of government known as the municipality serves certain functions relating to land use and service provision. Whether a town, village, or city, an incorporated municipality preserves the space of dependence of its residents and businesses, providing them with jobs and workers, housing opportunities, infrastructure, and other services. When issues at larger scales affect a significant number of interests within a municipality, that town or city must take a position representing its constituents with regard to that issue. In doing so, the interests of businesses must be balanced against those of residents. Frequently, regional or state concerns become subordinated to municipal needs or wants in this process of taking a position.

There are striking differences among the case studies with regard to municipal support for airport expansion. In Minneapolis-St. Paul, none of the seven municipalities interviewed officially opposed the expansion of MSP. Richfield was the only one with serious objections, based on the disproportionate impact its residents would experience. In Boston, only one of dozens of affected municipalities is officially in favor of the proposed runway; the neighbors of T.F. Green are opposed to expansion, while the neighbors of Manchester are in favor. Finally, in Chicago, there are municipalities who favor, oppose, and are undecided on expansion. A number of factors explain these differences, including history, perception of costs and benefits, and city/suburb politics. Perhaps most important, however, is the duty of municipalities to reflect the interests of their constituents.

The responsiveness of a municipality to its constituents has to do with two factors: whether its top officials are elected or hired, and who its constituents are. Elected officials are generally more responsive to voters than to business interests, which may skew their position on issues such as airport expansion. Ruhil et al. have discussed this responsiveness in regards to reinventing government, noting that the competition among suburban municipalities for residents and firms drives municipal officials to respond to a wide variety of interest groups [155]. The mix of land uses and thus constituents within a

municipality will thus influence the relative power of these interest groups and thus the municipality's official position on external issues, as well as the actions it is able to take.

Municipal governance and constituencies

Chelsea, MA, is an example of the difference that municipal governance makes. State receivership in the mid-1990s included the requirement that city government be led by a city manager who would be hired rather than elected. The new manager has pursued a closer relationship with Massport without the pressure from the electorate to maintain political opposition. A city planner commented, "So in the Massport bureaucracy, they know they're dealing with a professional who's running the city as opposed to -- and it's more strategic as opposed to a council that has to respond to voters." The municipality has benefited from increased economic development opportunities promoted by Massport, lowering residents' share of the tax burden and providing jobs, while the city retains its official position against airport expansion.

Another example is the contrast between Des Plaines and Norridge, IL. The city manager of Des Plaines was recently hired away from College Park, GA, adjacent to Atlanta's Hartsfield International Airport. Based on his experiences in Georgia, he has made Des Plaines more willing to compromise with O'Hare than nearby municipalities are. His pragmatic view is that "if you are a quote-unquote airport community, you need to either deal with it, or you're going to get nailed by it." This attitude is in stark contrast to the predominantly residential Norridge, where the village clerk said, "To [city managers] it's a job, and some of them stay and some of them move on to bigger and better things, but they don't have that…direct…they're not answerable to the residents, and we think we should be." This is not to say that hired managers are automatically in favor of airport growth while elected officials are opposed. Rosemont is controlled by a mayor, and its predominantly commercial land use base means that the municipality strongly supports airport expansion; Bensenville's city manager is strongly opposed to expansion because of the negative effects that he feels businesses as well as residents would experience. However, for the most part, non-elected city managers are more likely to balance the interests of businesses and residents rather than focusing on the needs of the electorate.

In fact, the official position of a number of municipalities would be significantly different were it not for citizens expressing their views, sometimes to the extent that they override the views of non-voters. Chapter 6 described how the city of Boston has taken an anti-runway position for political reasons despite planners' feeling that the city would benefit from the runway. A planner from Cranston, RI, for example, noted that while city staff do not consider airport noise to be a significant issue due to the city's distance from the runways, resident complaints have forced the staff to consider it as such. At the other extreme is Inver Grove Heights, MN, as described in Chapter 5. Located under the flight path but several miles away from MSP, the city has not experienced sufficient pressure from residents to make airport noise an important issue. Ironically, by the time airport noise *does* become an issue worthy of city resources, it will probably be because people have moved into the flight paths, when it is too late for the city to take internal action.

A municipality's position on issues such as airport expansion also depends on the mixture of its land uses and thus constituents. A planner from Eagan, MN, commented, "The balance is between the overall community benefit and the affected individual concerned.

The difference there is that Eagan *does* derive tremendous benefits from the location of the airport because we have a commercial/industrial presence that is related to the airport […] offset by that is some of the quality of life that you give up here, for residents in the area that happens to be impacted by noise." For individual residents, the airport may be an overall negative, but for the municipality as a whole, there is a greater sense of balance between positives and negatives. The neighboring city of Bloomington has a similar mix of commercial/industrial and residential land uses, but the city is strongly in favor of airport growth as its residential development is generally not affected by the airport. Many officials also pointed out that they are able to attract industrial or office use because of the airport's proximity, thus possibly lowering residential property taxes. However, residents who protest against the airport are not often aware of this potential indirect benefit, and thus some education on the part of the municipality is required.

Another type of balance is between current and future constituents. For example, though municipalities around all of the study area airports have considered requiring full disclosure to home buyers of the airport's proximity, such disclosure has only been approved for new construction because of the possible effects on the property values of existing residents (and thus the municipal tax base). Therefore, current residents are protected at some cost to future ones.

In some cases, the means of governance and the composition of the constituency are closely intertwined. In the most extreme example, the board of selectmen of Bedford, MA, came into conflict with the town's citizens over a lawsuit at Hanscom Field. The other three neighboring towns were suing Massport over increased commercial service at the airfield; Bedford had elected not to join, in part because of its relatively high economic benefits from the airfield. However, residents took advantage of the New England style of government, and in a town meeting voted to force the board to join the lawsuit. Because this direct style of citizen input is unique to New England, Bedford is an extreme example of the municipality responding to its residential constituency. Nevertheless, it illustrates the fact that it is not always possible to determine whether a municipality's responsiveness to its constituency is based on the identity of that constituency or on the structure of municipal government.

What all this means for municipal attitudes towards airport expansion is that, obviously, municipalities have to act in their own best interests. A number of Chicago-area interviewees, for example, understand Chicago's point of view as the airport operator and acknowledged that they would act the same way if they had control of O'Hare, suggesting that it is not so much individuals or even single municipalities that affect airport politics as much as the governance structure itself. I would therefore disagree with those who, like the Massport director quoted above, blame the inability of airports to expand on "local politics," or at least I would question what is meant by "politics." If politics refers to the function of municipalities in terms of preserving their own and their constituents' spaces of dependence, then yes, local politics will prevent "the improvement of the national airspace system." If politics refers to individual ambition and simple unwillingness to cooperate, then for the most part I would disagree. Again, internal conflicts between planners and elected officials show that definitions of the "best interest" of the municipality may be contested. However, there are also situations where

mayors support the position of neighboring cities even when it is not in their own best interests, for purposes of political unity.

Municipal action

As municipalities act in their own interests to support or oppose airport expansion, they have a number of different options available. The most basic division is between municipalities that cooperate to some extent with the airport operator, and those that do not. The former category includes participation in municipal organizations devoted to airport issues as well as direct dialogue with the airport. The latter includes municipalities that feel they can not work in good faith with the airport, resulting in a dialogue via the media and the courts rather than face-to-face. However, it appears that this combination of adversarial and cooperative attitudes is necessary to achieve concessions from airport operators. As a Chicago-area mayor said,

> "I don't disagree with what [SOC is] trying to accomplish, they're trying to accomplish the same thing I do […] They have chosen the courtroom. I have chosen the boardroom. And I think by both of those, good cop, bad cop, I think their resistance has helped us be more effective. 'Cause given the choice, Chicago didn't want to work with those guys in a courtroom, and these people [ONCC] are coming to sit down, maybe we'll make nice with these people."

Likewise, the leader of Communities Against Runway Expansion (CARE) near Logan Airport noted that while the Community Advisory Committee (CAC) had already existed as an official vehicle for airport neighbors to provide input, CARE formed as "a guerilla group" to take more direct action such as litigation. Both groups include some of the same people, but the official function of the CAC combined with the direct action of CARE allows airport opponents more options and more ways to pressure Massport. Interviewees in Minneapolis-St. Paul agreed that the threat of lawsuits and/or unwelcome media attention influenced the willingness of airport operators to compromise with neighboring municipalities and citizens' groups.

However, municipalities have a limited amount of resources, and only the largest and wealthiest places can devote a significant amount of time and/or money to fighting airport expansion. One of the actions most limited by these constraints is networking with similarly affected municipalities in other parts of the country. While many interviewees were aware of their counterparts near other airports and agreed they often had more in common with such places than with their own neighbors, they also noted that constraints on their own time and priorities meant that basic information sharing was the extent of their interaction with these potential allies. At a smaller scale, a number of O'Hare municipalities mentioned that while they had been members of SOC at one point in time, the cost of membership (which is based on the number of residents) was too high to maintain. An ONCC mayor noted that while a hallmark of that group was the active participation of the mayors themselves, that has fallen off recently, making the group less effective. Resources are further sapped by the time it takes for individuals to learn the technical language of noise contours and airport operations, language that airport staff and their consultants are familiar with as part of their jobs.

Nevertheless, inter-municipal cooperation is one of the most common actions taken by municipalities. This might include participation in airport-sponsored organizations such as the ONCC, or it might mean more informal networks among neighbors. Municipalities around MSP in particular noted the political advantages that come from such cooperation. As one interviewee put it, "I think for the most part the communities have always tried to take the high road because they recognize that bickering amongst ourselves makes us less effective in bringing our community interests to the [MAC], and at the Legislature. You know, I think they watch things more closely than they want people to realize they do." This fear of a divide-and-conquer policy on the part of the airport operator was present at each of the three large airports, as well as to a limited extent in the Boston region. Municipalities noted the zero-sum nature of airport noise, but also felt they needed to be politically united in order to strengthen their position, as in the case of anti-Hanscom and anti-Logan activists.

Airport issues can be so important to inter-municipal relations that they color other issues as well. Chapter 5 discussed how at least one SOC member felt they could not deal with Chicago on non-airport issues because of the enmity that exists over O'Hare. Though most Chicago suburbs agreed they were able to maintain good relations with each other despite differing opinions on O'Hare expansion, it was apparent that tensions exist. As one mayor put it, "I recognize [the neighboring mayor's] position on the airport is *completely* opposite of mine, but we just don't discuss it because there's no point. I'm not going to change his mind, and he's not going to change my mind, so whatever he tells his residents, even though I might disagree with it, that's fine." Sometimes only by compartmentalizing airport issues are municipalities able to maintain cooperation on other matters. Ironically, this prevents the integration of planning concerning airport issues among multiple municipalities, an integration that is necessary considering the size of municipalities relative to the airport.

Other municipalities had the opposite experience, where contacts with their counterparts on airport issues have led to cooperation in other arenas as well. As a selectman from Lincoln, MA, said:

> "We've found common cause in *other* areas, we've been able to share resources around other issues; it's been to my way of thinking, a huge plus. You know, who would have ever thought that the downside of Hanscom Airfield would have this tremendous side benefit and allowed us to -- it's created a vehicle, an institutional mechanism for us to come together and work together. Which we never would have had before […] we're these little towns with small budgets, and if we can share information, resources, and expertise […] And by all of us working together, we have really I think doubled our clout. And doubled our functioning level, increased our ability to function efficiently, effectively."

Only around Hanscom Field, however, was this type of expanded cooperation visible, perhaps because this is the only place where municipalities are united against airport expansion for environmental reasons that extend beyond their borders (in this case, into Minuteman National Historical Park). Individuals elsewhere did note the benefits of

having personal contacts in other municipalities, but not within the context of increased municipal cooperation.

Process vs. outcome

When it comes to a multi-scalar issue such as airport expansion, the power of municipalities to influence decisions made by other levels of government is important. Interviewees spoke of the power of voters to influence their representatives at higher levels, but that municipalities themselves are largely restricted to providing input rather than being part of the actual decisionmaking process. Furthermore, since the process of airport expansion is often discursively portrayed as a "done deal," municipalities feel that while they can influence the *process* of airport expansion, including how long it takes and the type of mitigation they receive, they have no say in the final outcome of whether expansion happens or not.

Decision-making power

One of the consequences of the multi-scalar nature of airport expansion is that actors have to be prepared to work simultaneously at multiple scales, both higher and lower. One example is the connection between individual voters and state or national Congressional representatives. O'Hare opponents in particular mentioned the strong support they have received from the elected officials who represent their residents, and in turn the effort they put out to encourage their residents to vote for those officials. As one SOC mayor said, "What helps a municipality is the vote. Bottom line is, it's people that are gonna make a decision on this airport, and also have an impact on it. We represent a million people, and those million people will come out to vote, and have their voices heard." Hosting candidate forums and political rallies are therefore some of the ways municipalities act to exert power with higher levels of government. Since municipalities themselves do not have representatives at higher levels, they need to influence their residents' vote so that their elected officials represent the municipality's point of view.

Having elected officials support municipalities' views is particularly important because state or federal legislation is often involved in airport expansion. As one T.F. Green activist observed, "All of the data and stuff… is not going to amount to as much as getting the elected officials to vote for or against legislation." While activists and municipalities might also work to disprove the assumptions or conclusions reached in airport environmental reports, they realize that the scale jumping airports employ means they have to be prepared to counter with their own representatives at those higher scales. Alternatively, they may support legislation that enables them to jump scale themselves, such as the Rhode Island law allowing Warwick to disapprove of extending a runway at T.F. Green that would impact city-owned wetlands.

The spaces of dependence of municipalities, voters, and politicians can therefore intersect in interesting ways. A Boston resident commented, "So we've accomplished not only a lot from the airport expansion perspective, but from the political perspective, to let our elected officials know…that we have power just as much as they do. Because [campaign contributors] can't give you *one vote*. Because the money's good, but if you're not elected, you're not getting any money!" As discussed above, because state and federal representatives are elected, they depend more on their constituents' support for re-election than the financial contributions provided by business interests.

Influencing elected officials is important because it provides one of the few opportunities municipalities (and residents) have to participate in the decision-making process. Of the seven study-area airports, only MSP has any sort of geographic representation in its governing body, meaning that municipalities in other places are largely forced to react to decisions made by the airport operator. Despite this representation, the city of Richfield made a comment representative of municipalities in all three study areas:

> "You know you're basically just told this is what -- you know we've weighed in on environmental impact statements, and said, "Well you'd better address this and you'd better address that," and you know…but in the end, we don't really have, no we don't have any say. We can maybe influence a *few* things that happen, but no, if the airport wants to expand it's going to."

This comment highlights one of the fundamental divides between public agencies and the public itself: the definition of public participation, which will be discussed in greater detail below. The outcome of the decisionmaking process has already been decided--the addition of a runway, the construction of a new airport, and so forth. The only official influence municipalities and citizens have is in terms of arguing with the assumptions and projections the environmental review document contains, and in terms of asking for what they deem to be appropriate mitigation.

Inevitability of expansion

Of course, one of the reasons why the divide over public participation exists is the discourse that considers airport expansion as inevitable and any local opposition to be simply NIMBY-based or a temporary obstacle. Even municipalities themselves view their role in opposing airport expansion as holding back or slowing down the inevitable. Municipal staff around O'Hare, for example, spoke of "twenty years of trying to hold back airport expansion," "a political football for 23 years," or that "[SOC has] managed to hold off the airport expansion for over 20 years. But that's all they've been able to do is delay it." Furthermore, while SOC is against the expansion of O'Hare, they still believe expansion of the Chicago-area aviation system is inevitable, and their push to open a third airport supports that. The same was true of the dual-track process in Minneapolis-St. Paul, where the need for more capacity was seen as inevitable for economic growth, therefore pitting opponents of expansion or a new airport against each other.

One of the ways in which airport opponents in New England are different from those elsewhere is that they are questioning the basic assumptions that growth in air traffic is necessary and that new runways and/or airports are the only way to deal with it. This position has arisen partially out of the political need to show solidarity with airport neighbors in other parts of the region, and partially because the higher population density of the region makes traditional expansion more difficult. On the other hand, Massport argues that the percentage of travel that can be diverted to high-speed rail or teleconferencing is not significant enough to make a difference in congestion at Logan, and that traditional means of expansion are still necessary.

At the same time, the long time scale of airport planning makes activism difficult. As noted above, success is largely measured in terms of *postponing* airport expansion rather than stopping it altogether. A T.F. Green activist noted, "People here are not willing to accept the fact in their heads that this is not a one-shot deal. It isn't like somebody at the airport's gonna say, [snaps fingers] 'You win.' It isn't going to happen. If that were the case it would have happened to Logan a long time ago." He went on to say that it is difficult to maintain activist interest when there is constant pressure on the part of the airport to grow. As quoted at the beginning of the chapter, "Since we have not gotten the airport to say, 'We're not going to grow, you win,' essentially in [residents'] eyes we lost."

The fundamental problem is that federal law prohibits the restriction of airport operations on the grounds of limiting interstate commerce, so any limits on growth in the form of curfews or flight caps are not currently legally possible. Agreements can be reached, as at MSP, that no more land will be taken from a particular municipality or that municipal approval is required for a new runway configuration, but there is no way to restrict the number of flights into a certain airport. Even restrictions on night-time flights have only been possible in locations where surrounding residents are politically well-connected (i.e., National in Washington, DC, and John Wayne in Orange County, CA). Airports will frequently argue that there is nothing they can do to restrict increases in traffic, as did T.F. Green's director:

> "We can choose to accommodate [growth], which will cause some expansion, or we can choose not to, which will cause congestion, because if you look at San Diego […] they just had congestion, and more pollution, and more wait times, and more people stuffed into a smaller box. It doesn't stop the growth, people will continue to come."

Because it is not possible to set legal limits on growth, then, those who are opposed to growth have to think in terms of postponement, thus contributing to the rhetoric of inevitability.

Mismatched scopes of planning

On the other hand, a number of SOC municipalities said that they consider themselves to be successful precisely *because* no expansion has occurred for over twenty years. This statement makes sense when considering the different time and spatial scales that airports and municipalities have, another one of the factors that make airport expansion so complicated. The uncertainty of airport planning is an issue as well, making it difficult for municipalities to put their plans on hold while airports go through years of planning and permitting.

Airports need to plan decades into the future, taking into account trends in the national and global airline industry as well as the local and regional economies. For example, the MAC developed a conceptual plan in 1991 for what MSP would look like in 2020, based on the activity of Northwest Airlines in particular. Forecasts have been updated since then, but the overall plan has remained the same. One of the effects of that plan was to make the first few blocks of Richfield uninhabitable, leading to plans by that city to redevelop the land as something other than residential. Operating within the budget of a medium-sized municipality, such redevelopment would be impossible. Richfield's state

and U.S. Representatives have sought state and federal funding to mitigate the impacts of a decision that the municipality had no control over; so far, they have received $5 million from the state and $10 million from the federal government, an estimated 12 percent of the total funds needed.

Municipalities, on the other hand, plan on the basis of five to ten years at a time, allowing for trends in the local and metropolitan areas. Chapters 4 and 5 demonstrated that municipalities are sometimes too small to take the airport into account in their land use planning, at least if they want to have a residential population. Additionally, the long time scale of airport planning, combined with uncertainty over whether a particular project will come to fruition, may lead municipalities to simply make their own plans without regard to the airport:

> "I mean, that's one of our problems, that we're seeing here in Park Ridge [IL] now. We want to develop this downtown area. Well, should we bother? That's the first question, if in fact there's going to be all this impact. *How* we do it, then if we choose to go forward with this, is going to be affected too by airport expansion. Do we put in townhouses, do we include residential areas in this particular part of town? We don't know because we don't know where the flight tracks will be […] So we're having a big -- there is no way for us to adequately balance our development in town and redevelopment because we have no clue what they're really going to do, or how they're going to do it."

While part of this uncertainty stems from Chicago's lack of disclosure over the proposed runway alignment, some uncertainty would remain even if the plans were completely public, until final approvals had been received. On the other hand, releasing plans that are not yet approved may also harm municipalities by reducing property values or development opportunities because of *possible* future impacts.

This mismatch between airport and community time scales is intensified at the neighborhood and individual levels. Although municipalities depend on their residents to some extent, they also have broader spaces of dependence that include fiscal and other issues that are not necessarily directly relevant to citizens. This disconnect between the issues that are of importance to the municipality and to the municipalities' residents goes back to the question over who a municipality's constituents are. For example, residents complained about the relatively slow pace of soundproofing programs at nearly all of the study area airports. While reasons for the pace varied from the rate at which funds could be raised to the number of approved contractors to do the work, what seemed like a reasonable time frame from the airport's point of view was too long for residents to wait. In another example, individuals who are worried about their own or their children's health cannot wait ten or fifteen years for a study to conclude about the impacts of noise or air pollution. They may move away from the area, thus preserving their own space of dependence while reducing the strength of local citizens' groups.

Nature of planning and public participation

Many of these airport-municipality-citizen conflicts lead to questioning the very nature of planning and public participation. Specifically, citizens and municipal officials disagreed

with airport operators over how much flexibility was appropriate in a plan, when "politics" were taking priority over planning, and whether satisfying official regulations constituted sufficient planning with regards to mitigating impacts.

The meaning of planning

Flexibility is an increasingly important component of large-scale infrastructure projects such as airports. In fact, one of the reasons that expansion was chosen over construction of a new airport at MSP was the flexibility that expansion allowed to adjust to a possible downfall in the airline industry, rather than the large up-front investment in a new facility. This has turned out to be a wiser decision than planners could have anticipated. With the airline industry as volatile as it is, airport operators need to be able to adjust to changes in the industry, something that is difficult with the long time scale of airport planning. As the last of the opening quotes of this chapter indicated, airport operators feel that expansion opponents are unaware of the flexibility that is needed in planning, and that plans need to be dynamic and not static.

However, for neighboring municipalities, this flexibility translates into uncertainty, as discussed above. Furthermore, when municipalities ask airport operators for a definitive plan, and that plan later changes, it often leads to distrust on the part of the municipalities. As a Hanscom-area town selectman said, "You know, they tell us one thing one week and then it's something completely different the next week, we don't know if they weren't telling the truth the first time, or that they are just completely rudderless." Residents around MSP expressed similar frustration at public hearings over the expansion of the residential soundproofing program, saying that their trust in the Metropolitan Airports Commission was being shaken by the MAC's change of opinion in what constituted full soundproofing. The director of Manchester airport summarized the dilemma as follows:

> "You know, I think what's kind of interesting in New York and Boston, just because of the *complexity* of those -- airport directors with the best *intention* of being completely honest with the community sometimes appear not to be simply because the bureaucracy takes them in a much different direction. Here I mean that's one of the…nice things about being in this position, is, the bureaucracy just doesn't *exist* here […] And that's what I think has really helped us to maintain that credibility is when I go out and say, 'Well, we are going to purchase this piece of property over here,' or, 'We're going to purchase those twenty homes,' I can feel comfortable that yes, I can follow through because I have the authority to follow through."

The flexibility/uncertainty dilemma therefore depends to some extent on the size of the airport and its governance system, but also on factors the airport operator has little control over, such as FAA funding or the financial stability of the airlines serving the facility. While this conflict can be reduced to some extent by increased communication between airports and their neighbors, again, the temporal and geographical scalar mismatch between the two types of land users means that there will always be some sort of disconnect between the two planning processes.

A related issue was whether politics take precedence over planning, particularly in locations where the airport operator maintains the tightest control. A suburban Chicago mayor complained, "And that's how it's done, there's a *monarchy* in Chicago, and that's the decision-making process […] Whether it's good *planning* or not, they don't seem to listen to the good planners. Those decisions are political, they're not made on any sound…consensus." Ironically, city planners in this same municipality noted they have never been asked in their official capacity to consider airport issues, and it has always been up to the mayor to determine city policy with regards to the airport! This echoes the comments noted above that if other municipalities were in Chicago's position with regards to airport control, they would probably have the same decisionmaking process. Nevertheless, interviewees had the fewest such complaints about the MAC in Minnesota, where commission members are directly appointed by the governor. Massport and Chicago's Department of Aviation in particular were perceived as being largely patronage organizations, often with leaders who have no experience in aviation or even transportation. The geographic representation built into the MSP governance system might account for this difference, where commission members have a definite set of interests to represent, rather than simply considering the needs of the aviation community.

Finally, one of the most controversial issues at nearly all of the study area airports was the obligation of the airport operator with regards to mitigation and abatement, and what constituted "impacts" on neighboring communities. The best example of this is the contrast between T.F. Green and Manchester airports, both of similar size and history (though T.F. Green has a significantly larger affected population). As a T.F. Green neighbor observed, "the major problem […] is that there's always been a premise that growth…is good, and that the only thing…the airport corporation has to do to satisfy growth, to allow for growth, is satisfy the FAA regulations." The executive director, on the other hand, pointed out that the entire mitigation program of soundproofing and buyouts is voluntary according to the FAA, and that T.F. Green is therefore going above and beyond what is required by even having such a program. Manchester, on the other hand, is one of a handful of airports around the country that has sought FAA approval to provide soundproofing to the 60 DNL, beyond the 65 DNL as legislated in Part 150. That airport director stated,

> "You know, in the past, people have been told that, 'No no no, it's FAA money, we can't spend it off the airport, sorry we're not going to do anything,' without even looking into it or trying to deal with the FAA. Sounds like a small thing, but a very small thing like that snowballs into this overall level of credibility that, when Kevin Dillon goes out and speaks to the community, they may not necessarily like what I have to say all the time, but they're going to believe me."

This comment reflects the division between public and agency views of what constitutes appropriate planning in terms of mitigating project impacts. To some extent this divide was present at all of the study area airports, but agencies differed sharply in their views as to whether following regulations was enough, or whether responding to public demand was the better way to go. Not coincidentally, the two airports that have sought FAA

approval to use mitigation funds to go beyond the regulatory limit of the 65 DNL, Minneapolis-St. Paul and Manchester, are the only two places that are currently implementing expansion projects, rather than dealing with litigation or legislation aimed at stopping those projects. The willingness of these airports to respond to citizens rather than go strictly by the rules has led to greater cooperation among all parties, and made expansion projects easier to plan and implement.

The meaning of public participation

This issue of responding to citizens vs. meeting regulatory requirements leads directly to the question of public participation, the meaning of which was contested in all of the study areas to some extent. There were two different divides: whether "participation" meant active involvement in the planning process as opposed to simply being kept informed, and to what degree public comments had to be taken into account in the final plan for "participation" to have taken place. Again, those places that are perceived as being most open to public input are the places where expansion is underway instead of delayed by litigation or legislation.

The history of public participation with regard to large-scale projects has gone through three general stages in the U.S.: no public involvement at all, common until the 1960s or 1970s; advance public notification of projects, requirements imposed by the National Environmental Policy Act of 1969; and actual public input in the planning process, increasingly common since the 1980s. While NEPA differentiated the first two stages, the division between the second two is still ongoing. The FAA's environmental policy review process, for example, allows for public input at a later stage in the planning process than much of the public would like. Figure 32 shows the first third of a flowchart of the official review process, with three stages highlighted. In the first and second steps, the permittee identifies the problem and the alternative solutions. In the case of airports, this means defining the problem of airport delay and proposing alternatives, usually limited to new runways or a new airport. Environmental review is then conducted on the proposed alternatives in terms of pollution, traffic, hydrology, archeological resources, and so forth. It is not until step nine that the public is officially allowed into the process, by which time all they can do is react to the projected impacts rather than to the alternatives or even how the problem has been framed. Sometimes even this level of input can be successful; the Boston-area group Communities Against Runway Expansion has managed to get state and federal Congressmen as well as the Boston Globe to oppose the runway because of flaws they found in the environmental review document. However, public comments in environmental review documents, public hearings, and interviews indicate that citizen complaints often are concerned with the first two stages of the process, which are treated as a "black box" by the environmental review document itself.

> In some cases, the airport has not managed to master even the second stage of public participation, that of providing information. As mentioned above, the tension between flexibility and uncertainty has led to criticism of airport operators for not accurately representing their plans to the public. Airport operators are caught between providing information that is reliable and based on events that are strongly likely to occur, and

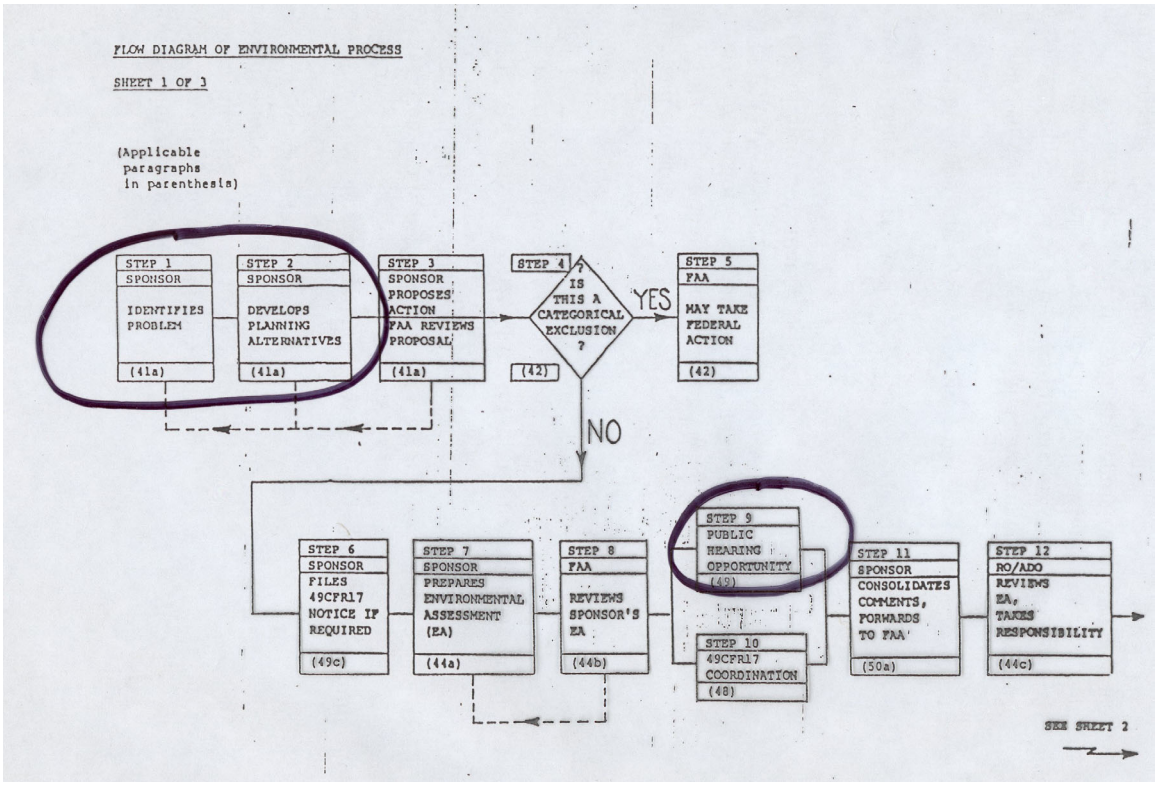

Fig. 32. Federal Aviation Administration's public participation process flowchart. Highlighted are the three crucial steps concerning public input.

providing information every time the possibility of an action occurs. As a member of ShhAir near Hanscom Field noted,

> "One of our major, major concerns with dealing with this whole thing is just the nature of Massport as an airport authority. For example we will go to a meeting, we will say, "Have you been approached by any -- has anyone expressed any interest in flying in here yet, any commercial, any cargo?" And the Massport guy, […] he'll say, "No, no, nope, nothing, nothing." The next week in the paper we'll read that Cape Air, for example, wants to fly into the Cape. So then we go back and we say, "Come on, you know," and [he'll say], "Well, we just had discussions, we didn't have a formal proposal then."

Airports have also been guilty of withholding information because they know what public reaction will be to that information. A T.F. Green neighbor explained how the Study Resource Committee (SRC) that was set up to provide public input into the airport's revised Master Plan ran into trouble because of the airport operator's attempt at pre-empting the state wetland law to make runway extension possible:

> "So they [tried to pre-empt the law at the State Legislature] without telling the city of Warwick, without presenting the 'what ifs' to the SRC. Now here, the SRC is your advisory group. These are dedicated people, put in thousands of hours a year, with no compensation. And you leave out a kind of significant point like that? Their answer was, 'Well we knew how the people would take it so we felt that it wasn't really worthwhile to discuss it.' Kind of a twisted little logic […] And what happened was at the very next meeting of the SRC, a number of the public members walked out."

On the other hand, one of the problems with allowing public input into the planning process as it is structured is that the average citizen does not have the technical training necessary to contribute meaningfully to the process. Opposition to airport expansion is often based on personal or other anecdotal experience, and activists have to learn on their own time the technical language of airport management, acoustical science, and economic projections. Citizens might request additional data that the airport deems to be unnecessary in the review document because professionals in the field already know it, such as safety regulations regarding runway length. Airport staff and their consultants believe that their job is to produce an environmental review document that meets regulatory requirements and is understandable by the technical staff of the FAA and EPA who will review it, not to meet the demands of the public with regard to clarity and comprehensiveness.

Additionally, there can be a tension between too much and not enough data. Because of the amount of information that is required to be in an Environmental Impact Statement, community members in several locations complained about the length of time it took them to read and understand it enough to be able to use it to argue against the expansion project in question. Yet one of the most common objections to such a review document

is that it does not include enough information. On the other hand, airport operators may deliberately exploit this tension over the amount of data. For example, an O'Hare-area mayor recounted the frustration of SOC and its member communities at getting information out of the City of Chicago:

> "[We] brought suit about four or five years ago to get the city of Chicago to reveal the plan, that they had a plan (which we knew they did), to reveal the plan, to go to the governor and to request permits. They said, 'We don't have a plan.' We got the courts to, through discovery, to allow us to look at their paperwork on this issue. Well, one of the things they did was they delivered like two *trailerloads* of paperwork. So that to make it as hard as possible for us to find what we needed to find. It took the better part of two years to go through that paperwork."

Even if differences are settled over what constitutes an appropriate level of participation by the public, there is still the question of how much of an impact that participation will have on the final outcome. While agencies seeking an environmental permit are required to *respond* to public comment, they are not required to do what the public asks. A frustrated T.F. Green activist outlined the situation as follows:

> "We know we're working against -- it isn't like it's a fair system like they're listening to us, and you know they're weighing our opinions vs. their data and so forth, we know it's a done deal. So we're not so foolish into thinking we're going to lose much by raising a little hell in a meeting, and making our point known."

The previous comment from Richfield, MN, echoes this statement, complaining that while municipalities may have some impact on the form mitigation will take, they have relatively little say in the overall planning process.

Other municipalities had a more pragmatic view. One of the interview questions asked municipalities whether they felt they could be proactive with regard to airport planning, or if they were always reacting to decisions made by someone else. A staff member from the city of Inver Grove Heights, MN, made the following response: " I believe that if…a voice is persistent and constructive enough -- it has an impact. And generally speaking, if the answer has been 'no' to a specific city, then you probably get the response that they don't listen. In fact, they listen, but the answer is no!" This statement summarizes the tension between the different meanings of public participation as seen by different actors. For some municipalities and citizens, being heard is enough. For others, they are not "heard" until their views are incorporated into planning documents or the actual plan. For airport operators, the meaning of public participation is listening to the public and taking their views into account when it is technically possible. The tension between these three views explains why arguments over airport expansion are to some extent fundamentally arguments over the extent to which average people have a say in the larger-scale processes that directly affect their everyday lives.

Conclusion

In this chapter, I have shown how the spaces of dependence and engagement of municipalities and residents impact the airport planning process. First, while municipalities have to act in their best interests, the composition of a municipality's constituent base and its form of government shape what those interests are. Secondly, while municipalities can take action to influence the process of airport expansion, the outcome is often determined by the airport at the earliest stages of the planning process. Thirdly, airport expansion is controversial because of the difference in temporal and spatial scope between municipalities and airports. What the airport perceives as flexibility in its planning is interpreted as uncertainty by the municipality. Finally, airport operators and municipalities or residents may have different definitions of public participation, including the time at which it is appropriate and the degree to which public input must be incorporated in the expansion plan.

There are three conclusions that can be drawn concerning planning and public participation from this research. First, citizens and municipalities *will* find a way to participate and have their voices heard. Though the FAA process only allows for public input after the problem has been defined and the options selected, municipalities and/or residents have used litigation, legislation, and the media to make their views heard. Interviews showed that municipalities that felt they were at least being heard by the airport had a much more positive view of the airport operator, and thus of expansion, than did those who felt they were ignored or overridden.

As a corollary, it appears that allowing more public participation makes for faster airport expansion. Two out of the six airports studied are currently implementing their expansion plans (MSP and Manchester), and those are the two with the most positive community relations. To compare MSP and O'Hare, the dual-track planning process allowed for public input both in terms of the non-airport staff that participated directly in the process and the public hearings that were held throughout (Step 2 of the FAA's flowchart). At O'Hare, Chicago has proposed an expansion plan with literally no opportunity for public input and is seeking federal legislation so as to cut off future opportunities for input as well. MSP will have a new runway after sixteen years of planning and building, while Chicago has been trying for twenty-three years to expand its aviation infrastructure. The increased opportunities for public participation that are part of MSP's more open governance structure have played a major role in the speed of the process, because the public has been heard without having to resort to means such as lawsuits.

It might seem from this argument that municipalities should then *discourage* public participation if it actually speeds up the expansion process. However, to reiterate the point about flexibility and uncertainty, it benefits the municipality in the long run to be able to plan accordingly for airport expansion. As noted above, if municipalities around O'Hare knew where the proposed runways and noise contours were going to be, they would be able to undertake redevelopment projects that would keep residential housing out of those areas. As it stands, they will probably go ahead with their own projects as if the airport weren't there, leading to more conflict in the future.

Additionally, increased participation allows for more compromise. The new runway at MSP was originally proposed as a third parallel, which the airlines supported. However, Minneapolis and Mendota Heights strongly opposed the runway because of the number of houses that would have to be removed and the size of the population that would be newly exposed to aircraft noise. The compromise was made to not only put the runway on the western edge of the airport, but to have takeoffs and landings only over the Minnesota River Valley to the south. Such a compromise would not have been possible if the MAC had not been willing to take community views into account. Because the public *will* find a way to participate, allowing official participation earlier in the process not only improves airport-community relations but speeds the expansion process, which can benefit neighboring municipalities in terms of providing greater certainty in their own planning and more opportunities for compromise.

CHAPTER 8

THE POLITICS OF SCALE

> "Local politics can and has prevented the improvement of the national airspace system […] unless the federal government begins to take control of the national airspace system and its ability to improve itself, we as a nation are in trouble. And we are!" (Director of Planning Betty Desrosiers, Massport 2002, [36]).
>
> "One of the real things that's bothering us right now is this whole attempt to make the [O'Hare expansion] plan law, through federal action […] Now, why would you want to go to the federal government for any other reason than to circumvent existing law because you can't work within the existing rules? […] But we think that there's not any reason for the federal government to get involved in what's essentially a local issue" (City Manager Jim Johnson, Bensenville, IL 2002, [108]).

These two viewpoints reflect the inherent tension between scales when it comes to airport planning. As quoted in Chapter 2, "The scale of struggle and the struggle over scale are two sides of the same coin" [50, p.74]. Airport operators believe the national airspace system should take priority over what they see as local politics, and the national level is the appropriate place to discuss expansion plans. Meanwhile, municipal leaders see the federal government as interfering with "what's essentially a local issue" by circumventing local and state laws. This conflict is further exacerbated by the fact that there is no clear method of adjudication between conflicts at different scales, except for the larger scale to win.

Chapter 2 discussed the recent literature on the three ways in which scales are produced: understanding phenomena, tracing political power, and defining the nature of scale itself. That chapter also discussed that part of the power of scale lies in the fact that it is often taken for granted. Different issues are assumed to be relevant to certain scales, and the questioning of those assumptions can be highly political. Furthermore, the homogeneity of scale is assumed, so that an issue at the local level, for example, is thought to apply not only to people solely within that jurisdiction, but to apply to *all* people within that jurisdiction.

Many of the airport expansion issues that were discussed in the previous three chapters are fundamentally concerned with who gets to influence the policymaking process, or to use Cox's terminology, whose space of dependence "wins." If spaces of engagement coincide at the same scale, policy debates are relatively straightforward, whether a local dispute over zoning on a particular parcel or a national debate on funding for security enhancements. If there is not a clear overlap between the spaces of engagement, we come back to Williams: "the scale(s) at which a social problem is generated may not coincide with the scale(s) at which the problem might be resolved via public policy. It is precisely in that divergence that the politics is situated" [51, p. 56].

As described in the last chapter, interviews and other data challenged the definitions of planning and of public participation. Similarly, analysis of these data called into question

the meaning of scales in two ways. First, there are policy implications of multi-scalar issues that, as demonstrated in the opening quotes, cannot be pinned down to one particular scale. Secondly, two different types of scale structure were revealed: a territory, and a network of smaller-scaled territories. For example, some issues such as health care policy are relevant to the entire country, while others such as airport expansion occur in a subset of places that are nevertheless connected at the national level. Because the blurring of the distinction between the two can be a political tool that is part of scale jumping and making an issue relevant to a larger audience, it is important to know when an issue deemed to be of national importance assumes the "national" is a scale-as-territory and when it is a scale-as-network.

Data on scale

While only one of my interview questions was explicitly about scale, interviewees nevertheless discussed scale in response to other issues. Many noted that national or regional activities *should* have priority over local ones and that jumping scale is useless or even inappropriate. Others make jumping scale a deliberate part of their work, whether as airport operators, municipalities, or activists. This section discusses the data from interviews and documents, with the following section focused on the implications of those findings for scale theory.

Scale issues from the literature

The two opening quotes demonstrate the conflict between different ways of comprehending the problem of airport expansion, as of either national or local importance. Municipalities and airports have spaces of dependence that are at different scales, and thus usually have differing spaces of engagement as well (unless the airport operator *is* a municipality). Each side argues that the issue should be understood within their space of engagement, which becomes the space in which policy should be made. For example, in Minnesota, the space of engagement of MSP has been embodied in statewide representation on the Metropolitan Airports Commission, not as a state-level agency, but as a network encompassing key locations within and outside the Twin Cities. The legislature determined that any planning with regard to MSP had to take the needs of the entire state into account, not just the metropolitan area or portions thereof, because of the importance of MSP as a hub to air transportation throughout Minnesota.

Interviewees were asked at what scale they felt policy was made for their neighboring airport. Responses varied from a single individual (Mayor Daley of Chicago) to the nation. Many recognized that as a municipality, their voice was not likely to be heard because of the airport's larger space of dependence. "But this is definitely, this is bigger than a city of 34,000. And even bigger than just Minneapolis, and so […] we don't have power over any of this, or influence or control," noted a city official from Richfield, MN. She also commented that while Richfield was able to provide some input in terms of responses to environmental impact statements, the only real control the city has over its own land uses near the airport comes from state legislation that forbids further taking of Richfield land. "This thing is so much bigger than us […] air travel demand dictates that there is a bigger airport and that decision is made at the state level, you know you're basically just told this is what [will happen]."

Another pragmatic response came from Norridge, IL: "But that doesn't mean that Norridge is going to outweigh the travel needs of the United States! And we understand that. But we just want to make sure that our residents are taken care of as well as they can be." Like Richfield, Norridge recognized any input its citizens and officials give is not likely to change the final outcome of the decision, but they still have to try to maintain their space of dependence. These places see airport expansion as a multi-scalar phenomenon, with the largest scale being the most important.

Other respondents emphasized the taken-for-grantedness of scale. One O'Hare neighbor responded,

> "Well, the scale's not at my scale. It's much higher than that. And again I accept that because that's what people are elected for [...] The village would like to be able to do something, but they have to…learn…to do the things that they're capable of doing themselves, and then work with the state and federal governments to do the projects that would fall within their jurisdiction."

This interviewee expressed a strong conviction that certain activities were appropriate at certain scales, and anyone who tried to do otherwise was acting out of turn. Other supporters of O'Hare expansion expressed similar views with regards to the inevitability and appropriateness of Chicago's control over the airport decisionmaking process. Such respondents are comfortable with the idea of scale with regards to policymaking as a rigid hierarchy.

The airport director of the Rhode Island Airport Corporation (RIAC), as a victim of scale jumping, felt similarly with regards to the Rhode Island law that allows municipalities to veto projects such as runway expansion at T.F. Green that would affect wetlands inside their borders. "Our general counsel really says this beautifully, he goes, 'If they wanted to give the local municipality the authority to stop the airport to expand, why didn't they just write the law that way? Why is it just focused on wetlands?'" The municipality of Warwick is jumping scale in an unusual way, using its own municipal powers as granted by state law to affect the regional decision on airport expansion. The airport, unsurprisingly, does not appreciate this creativity, and has sought an exemption to the law in question. RIAC feels the state is the scale at which it is appropriate to discuss airport expansion, and therefore that is the scale at which policy should be made, not the municipal level.

Of the three ways of constructing scale, interviews and documents were most concerned with tracing political power, as seen either through jumping scale or discussions about NIMBYism. Though one example of scale jumping above was on the part of a municipality, scale jumping occurs (and is disapproved of) on all sides of airport expansion issues. For example, Chicago is seeking federal legislation to require that its plan for O'Hare expansion be implemented in order to head off objections by any future governor. As the second opening quote shows, some municipalities see such scale jumping as inappropriate federal intervention. An official and resident from one of the SOC communities complained, "You know with O'Hare, you have the two senators from Iowa coming in and threatening to do things […] well, why does a person from Des

Moines, IA (or wherever they're from), think that they should tell -- or have any impact on how *I* live my life." By raising the debate on O'Hare to the national level, Chicago has not only gained a wider audience, but threatened the spaces of dependence of states, municipalities, and even individuals.

Individuals and activists, of course, jump scales as well. The best example is the attempt of citizens around Hanscom Field to make a national issue out of expansion, ironically in the same fashion as Chicago: through federal legislation. "Hanscom again we say it's in this unique position because it's a park and a historic resource, and there's a direct contradiction between the mission of Hanscom and the mission of those resources. Those resources are national and international. Hanscom is regional." This town selectman acknowledges that the airfield is of importance to the entire region, making it clear this is not just a NIMBY issue. She then goes on to argue that the areas affected by the airfield are of even broader importance, and thus the demands of air transportation should be subordinate to the demands of historic preservation. The executive director of Save Our Heritage has directly addressed this issue by saying, "This is the 'nation's backyard,' " again overriding NIMBY accusations by highlighting the importance of the Minuteman National Historical Park to the entire country [156]. Another SOH activist argued that federal legislation is the *only* way to meet their goals, since the Constitutional clause on interstate commerce severely limits airport operators' attempts to impose any kind of restrictions on airport operations. SOH has taken federal legislation regarding both the Grand Canyon and Grand Tetons as a model for possible restrictions on Hanscom Field.

The scalar mismatch between the benefits and costs of an airport is used in many different places to argue that anti-expansionists are only NIMBYs, which activists must then work to counter. Such an argument states that if the benefits are distributed over a large area, and the costs are geographically confined, then the greater good should win out. The SOH activists confront the NIMBY issue head-on, in part as a strategic move because their objections in the early 1990s to increased flights at Hanscom were dismissed as such. Others are well aware of the scalar mismatch, if unaware of what they can do to fight it. As a T.F. Green activist commented, "If there are any benefits to be derived, the state gets them […] And when you don't live near it, it's easy to say, "This is a great resource, we can't let this go down, this is a bunch of whiners in Warwick"… and this is what we're working against." As Chapter 5 showed, if the benefits of an airport are not evenly distributed throughout a region, it may make less sense to argue that the greater good is always served by airport expansion; in other words, the NIMBY argument may break down.

People in favor of expansion at O'Hare similarly argue that SOC municipalities in particular are NIMBYs who benefit economically from the airport but are not willing to accept the concurrent disadvantages of their location. SOC members, however, argue that "what started out […] as a NIMBY anti-noise position, has blown into a much larger and much more complex issue, which has to do with government responsibility and irresponsibility, good planning processes, and what's good for the region and the state of Illinois." The initial focus on particular land use issues led to investigation of the processes underlying those issues (as happened with this research project, as a matter of

fact!), not only strengthening activists' position by moving beyond the NIMBY label, but potentially relating local issues to those in other places as well.

As described in Chapter 6 for Boston, activists have not been successful at engaging with one another. While a nationwide network known as Citizens' Aviation Watch exists, its purpose is largely to share information, not provide for united political action. This lack of cooperation at a national level may be due to the newness of the organization, established in 1997, but there is also the fact that the most common solution of anti-expansion groups is to put the planes and noise at another airport. SOH and CARE in the Boston area have at least acknowledged that they have a common enemy in Massport, and are promoting alternate modes for long-distance transportation, but they each have a vested interest in seeing the other's airport experience more traffic than it currently does. Similarly, most municipalities interviewed said that the only contact they have with municipalities in similar situations across the country is for information-sharing purposes, noting that their individual situations are different enough to make any kind of united stance or action plan difficult. Until activists and affected municipalities are able to form networks among themselves and make their opposition apparent beyond the local scale, they run the danger of being denigrated as NIMBYs. Further discussion on this intersection between scales and networks follows below.

New scale issues

There were two points raised by the interviews with regard to scale that are absent from the literature reviewed above. First, individuals wield considerable influence and power within the scale hierarchy. The best example is the power ascribed to Richard M. Daley with regard to controlling the nation's transportation system through his mayorship in the city that manages O'Hare Airport. On the other hand, this power is only available to individuals at certain points within the hierarchy of scales. It is the office of mayor as much as the person occupying it that is the seat of political power. Secondly, there is the question of power vs. responsibility with regards to scale jumping. Policymakers at higher scales have the ability to make decisions concerning areas under their jurisdiction without necessarily being responsible for dealing with the consequences of their decisions. In other words, scale jumping can be not only a strategy to win disputes, but to tap into power at higher decisionmaking levels without bearing the responsibility of being at those levels (also known as "passing the buck").

Interviewees spoke both explicitly and implicitly about the power of individuals. A number of O'Hare neighbors spoke disparagingly of the power that Mayor Daley has over the airport planning process in the Chicago area. With regard to the building of a third airport south of the city, one suburban mayor stated,

> "If you look at this thing, we've got in this issue, liberal Democrats, conservative Republicans. We've got African-Americans, white Americans, Hispanic-Americans, coming together, rich people, poor people, middle-class people, all uniting on this issue. For this fight. And if you look at it, the whole world basically united. There's one person stopping us from being successful and building our plan out and doing what's right for the region, and that's Mayor Daley."

Of course, the 343 U.S. Representatives who voted in favor of H.R. 3479 on the expansion of O'Hare are also are in the way of the suburbs' plan, even if it was the City of Chicago that convinced them to support the resolution. But there is definitely a perception on the part of the suburbs opposed to airport expansion that one individual is all that stands in the way of a new airport in the southern metro area.

In another example of the power of the individual, the FAA executive director who conditionally approved Runway 14-32 at Logan, Jane Garvey, was previously the head of Logan Airport. Her experience directing Logan gave her more background on the controversy than other decision-makers would have had, as well as a potential bias towards Massport. On the other hand, as a Boston official put it, "She lives here! She has to come back to Boston. And I don't think she wants to come back with an angry mob waiting for her at her front door. So I think she really wants to come up with a decision that'll sort of be the best for both parties. 'Cause her reputation basically is at stake." He went on to predict the compromise that occurred, based on Garvey's personal need to maintain both her reputation in the transportation field and good relations with the community.

Other interviewees noted that the power and attitude of the individual who heads the airport can be as important as the system of governance itself in determining the airport's response to congestion and delay issues. The director of Manchester Airport noted:

> "I've seen community relations handled *very* well, and I've seen it handled very, very badly in locations where I've been at, and I think a lot of it comes and stems from the personality of the airport director and how he's dealing with the community. I think if there's a level of trust has been developed…most people will look at these programs for what they are. If there's a level of *distrust*, in terms of everything that the airport or the airport director has done, usually those programs are not viewed as favorable."

Related to this observation is the background of the director him- or herself. This particular director had worked at other airports in New England and New York, and is held in fairly high regard by surrounding municipalities for keeping them informed and being responsive to them. The executive director at MSP, also generally well-regarded, stated his tenure of 26 years was the longest in the nation, with the average length of stay at six years. The current director of T.F. Green, on the other hand, had recently moved from the West Coast (after the existing director left to head a Midwestern airport), and is not considered to be as responsive to citizens or municipalities. If airport directors see only the big picture with regards to the national aviation system, frequently moving around the country and without devoting time and effort to the localities around their airports, they are likely to have more difficult relations with those localities.

However, it should be apparent that the power of these individuals derives from their position within a scalar hierarchy. The personality of individual staffers within the airport organization does not matter as much as that of the executive director, as is the case with city staff vs. mayors or village presidents. It was already noted that in the case of at least two Chicago-area municipalities, city planners' advice on maintaining land use

compatibility was overridden by elected officials. Since these were the only two municipalities where planners and mayors were interviewed, such internal conflicts may be more common than was observed.

The preeminence of hierarchical over individual power is demonstrated by activists who try to bring the debate over airport expansion down to the scale of the individual, usually with limited success. One Chicago-area resident noted, "I always want to invite the people that are so pro-O'Hare, you know, I'll cook you a Sunday dinner, come on out and let's talk about this. Because I don't think the people that aren't, that don't live here, don't have the sense of what noise really is -- and how frustrating it really can be." Similar statements were made by residents near MSP, Logan, T.F. Green, and Hanscom, and are a common theme in anti-airport activism across the country. The maintenance of the spaces of dependence of these individuals are threatened by noise from the airport, something that people outside those spaces cannot relate to. However, the pro-O'Hare individuals, whether business leaders or senators, are unlikely to take people up on their offers to have a barbecue in the backyard. Residents' inability to jump scale beyond, literally, their backyards, becomes not only unhelpful but actually harmful to their cause if NIMBY arguments arise.

Because of the limited power of individuals outside the jurisdictional hierarchy, individuals may try to boost attention for their cause by seeking political office. For example, the current mayor of Minneapolis, R.T. Rybak, had been an anti-airport activist for years before being elected in 2001. While his political platform included issues other than the airport, his activist experience fighting noise at MSP was the base for his candidacy. On the other hand, O'Hare supporters argue that SOC activists are motivated *only* by the desire to retain their political power:

> "They have yet to come up with a solution. They have not soundproofed a home. Yet O'Hare Noise Compatibility has soundproofed hundreds in Bensenville. And Schiller Park. You know, all these members. Elk Grove. We've done their homes. So how many have they done? So all they've done is waste litigation money that could have been put to soundproofing more homes. They've wasted millions. So I have no use for them for that reason. Because I don't believe they're doing it to help you and I, they're doing it to help their own political gains only."

Leaving aside the fact that soundproofing is only one of the many means of abating or mitigating the airport's environmental effects, this quote further illustrates the political tensions that underlie the O'Hare conflict, including inter- and intra-municipal tensions, that were discussed in Chapter 4.

Finally, while the scale literature has discussed the ramifications of struggles over scale in terms of wielding power, there has been little discussion of the relative responsibilities that each jurisdiction maintains when scale jumping takes place. There are two issues here. First, when scale jumping occurs, jurisdictions at lower scales are able to pass on responsibility to the higher scale. As the director of the Manchester airport noted in the previous chapter, airport operators tend to respond to citizen or municipal requests for additional mitigation by saying that the FAA would not allow it, thus passing the buck to the higher scale.

On the other hand, the higher scale is usually no more likely to take responsibility than is the lower one. When power shifts between scales, responsibility seems to fall through the cracks. While scale jumping reorders the power relations between different jurisdictions, it does not shift responsibility accordingly. The best example of this is the Minnesota state legislation that preempted the dual-track planning process that the MAC was conducting. A number of municipalities around MSP had similar complaints to that of Eagan: "And the single largest public works project in the history of Minnesota, when it's all said and done, and the state of Minnesota hasn't kicked in a dime." (Since this interview, the state has authorized $10 million for redevelopment in Richfield, the municipality most affected by the new runway.) However, for the Minnesota Legislature to claim that the airport is of importance to the entire state, but not provide state funding for dealing with the impacts of that decision, is shirking the responsibility that comes with their power. These findings would suggest that scale jumping is useful not only as a means of shifting power, but of shifting responsibility to a nebulous place in between scales.

Theorizing scale

The above observations lead to two theoretical issues having to do with scale: the policy implications of issues occurring at multiple scales simultaneously, and the structure of scale itself. While Martin [157] and others have argued that the decision-making process involves actors at scales beyond the boundaries of governmental jurisdictions, the fact remains that policy is made at those jurisdictional levels, and one scale has to "win" in terms of being the level at which an issue is addressed. Secondly, the case of airport expansion is strong evidence for the nature of scales as networks. The physical structure of the air transportation system affects certain places considerably more than others (in both positive and negative ways), and therefore leads to the question of what is meant by the terms "regional" or "national."

Multiscalar policymaking

Kelly's comment on the simultaneity of scale is representative of the literature: "Rather than coming to terms with the ways in which globalization as a determinative process has 'local,' 'regional' and 'national' impacts, it should instead be recognized that social processes happen at none of these scales exclusively but at all scales simultaneously" [1, p. 10-11]. His work on the Philippines demonstrates that what appears to be the outside influence of a monolithic "globalization" acting on local farmers and workers is more accurately portrayed as the deferment of the explanation of economic restructuring to the global level on the part of local politicians and business interests. Kelly asks us to consider globalization not as an outside force at the highest possible scale, but as a series of processes that act at multiple scales simultaneously without being confined to a single jurisdiction.

However, public policy is explicit in its delegation of certain powers to certain scales and jurisdictions, even though those powers may be contested. Issues may be multiscalar in nature, but one policy level has to have the final say concerning legislation and regulation. Morrill has written about this with regard to the Hanford nuclear reservation [53]. He notes that because higher levels of government generally prevail in multi-scalar issues, parties on both sides of a land use conflict frame their issue as being of more than

local importance. Because a decision has to be made regarding land use issues, in this case the reuse of the Hanford reservation, either local, regional, or national policymakers will win in terms of having the power to make that decision.

I would argue that the fact that there is an existing hierarchy of scale not only makes a difference in policy outcomes concerning airport expansion, but is a key reason why expansion controversies can last for decades. The explanation of how that hierarchy came about in the first place and how certain powers were delegated to certain jurisdictions, though of crucial importance, is beyond the scope of the present work. However, once the hierarchy is in place, the actors who are a part of it treat it as fixed. For example, for the mayor of Warwick, RI, a major source of frustration concerning T.F. Green came from this fixity of jurisdiction. "Whenever we go over to the Airport Corporation and say we would like a better curfew, the answer is, 'The FAA says no.' We would like fewer flights, or restricted flights. 'The FAA says no.' We would like more money from you. 'FAA says no.'" [158]. This conflict between the need for national standards and the need to take into account the individual situations of airport surroundings, discussed above, is almost always decided in favor of the national standards, in keeping with Morrill's findings. Because of this preeminence of the higher scale, actors at smaller scales therefore jump scale to make their issue relevant to a regional or national audience.

Another complication in the question of policymaking and multi-scalar issues arises from the fact that there might not *be* policymaking bodies at all of the relevant scales. In a commentary on Cox's article on spaces of dependence and engagement, Judd notes: "When scales are absent, important political consequences ensue -- and political agents will typically find it difficult and sometimes impossible to replace the scales that have not been constructed by the state." [159]. Judd's examples include the lack of a regional government in most major metropolitan areas, despite issues such as housing and employment that stretch across metropolitan regions. This is particularly relevant in the case of air transportation, where the economic benefits are discursively constructed as belonging to the entire region, despite the lack of a decision-making body at that level. As has been shown in the case of Minneapolis-St. Paul, those benefits do not in fact accrue equally throughout the region, making it easy for actors at other scales to argue that the "region" benefits from and demands expansion, when in fact there is no one body to speak on behalf of the region. Minneapolis-St. Paul is one of the few exceptions to Judd's rule, having a regional government in the form of the Metropolitan Council that was quite active during the dual-track planning process. On the other hand, while the MAC has the power to levy property taxes for airport improvements, including mitigation, it has never chosen to wield that power.

However, because the governance system of MSP *does* deal with the multi-scalar complexity of airport expansion, it is the only airport of those studied (besides Manchester, a much smaller facility) to successfully begin an expansion project since the 1970s. Because the airport is governed by a statewide board that also represents locally affected municipalities, compromise is possible between competing state and local interests *within* the governing body of the airport itself. The executive director of the MAC noted that while occasional discussion arises about making the Commission an

elected body rather than governor-appointed, the MAC is much more effective as an appointed body. Without voting constituents to represent, MAC board members are able to represent a broader range of present and long-term interests and reach a compromise concerning airport expansion (as was done with the new runway's final alignment). As discussed in the previous chapter, the power that MSP neighbors hold through representation on the MAC board makes it easier to work within the airport system rather than outside of it through lawsuits or legislation.

The structure of scale

Finally, this work leads to questions on the nature of scale itself. For example, the term "national" could have two different meanings regarding public policy: a) the issue is relevant to everyone in the country or a subset of the population distributed throughout the country, as with citizenship requirements or farm subsidies; or b) the issue is relevant to a network of smaller-scaled places, as with military base closures or funding for airport expansion. Since part of the power of scales lies in the assumption of homogeneity, it is clear that the first meaning of "national" is the one generally accepted.

However, there is also a second possible meaning of "national." When a collection of cities is connected by an issue that transcends their boundaries, is that automatically a "national" issue? For example, urban poverty used to be considered a national issue, with federal funding devoted to the War on Poverty in the 1960s. Since the 1980s, urban poverty is considered to be a local issue [160]. The same subset of American cities suffered the same problems in both decades, whether this subset was defined as being at the national scale or simply a collection of local places. Obviously, there are major social and political implications for declaring a network of places to be equivalent to a higher scale or not.

Sheppard has criticized scale theory for missing these types of connections between places that are at the same scale: "scale theory only connects geographically distant localities indirectly, moving up to a larger scale and then down again to the locality, without examining direct interconnections. A focus on territories […] is not sufficient to capture such horizontal geographical relations" [161]. At the same time, within the realm of public policy, geographically distant localities *are* connected through laws and regulations that are made at a higher scale. The question remains whether those connected localities form a national entity or are a network of cities or regions, and what kind of vocabulary and politics can differentiate between the two.

What is needed is a way to combine the concept of a network with the concept of scale. The only way this combination has thus far appeared is in the distinction between "international" and "global." This distinction encompasses more than just the precision of vocabulary. "Globalization," as many authors have argued, implies pervasiveness, not only across national borders but through them, linking people over long distances more closely than over short ones and making networks preeminent over spatially bounded jurisdictions (e.g., [70]). "Internationalization" not only implies that nation-states retain power, but that as discrete units they interact in networks, with some places retaining more power than others.

This distinction is not perfect; all nations are not equal in power, and none is homogeneous, either. However, the difference between international and global could be expanded to other scales as a means of breaking down the dichotomy between "network" and "scale." The fundamental difference between the two types of scale is that one (call it scale-as-territory) implies administration of and relevance to the scalar unit as a whole, while the other (scale-as-network) implies that a collection of smaller-scaled units are connected across the space of a larger scale, but are not necessarily relevant to or administratively part of that larger scale. While there may not be a difference in terms of policymaking between the two, there is a great deal of rhetorical power in the assumption of homogeneity that is present in the scale-as-territory model.

For example, the City of Chicago argues that O'Hare is of importance to the entire nation because of its hub role in the air transportation network. In truth, O'Hare is vital to the dozens of cities that have connections to no other hub airport, namely places in Wisconsin, Iowa, and Illinois. However, cross-country travelers could just as easily switch planes in Denver, St. Louis, or Cincinnati as in Chicago. Chicago-based passengers could use regional airports in Gary, Rockford, or Milwaukee. Additionally, if the entire network really depends on the smoothness of operations at one facility, perhaps the network topology needs to be strengthened, rather than continuing to pour resources into one single place. Nevertheless, by arguing that O'Hare's preeminent position in the air transportation system means it is important to the entire country, not just to the 180 destinations it serves, Chicago moves from the scale-as-network to the scale-as-territory model, implying a stronger need for federal intervention.

On the other hand, anti-airport activism, though also a national scale-as-network, does not have the rhetorical or political power that airports do. Though a few national networks of activists exist, they are for the most part information-sharing networks rather than sites of political activism. If O'Hare is of enough national importance to secure federal legislation, so too are airport-neighbor conflicts that exist in dozens of places across the country. Indeed, it was the collaboration of airport activists that got federal legislation on airport noise passed in the first place. However, the existing lack of political unity is best expressed by the fact that some of the most ardent anti-Logan U.S. Representatives in Massachusetts voted in favor of the O'Hare expansion bill. When a single place can be raised to national importance because of its connectivity, but a network of places spanning the country is simply considered to be a collection of local places, it calls into question what is meant by "national," and by the concept of the national scale.

Conclusion

This chapter has shown that scale is a fundamental part of airport expansion controversies, not only in terms of deciding who should make policy but as an explanation for why the expansion process can be so lengthy. Municipalities and airport operators are generally aware of the scale jumping that goes on concerning airport planning, and they generally disapprove when their opponents do it. Scale jumping can be a means of carrying out the participation that was discussed in the previous chapter, or a means of silencing it. Furthermore, responsibility does not jump scale along with power, which in fact may be part of the strategy of scale jumping in the first place.

The multiscalar nature of airport expansion issues has two main consequences: because there is no means of adjudication between different scales, scale jumping is a necessary strategy on the part of the smaller scale involved. Secondly, the structure of scales themselves are called into question by such issues. Does a "national" issue concern people spread throughout the country, or does it concern a network of regions or cities? Scales-as-territories and scales-as-networks, though imperfect designations, embody this division between two different ways of characterizing scale. Because of the instability of the scale-as-network (as in the example of urban poverty), the scale-as-territory is preferred as a discursive base. Arguing that airport expansion is necessary for the *state* of Minnesota, the *region* of New England, or the *nation* of the United States is a means of shifting from the less stable scale-as-network to the scale-as-territory.

Of course, this discussion of the structure of scale has further implications if we consider the connections between air transportation and globalization. As Kelly has shown, and as the next chapter discusses, politicians and businesspeople can use "the global" as an explanation or a motivator for certain policy actions that really just express the interests of local or regional actors.

CHAPTER 9

GLOBALIZATION AND AIR TRANSPORTATION

> "But it's an interesting theory that with globalization there seems to be no, no need to concern yourself with…the hard…sciences or the hard infrastructure that's on the ground because it's assumed when you push a button you see something, okay, now we're moving 80,000 units of something to Sri Lanka" (City Planner Michael DeLuca, Cranston, RI, 2002, [162]).
>
> "Do you realize our region's link to global markets, tourism dollars, customers and conventioneers can be shattered by something as simple as a strong northwest wind?" (Richard J. Egan, Chairman of EMC Corp., Hopkinton, MA, [163]).
>
> "What if the whole world wants to come to Boston? [Then should] the people of East Boston have to put up with 15 runways?" (Fran Rowan, East Boston, MA, [164]).

There are two fundamental tensions concerning globalization and air transportation. First, businesses and academics alike seem to assume that with the push of a button, globalization happens. Whether globalization is conceived of as an inevitable force of positive economic development or a contestable series of processes that often do more harm than good, transportation infrastructure is in the background as a necessary but unquestioned enabler of globalization processes. If more transportation capacity is needed, it is assumed that it will be provided.

However, debates over the provision of transportation infrastructure reveal more fundamental tensions over the meaning of that infrastructure to the various parties that use and are affected by it. The businessperson's perspective, that the region's economy depends upon reliable connectivity to the outside world, is countered by the citizen's view that the local consequences of continued economic expansion need to be taken into account. Obviously, both speakers are exaggerating their positions for dramatic effect, but they demonstrate the fundamental tension between globalization and growth, and their consequences. Transportation infrastructure here comes out of its usual background position and takes on one of two roles: the necessary public good that enables the entire region's economy to survive by connecting it to the outside world, or the locally harmful force that privileges the needs of the outside world over those of the region's own residents.

The three case studies present different experiences with regards to globalization and air transportation. These differences accrue from the role of each airport with regards to its service area, the airlines that use it, and the region's interactions with the larger economy. MSP, for example, is closely tied to the fortunes of Northwest, as well as that airline's method of structuring its operations. Globalization of the airline industry is therefore of particular importance to the Twin Cities. While O'Hare relies similarly on United and

American for service, the role of transportation infrastructure here is perceived as enabling Chicago to be receptive to Castells' "global flows" due to its position in the national air transportation network. Finally, air transportation is seen in New England as a means of connecting that self-contained region to the "outside world" with its markets, its tourists, and its foreign investment. Logan is not a major node within the national network, but serves as a gateway to and from the regional subnodes, and this process continues at smaller scales in other New England states.

This final substantive chapter describes the above connections between globalization and air transportation in two parts. First, each case study reveals different ways that globalization influences air transportation in both discursive and material terms, to go back to the original research question. The first section describes this influence for each of the study areas. Then, the two tensions revealed in the opening quotes are explored. First, I show how local debates over airport expansion reveal and even drive the tension between regional economic growth brought about by globalization processes and the consequences of that growth. Like Kelly, I argue that "globalization […] must be seen as an inherently localized process rather than as a universal and homogenizing force. It is through local politics and social structures […] that globalized development is constructed. From there, other scales spiral outwards" [1, p. 164-5]. Finally, I explore the implications of moving transportation infrastructure from the background of accounts of globalization processes to the foreground. As revealed by the three case studies, how does air transportation discursively and materially influence processes of globalization?

Globalization in place

As outlined in Chapter 2, there are four main processes that constitute globalization: increasing international trade, the growth of transnational corporations, technological improvements that have reduced transport costs, and deregulation and liberalization. Each of these processes place particular demands on transportation networks, including air transportation. Those demands in turn translate to effects on the ground in terms of land use changes around airports, which feed back into the system and affect the processes of globalization. Finally, the discourse of globalization is an important part of this feedback loop as well, particularly since it differs from place to place.

Minneapolis-St. Paul

More than any of the other case study airports, Minneapolis-St. Paul relies on not just its airport but its major airline for connectivity to the rest of the region and the rest of the world. MSP's position in the internal network of Northwest Airlines is fundamental to its position in the nation's air transportation system. International service is of particular importance to MSP, as is air cargo service (e.g., [25]). The MAC's attempts to increase both of these types of service demonstrate its desire to position MSP and thus the Twin Cities as a major node in the global networked economy, rather than connecting through other places both physically and symbolically.

Of the major U.S. airlines in the year 2002, Northwest has the longest history as a major international air carrier. From 1947 to 1988, it was known as Northwest Orient, reflecting its strong orientation towards Asia. Two of the first post-deregulation agreements between the U.S. and other nations were made with the Netherlands in 1978 and Singapore in 1979, both major international destinations for Northwest. The joint

alliance formed between Northwest and KLM in 1991 also influenced the first "open skies" agreement, between the U.S. and the Netherlands in 1992 [5]. However, despite the location of its headquarters in the Twin Cities, Northwest has made Detroit its major international hub, due to proximity to East Coast markets. While Minneapolis-St. Paul does enjoy more international air service than other Midwestern cities of comparable size, that still translates to only a few flights per day. There are therefore fewer land use effects at MSP than Detroit, where recent expansion has included a fourth parallel runway and a new terminal built specifically for Northwest.

With regards to the four main processes of globalization, some have had more impact on local land uses than others. In terms of trade, the Twin Cities metropolitan area ranks eighth in the nation in terms of international export sales, well above its rank of fifteenth in population [165]. Figure 33 shows the percentage of companies in the municipalities neighboring the airport with local, regional, national, and international markets. As the figure shows, the percentages of firms with regional and national markets have remained fairly constant over the 26-year period from 1970 to 1996. Local and international market percentages have fluctuated, with international markets peaking as a percentage in 1985 and falling since then to their 1970 levels. The eight largest foreign markets in 2001 were Canada, Japan, Ireland, Germany, the United Kingdom, Mexico, Hong Kong, and the Netherlands, six of which had nonstop service from MSP on Northwest at some point in the late 1990s (except Ireland and Germany). However, the number of flights per day to each country except Canada varied between one and two. Furthermore, Loughlin has observed that a significant percentage of the goods produced in the Twin Cities that are sent to their final destination by air are first trucked to Chicago to take advantage of the more frequent flights, especially international ones, out of O'Hare [25]. Minneapolis-St. Paul's relatively large amount of foreign exports, therefore, do not necessarily leave the Twin Cities by air.

Nevertheless, international trade has had an impact on local land use in the Twin Cities, albeit a small one. In the late 1990s, Runway 4-22 was to be lengthened to accommodate Northwest's non-stop flights to Hong Kong. Because this runway has no parallel and intersects the other two runways, is only used for a few flights a day unless wind conditions require its use. The percentage of traffic using Runway 4-22 averaged less than one percent per month in 2002 [122]. Shortly after the runway's extension was approved, however, Northwest suspended its nonstop flights to Hong Kong, citing the failing Asian economy and the concomitant drop in demand. The runway was still extended in hope of future use.

In terms of multinational corporations, air transportation has had less of an impact at MSP than at the other cities studied. For example, though the metro area ranks ninth in the nation in terms of the number of Fortune 500 companies [165], all but three of those sixteen companies began in the Twin Cities area. One of the most frequently heard arguments made during the dual-track process for a new facility was that a new airport would attract more new companies to the area, based on the growth of national headquarters and international branch offices in Dallas-Ft. Worth and Atlanta after expansion at those airports. As an editorial from 1992 noted, "If we had started [in the 1970s], we already could be a powerhouse in a location to attract additional corporate

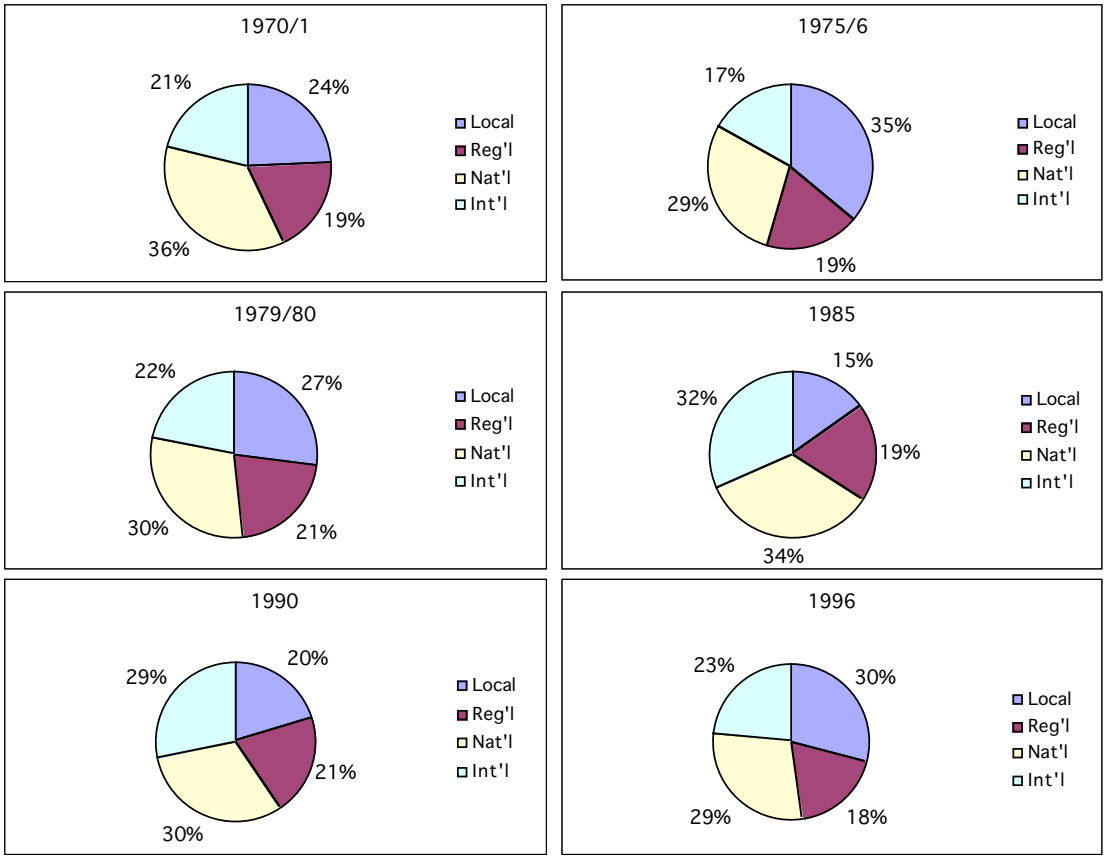

Fig. 33. Percentages of firms in MSP study area municipalities with local, regional, national, and international markets, 1970-1996.
Source: Manufacturers' News, Inc. (various). Minnesota Manufacturers' Register. Chicago, Ill.

headquarters […] A global airport is for the whole area. Just look at Atlanta's record. There were about 100 foreign firms in Georgia before it got a global airport; now there are 1,400" [166]. However, Atlanta's "global airport" came about from expanding the existing airport rather than building a new one, in contradiction to the argument for a new Minneapolis-St. Paul airport. Other factors such as Sunbelt location have probably been as important as transportation access has been in influencing the relocation of multinational corporations to Atlanta and Dallas.

Technology, the third highlighted process of globalization, has had a considerable effect on airports and land use in the Twin Cities. Northwest has invested in new aircraft (regional jets) for short distances and continued to use older planes (DC-9s and 727s) for medium-length flights. The replacement of turboprops with regional jets led to the reconstruction of part of the existing terminal building and the construction of two new concourses. This construction resulted in the effects described in Chapter 5, where car rental and parking firms had to move off airport property at least temporarily. While the car rental facilities have been transferred back to the airport, neighboring municipalities such as St. Paul were inspired to more carefully plan their land uses adjacent to the airport in order to prevent those unwanted ancillary uses from possibly coming back in the future.

One of the reasons the neighbors of MSP complain more than those at any other U.S. airport is Northwest's selective adoption of new aircraft technology. When Stage 3 limits on aircraft noise were drawn up in the early 1990s to be implemented at the end of 1999, the International Civil Aviation Organization agreed that older planes could be retrofitted rather than requiring the purchase of new planes. Northwest invested heavily in hushkitting its older DC-9s and 727s as a cost-saving method. Though the hushkitted planes technically meet Stage 3 standards, they are now the noisiest planes in existence, making the noise contours around MSP larger than they would be if Northwest had invested in Stage 3-manufactured planes. This perceived reluctance by Northwest to take action that would reduce noise because of its cost to the airline has damaged community relations on a number of occasions. On the other hand, Northwest's increasing use of regional jets on routes formerly serviced by these noisier planes has led the MAC to consider revising the noise contours, leading to less land area inside the contours and thus less mitigation.

Finally, there is deregulation. As a fortress hub for Northwest, MSP has obviously been affected by the hub-and-spoke system that is an outcome of deregulation. Northwest's dominance has resulted in a tradeoff of higher average fares and increased nonstop destinations as compared with other cities of similar size. The merger of Republic and Northwest in 1986 led to increases in traffic and noise that prompted local citizens to become more involved in airport issues, thus influencing the noise mitigation program and the dual-track planning process. The nature of the hub-and-spoke system also means that key points such as MSP need the capacity to handle more traffic than they themselves may generate. Approximately 40 percent of the passengers at MSP are on connecting flights [138]. Thus, the current expansion project and its effects on land use in Richfield, Eagan, and other neighboring municipalities as outlined in Chapter 5 are a result of this facet of globalization.

Besides the four material processes, the discourse about globalization also needs to be considered. Globalization was used in the 1990s as an argument not just for expanding airport capacity, but for building a new airport. For example, a Minneapolis City Council member argued,

> "MSP is not just another regional facility. It serves the entire state and large parts of the Upper Midwest. If the airport becomes more and more congested, Greater Minnesota will pay the highest price in restricted access […] It comes down to a question of vision. Do we see ourselves emerging as a more significant player in the global economy, with the chance for growing export activity and the jobs that go along, or not? If the answer is yes, I must betray my bias and argue that Minnesota can only have a truly modern airport in Dakota County" [167].

This comment is representative of those who see MSP as a gateway for the Upper Midwest into the network of air transportation and thus the "global space of flows." In part because of the dominance of Northwest and in part because of the low-density and fragmented nature of the region's population, building or expanding MSP were the only realistic choices, rather than looking to regional airports or alternative modes as in New England.

Kelly argued in his work on the Philippines that the history of the region lent itself to arguments on the part of the national and provincial governments that attracting foreign investment was necessary for economic growth. In other words, globalization is seen as an outside force that comes *into* the region and has to be accommodated. The discourse in Minneapolis-St. Paul (and other regions, as well) is that global *access* is necessary for local companies to export their goods to wider markets, and that this access is only possible through air transportation. For a region trying to grow from within rather than attract outside investment, the expansion of air transportation infrastructure is likely to be built around the needs and desires of the existing airlines because of the power they have over the provision of air service. Thus, expansion at MSP was chosen over the construction of a new airport in large part because of the preference of Northwest Airlines, the region's link to the global economy.

Chicago-O'Hare

Both discursively and materially, O'Hare plays a major role in the air transportation network of the United States, and even the world. By arguing that expansion at O'Hare is necessary to the economy of the country and not just the region, the City of Chicago is positioning itself in the so-called global space of flows in a different fashion than Minneapolis-St. Paul. Rather than arguing that O'Hare connects the Great Lakes region to the outside world, Chicago argues that it connects the nation to the nation, if not the world to the world. Decreasing delays and increasing connectivity, both demanded by processes of globalization, are therefore a key component of Chicago's expansion advocacy.

In 2001, O'Hare ranked first in the world in number of aircraft movements and second in terms of passengers [168]. Well over half of those passengers were connecting through O'Hare rather than beginning or ending their travels in the Chicago area. Of passengers

using United, 56 percent were connecting, and 68 percent of American passengers were connecting [138]. These numbers are significantly lower than the 40 percent of passengers using Northwest at MSP who were connecting, verifying that O'Hare's emphasis is, indeed, on supporting the national air transportation system rather than just serving local or regional demand.

Figure 34 shows the change in the scale of markets for manufacturing firms between 1985 and 1995, for firms located in the study area municipalities (with the exception of Chicago itself). There is a distinct difference between Chicago and the Twin Cities. National markets remained the strongest at 37 percent, while a slight decrease in the percentage of regional firms was distributed evenly between local and international markets. The list of the top ten countries that receive Illinois exports is more similar to that of the country as a whole than is MSP's: Canada, Mexico, Japan, United Kingdom, Germany, Belgium, China (mainland), Brazil, Australia, and the Netherlands. O'Hare provides nonstop or direct service to all of these countries (and 22 others as well). This access is being provided to more places than just Illinois, however, as evinced by the high percentage of air cargo that is trucked from Minneapolis-St. Paul to be flown out of O'Hare.

Technological improvements that shrink distance, of course, were why O'Hare was built in the first place. Jet aircraft reduced the friction of distance and made possible many of the processes of globalization. At the same time, their larger size and noisier engines had a dramatic impact on the quality of life in surrounding areas, as well as a significant influence on land use patterns. As airlines have switched to regional jets and Stage 3 aircraft, the noise contours have shrunk in size because they weigh the noise of individual planes more than the frequency of flights. Future technological developments such as the Airbus 340, a double-decker, 600-seat aircraft, may require the modification of terminals, runways, and taxiways. It is unlikely that such large aircraft would have any significant impact on land use outside airport borders, however.

Finally, deregulation has had a huge impact on O'Hare because of its status as a dual hub. Like MSP, hub status meant rapid growth for the airport in terms of traffic and noise, as well as demands for increased capacity. At the same time, the dominance of United, headquartered in the Chicago area, and American have led to higher average fares to counterbalance the large number of nonstop destinations. Furthermore, the international air transportation system, with its bilateral agreements that allow flights between particular airports, has focused international traffic on a few key hubs, including O'Hare. More "open skies" agreements may lead to a more even distribution of international traffic, removing some of the pressure at O'Hare.

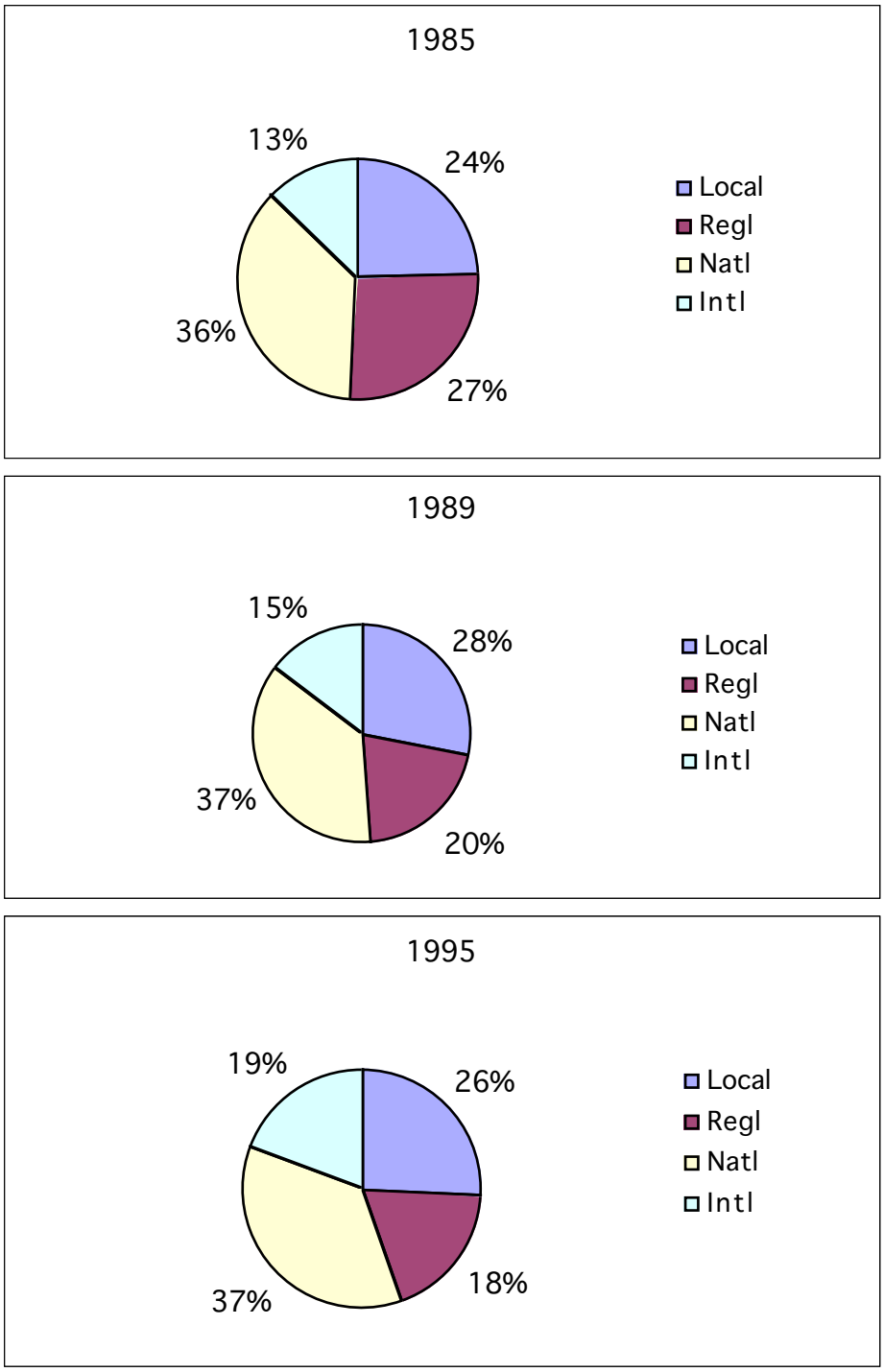

Fig. 34. Percentages of firms in O'Hare study area municipalities with local, regional, national, and international markets, 1985-1995.
Source: Registry Publications. (various). Big green book; Business directory of industry and service in the State of Illinois. Northbrook, IL.

The hub-and-spoke system has also been a contributing factor to the delays that are the main justification for increased capacity. While the nationwide percentage of passengers who are on connecting flights has only changed from 30 to 33 percent since deregulation, passengers now connect almost entirely between flights on the same airline, contributing to this concentration of traffic [143]. Furthermore, because traffic is concentrated at certain time periods, delays build up more rapidly. While one of the intended consequences of deregulation was to increase airline competition, the limited number of gates at many major airports has made this difficult. At O'Hare (as well as LaGuardia and National), caps on the number of flights per hour made the entry of new airlines even harder. The lifting of those caps in 2000 in the name of competition, however, contributed directly to the serious delays that O'Hare experienced that summer.

Chicago's discourse with regards to globalization and air transportation is completely different from that of the Twin Cities. Rather than seeing O'Hare as a gateway to the Great Lakes region, Chicago perceives its airport as a fundamental node in the national transportation network. As Castells would argue, Chicago is trying to be receptive to the global flows of people and goods in order to maintain its position as a key node in that network. There are two consequences of this view. First, if the economy is now structured at a global scale, economic growth is seen as a zero-sum situation. If Chicago fails to act to attract investment, that investment will go elsewhere, harming the region. As an interview from a pro-expansion municipality said,

> "[E]very time one of those trucks goes in and picks up a shipment of strawberries from Mexico that they fly in here, that truck comes over here, takes something from employed people, off that airport, and also the freight lines, puts it back into that truck, takes it down to South Water Market, and it's distributed there -- well where would we do it if that airport wasn't there? It would be done somewhere else."

Furthermore, seeing Chicago as Castells would implies that those who are opposed to airport expansion here are not only selfish with regards to the needs of the region, but the nation. If Chicago is such an important part of the network, it has an obligation to the rest of the country. As H.R. 3479, passed by the U.S. House Transportation Committee in 2002, reads:

> "The reliability and efficiency of the national air transportation system significantly depend on the efficiency of Chicago O'Hare International Airport. Because of O'Hare's central location […] O'Hare has an essential role in the national air transportation system. The reliability and efficiency of interstate air transportation for residents and businesses in many States depend on efficient processing of air traffic operations at O'Hare." [169].

If approved by the Senate as it has been approved by the House, this statement will become federal law, thus pitting expansion opponents against the good of the entire country. However, this resolution arose from local and state political conflicts, suggesting that the discourse of globalization is being used to justify actions that benefit those who already control the airport. As Kelly argued for the Philippines, "political bosses can construct an image of the global, mediate local experience of global flows and, at the same time, legitimate local practices and their own authority with reference to

the same discourse of globalization" [1, p. 161]. O'Hare's connectivity *does* matter to Illinois and the U.S. in terms of maintaining economic flows. However, if the real concern is keeping the nation's air transportation system functioning smoothly, diverting traffic to other airports or other states might have a greater effect than continuing to pour resources into O'Hare. The City of Chicago has to argue that expansion at O'Hare is the only viable solution to delays not because that is what the implacable forces of globalization demand, but because any other solution will reduce the power that the city has over aviation infrastructure in the Chicago metro area.

Logan and New England

Similarly to Minneapolis-St. Paul, expansion proponents in New England argue that access to air travel is necessary to connect local and regional economies to the outside world. There are two differences, however. First, there is no single airline on which that access depends. Though airlines still prefer airports such as Logan to expand in place so that they do not have to invest in additional ground infrastructure and personnel, they are not able to make the same kind of threats about abandoning the city that fortress hub airlines can. Secondly, while MSP worries about gaining direct access rather than working through others (e.g., connecting flights through Detroit rather than direct international service), New England seems to consider anything but direct access to be no access at all. The region serves as an example of the centralizing/decentralizing tension that is an outcome of globalization processes.

Air transportation is generally regarded as a mode of transportation that provides connections from a region to the outside world. Except for geographically fragmented regions, internal circulation generally takes place via roads or rail. However, air transportation is preferred for long-distance travel, and thus for connecting a city or region to "the global." As described above, the discourse of globalization requires localities and regions to be receptive to outside flows of people, funds, and goods. The discourse concerning the necessity of air transportation continues in this vein. Expansion proponents talk about air transportation as providing their region with expanded access to markets. However, local residents often respond as quoted above: "What if the whole world wants to come to Boston? [Then should] the people of East Boston have to put up with 15 runways?" This speaker is engaging with the implicit argument that increased connectivity through expanded air transportation only benefits those outside the immediate community by allowing them access. The world wants to come to Boston in her formulation, not the other way around. Therefore, not only are the costs and benefits of airport expansion unequally distributed by scale within the region, but within the space of the globe.

In terms of trade, most differences between the list of the 25 countries that receive the most exports from the state of Massachusetts and the corresponding list for the U.S. can be accounted for by distance--European countries are higher for Massachusetts and Asian countries and Mexico are lower. Boston's economic base depends on high-tech and R&D functions, meaning that there is significant demand for air travel for both people and goods. As Bell and Feitelson noted, these particular sectors are most concerned with frequency and reliability of transportation, so that unpredictable delays can be damaging to business [20]. This validates the opening argument that global markets are affected by

the runway layout at Logan that limits capacity under certain wind conditions, and the corresponding argument that Runway 14-32 will be a benefit to the economy. On the other hand, as Boston mayor Thomas Menino said, "When a new runway was proposed 25 years ago by Massport director Ed King, supporters said the region's economy would suffer if the runway did not open. In fact, the region's economy has exploded and traffic at Logan Airport went from 8 million passengers to 26 million a year" [148, p. 5].

Technology is influencing the current debate over Runway 14-32 at Logan because of the increasing use of regional jets. Runway proponents argue that it is long enough for these smaller jets and thus will be usable by a significant number of aircraft. Opponents point to Philadelphia as an example of a supposedly long enough runway (5000 feet, the same as the proposed 14-32) that regional jet pilots refuse to use, and suggest the same will happen at Logan, leaving only small propeller planes that should be using smaller airports anyway. Regional jets have also opened up other regional airports in New England, allowing Manchester and Providence to increase the size of their catchment areas. Finally, the increased use of teleconferencing, favored by Hanscom and Logan opponents as a means of reducing air travel altogether, has the potential to shrink distance in a new fashion.

Deregulation did not affect Boston in the same manner as other U.S. airports. Its location on the northeast edge of the country eliminates it as a cross-country hub, and its proximity to New York reduces its viability as a transfer point for international flights. Over 90 percent of all passengers that pass through Logan are beginning or ending their trip in the region, differentiating it from airports in the hub-and-spoke system. As the director of Logan said, "So we are a very different type airport here in that if we as a region don't meet that demand, we're hurting ourselves, in a very direct way." Not only is Logan servicing just the immediate region, but there is no single airline making demands to expand existing infrastructure instead of building a new facility or promoting alternate modes of transport. While the airline industry still wields a certain amount of influence over airport decisionmaking, there is no airline that can threaten to move its headquarters or shift its operations to another hub as in Minneapolis-St. Paul or Chicago.

In terms of the discourse of globalization, Boston is similar to the Twin Cities in its perception of its airport as a gateway to the region, particularly due to its location in the corner of the country. Smaller airports in New Hampshire and Rhode Island have the same vision for their states: Manchester Airport worked to receive Free Trade Zone designation within the neighboring town of Londonderry in order to attract international firms such as Brita, and T.F. Green has been working to attract international flights beyond those to Canada. Though the states of New England are considerably smaller than those of the Upper Midwest, they still see themselves as individual economic units that each need air transportation access. After all, if companies are willing to ship cargo by truck seven hours from the Twin Cities to be put on a plane in Chicago, surely they would be willing to ship cargo three hours from Boston or Providence to JFK in New York. But the prestige in maintaining connectivity from one's own state is an important component of regionalization in New England. As the processes of globalization make regions increasingly important as economic units (e.g., [68], [70], [74]), this need for direct access to subregions will probably increase in importance as well.

Globalization and air transportation

The three different experiences of the case studies with regards to the connections between air transportation and globalization reflect Kelly's argument that globalization is inherently localized in the power structures and practices of individual places. Because Chicago, Minneapolis-St. Paul, and Boston all are in different situations with regards to regional economics, airport governance, and position in the air transportation network, it is misleading to speak of the impact of globalization on these places as if they were all reacting to the same set of forces, rather than playing a role in the production of those forces themselves. Debates over airport expansion thus feed back into the system by, for example, forcing airlines to adjust their schedules or routes, pressuring state and federal governments to consider alternate modes of transportation, and encouraging the use of teleconferencing instead of business travel.

Resistance to the local and the global

Kelly also argues that it is misleading to speak of resistance to globalization as the "local" standing up to the "global." As he says,

> "The broader point to draw is that to speak of 'local' resistance to 'global' forces is to misrepresent the context of change. Instead, the experience of farmers in Tanza shows that 'local' resistance is pitted against 'local' processes of change, because it is only through local structures that 'global' processes are manifested" [1, p. 157].

Anti-airport activists are not explicitly arguing against globalization; in fact, the focus of their arguments at the local level has frequently led to them being considered as NIMBYs. However, their arguments against local environmental and economic inequity have the potential to tap into issues of inequity at higher scales (if scales can be considered as networks rather than territories). These activists are thus working against the processes that constitute globalization through their local fights.

For example, an activist in Warwick, RI, talked about city residents being unwilling to protest the environmental effects of T.F. Green because of its perceived economic benefits: "And it's very easy to put things across on these people as long as you convince them it's for their own economic good, they'll just keep taking it, and the city'll keep buying it you know [...] The people who benefit the most don't even live in Rhode Island. They live out of state." This spatial inequity between economic winners and losers is one of the features of globalization that is most often critiqued (e.g., [62]). By challenging inequity at the local level brought about by airport expansion, activists are implicitly challenging the global inequity brought about by the processes of globalization.

Another common critique of globalization processes is that they lead to zero-sum economic situations, where one region gains jobs and activity only at the expense of another (e.g., [64]). As a suburban Chicago village manager said, "At this point we have not been able to get the city of Chicago, state of Illinois, or anyone else to show us where the 195,000 jobs that they claim [the expansion of O'Hare] will generate will end up. You know, I can show you where we'll lose them, they can't show me where they'll gain. Theirs are based on…modeling and past experiences, ours are based on real activity." By questioning the spatial distribution of the economic benefits of the airport, this official

and others are challenging the rhetoric of regionwide growth that is a part of globalization discourse.

Finally, the opening quotes reflect one of the fundamental tensions brought about by globalization processes: viewing economic growth as coming from within and being self-sustaining vs. viewing growth as outsiders coming in, using up resources, and leaving a mess behind. Particularly in places like Minneapolis-St. Paul and Chicago, where a significant percentage of those using the airport are not contributing to the local economy in any more direct way than buying a sandwich during a layover, the latter view is easy to see. On the other hand, the Twin Cities' pattern of exports and multinational corporations shows that regional growth is largely coming from within and is strongly influenced by its air service connectivity, while a significant amount of the cargo on the planes that take off from O'Hare in the middle of the night is trucked in from other metropolitan areas. Even though only 10 percent of the passengers at Logan are connecting, the same issues are repeated at a smaller scale, with residents of East Boston complaining about people driving in from the suburbs to use Logan instead of Hanscom or Worcester.

Reformatting globalization

Chapter 2 complained that the voluminous literature on globalization has taken transportation for granted, not only failing to show how it facilitates the processes of globalization, but assuming that additional infrastructure will be provided as needed. The current chapter has shown that transportation and globalization are interconnected in different ways depending on the economic and political context of infrastructure. By moving transportation infrastructure from its usual background role to the foreground, it is possible to analyze exactly how different places are connected to each other, as well as how place matters, or how context determines the composition and the outcomes of the processes of globalization.

First, restrictions on airport expansion have fed back into the air transportation system in different ways, depending on the context. For example, airlines have dealt with delay at major airports by increasing the scheduled time of their flights, thus reversing the shrinkage of distance that air travel has provided for decades. In fact, the average flight time has increased by fourteen minutes since 1977 [143]. Airlines have also shifted service to places where there has been less opposition to airport expansion, such as Atlanta or Dallas. American announced in 2002 that it would loosen the timing of its hub-and-spoke system by spreading out flights more evenly during the day, instead of concentrating them in ingoing and outgoing banks, in an effort to reduce delay and improve the reliability of travel times, as well as to reduce costs. At a broader scale, capacity restrictions at major airports have combined with technological changes to increase connectivity for smaller metropolitan areas, enabling subregions to be more directly connected to the global economy.

Secondly, as described above, seemingly local fights over the expansion of transportation infrastructure can take on national or even worldwide importance. If globalization processes are the compilation of actions taken at the local level, as Kelly and Flusty have each argued, then individuals who are trying to preserve their municipal or even household spaces of dependence should not be considered as just NIMBY activists. Their struggles to maintain their quality of life and to seek a more even distribution of the

costs and benefits of air transportation are representative of similar struggles taking place all over the world for all sorts of different issues.

At the same time, airport expansion opponents are different from other groups trying to preserve their local quality of life, because of the scope of the projects they are fighting against. Airports *are* important to entire metropolitan areas and regions, and the actions of a few municipalities or citizens can thus have a major impact. Citizen opposition to expansion at Logan or the construction of a new airport in Massachusetts, for example, led to increases in traffic at Manchester and T.F. Green that are angering neighbors of those airports.

Finally, the debate over airport expansion has led in some cases to a questioning of the service that air transportation provides, and whether that service can be provided in some less harmful manner. As a selectman from a Boston suburb said with regards to regional airport planning, "Regionalization needs to be thought of as multi-modal, not just aviation. Because the only point of transportation is to move people, ideas, and stuff, and there's more than one way to move it." While concern over the consequences of the increasing *symbolic* connectivity of the world has grown in recent years, there has been relatively little concern about consequences of the increasing *physical* connectivity brought about by decreased transport costs. As the environmental costs of air transportation receive more attention, as well as the spatial distribution of the costs and benefits of this particular mode, the value of air transportation will increasingly be questioned, and alternatives sought. It is therefore vital to understand exactly how air transportation enables the processes of globalization, in order to determine if there is a more environmentally friendly and spatially equitable way of carrying out those processes.

Conclusion

The "simultaneous dispersion and concentration of advanced services" [70, p. 410] that is one of the hallmarks of globalization is connected to air transportation in two different ways. First, air transportation itself is an advanced service. The network of air service is simultaneously being dispersed and concentrated, with more service to smaller airports, and continued concentration via the hub-and-spoke system. The dispersal means that the same airport-community conflicts that take place at major airports are likely to be repeated at a smaller scale, as has been seen in New England. The concentration means that there will continue to be pressure on the major hubs to increase their capacity, as has happened at O'Hare and MSP.

Secondly, advanced services have been dispersed across the landscape in a variety of ways, thanks to the reduced friction of distance brought about by jet aircraft. Some firms have divided their functions between different places, such as Boeing moving its corporate headquarters to Chicago to take advantage of O'Hare's large number of destinations, while keeping its manufacturing division in Seattle. As Bell and Feitelson argued, this dispersion has resulted in the simultaneous concentration of R&D, manufacturing, and back offices in different places [20]. Each type of place therefore has different transportation requirements, whether frequency, reliability, or the number of destinations. These different requirements place different strains on the local air

transportation infrastructure, strains which are best met by more runways, more airports, alternate modes, or better long-distance communication, depending on the context.

The processes of globalization are therefore composed of activities at the local or even individual level. These activities include components of the transportation infrastructure that make international trade and multinational corporations possible while being influenced by technological improvements and deregulation and liberalization. The role that a metropolitan area sees itself as playing in the global network determines its attitudes towards transportation infrastructure, as does the governance of the airport in combination with other local power structures. Finally, the uneasiness that local places feel about the external pressures of globalization is represented by conflicts over who benefits from transportation infrastructure: the same people who are negatively affected by that infrastructure, others in their city, or outsiders who do not have to suffer the environmental effects.

CHAPTER 10

CONCLUSION

> "The extraordinary fluidity of capital today is therefore purchased by the fixation of extraordinary amounts of capital, immobilized in the structures and infrastructures of production and circulation -- the production of a built environment that is fixed in place beyond what would have been recognized at the beginning of the century. The global becomes a product of the local as much as the local is remade by the global" [4, p. 188].

> "Well, there's a reality here. We're in the center of the United States, the country that it is, and transportation is what it is, and Chicago has always been a hub, it's always had the world's busiest airport […] So, we have gone to hearings, we have been allowed to speak if we so choose, but still there's certainly a reality here that we know is not going to change. It's a geographical thing more than anything else, I think" (Judy Bernardi, Village Clerk, Norridge, IL, [170]).

Flusty has suggested, "What if the minutiae of global formation were approached as the underpinnings of globalization, rather than as the result?" [78, p. 135]. He focuses on items such as a piece of clothing or an ethnically-derived nickname in his argument that globalization is constituted out of everyday people and things, not just transnational flows of money and goods. I would argue that these everyday items have to include the aircraft, runways, noise contours, and residences that affect the process of airport expansion and thus the flows of everyday and "globalized" people and goods.

If the processes of globalization are composed of individual actions, then they are also strongly influenced by the places in which those individuals are located. Citizens and municipalities trying to preserve their spaces of dependence engage with both higher and lower scales, forming connections that transcend jurisdictions. While neighbors of an airport may be negatively affected at the relatively small scale of individual dwellings or municipal budgets, they nevertheless must engage with the national and international regulations and legislation that impact the airport in question. The means of that engagement are influenced by the governance structure of the airport, the history of the metropolitan area, and the economic status of the region, among others.

This dissertation began with research questions on five main topics and added one along the way. First, there were three case studies, each with their own question aimed at a different type of connection between globalization, air transportation, and local land use.

> How have local land uses changed over time around O'Hare Airport in Chicago? How are municipalities able to exert power over airport decisionmaking, or are they always reacting to decisions made at other scales?

> How are the economic benefits of the Minneapolis-St. Paul International Airport distributed geographically throughout the Twin Cities region? Are they in equitable balance with the environmental and other disbenefits of the airport?

> How has the regional approach to long-distance transportation in the Boston area come about, including the promotion of regional airports and alternate modes of transportation? Is this regionalization truly successful? What impacts has it had on municipalities and local land use?

Chicago-O'Hare exemplified the difficulties involved in keeping local land use compatible with airport operations. Census housing data, zoning maps, and interviews revealed that land use compatibility around O'Hare has been influenced by region-wide geography rather than municipal-level planning. Municipal size and history, market forces, and distance from downtown were all more important than airport proximity in determining the pattern of residential land uses. Furthermore, those places that did actually take the airport into account in their planning have sometimes had that planning rendered moot by airport expansion.

Municipalities were able to indirectly influence the airport decisionmaking process through some participation in official organizations, but mostly through tactics such as lawsuits. The historic tension between the City of Chicago and its suburbs is fundamental to the O'Hare issue because of the tight control that Chicago has held and exercised over the airport. City-suburb politics proved to be a better indicator of airport support or opposition than did land use compatibility or economic development. The attempt to mandate the expansion of O'Hare through federal legislation is a prime example of scale jumping, one that would force municipalities to react to decisions made at higher scales.

For Minneapolis-St. Paul, analysis of Standard Industrial Classification data from the Economic Census indicated that the economic benefits of MSP are not evenly distributed throughout the metro area. In fact, they are concentrated in the parts of the region that are already the fastest growing, as previous research found for Atlanta. Furthermore, these economic benefits do not match up with the environmental effects. These imbalances are partially the consequence of the relative size of municipalities with regards to the airport, and partially the consequence of scale jumping on the part of the state, taking the power of decisionmaking but not the responsibility to deal with the consequences of that decision.

Finally, the regionalization of air transportation in New England has come about from a number of factors that for the most part are unique to that region. New England is growing in population and high-tech jobs, but is too densely populated to have enough undeveloped land available for a new major airport. Diversion of air traffic to smaller regional airports has reduced congestion at Logan while replicating the same airport-municipality conflicts at the smaller airports. Increasingly, regional airports are being connected to major hubs, allowing greater accessibility to these smaller metropolitan areas. It is unclear, however, how long-term of a solution the regionalization of air traffic is. Opponents of airport expansion are pushing the use of high-speed rail and teleconferencing to carry out the same functions as air transportation.

There were also two broader research questions that concerned all three case studies:

> How do globalization and air transportation influence each other with regards to local land use, in both discursive and material terms?

How are new scales constructed in struggles over airport expansion? Namely, how is the scale defined at which policy should be made, and what are the implications for municipalities in terms of land use and economic development?

In addition, fieldwork showed that questions concerning public participation and the planning process were a fundamental part of the connections between globalization, air transportation, and land use. Municipalities are influenced by their constituencies and their form of government in determining their best course of action with regards to airport expansion. Spatial and temporal mismatches between municipal and airport planning processes also influence the expansion process, as do different definitions of the meaning and influence of public participation. I also found that citizens and municipalities *will* find a way to participate and have their voices be heard. As a corollary, it appears that allowing more public participation makes for faster airport expansion, based on the seven airports that were part of the three case studies. Faster airport expansion may actually benefit neighboring municipalities, however, by removing uncertainty that interferes with their internal planning and by providing opportunities for compromise.

Globalization was shown to influence transportation by placing particular demands on the air transportation system through international trade, the needs of multinational corporations, technological improvements, and deregulation. Air transportation is itself simultaneously being dispersed and concentrated, while facilitating the dispersal and concentration of firms and parts of firms. Following Kelly, I argued that the processes of globalization are composed of activities at the local or even individual level. The role that a metropolitan area sees itself as playing in the global network determines its attitudes towards transportation infrastructure, as does the governance of the airport in combination with other local power structures, including municipal politics and the politics of land use.

Finally, I showed that scale is a fundamental part of airport expansion controversies, not only in terms of deciding who should make policy, but as an explanation for why the expansion process can be so lengthy. The multiscalar nature of airport expansion issues has two main consequences. First, because there is no means of adjudication between different scales, scale jumping is a necessary strategy on the part of the smaller scale involved. Secondly, the structure of scales themselves is called into question by airport expansion, particularly the distinction between scales-as-territories and scales-as-networks. Globalization processes may be made up of many local actions, but individuals and municipalities still have to jump scale to be heard.

As the opening quotes of this chapter indicate, place matters. Throughout the history of air transportation, certain places have come to play particularly important roles in the provision of infrastructure, with ensuing economic and environmental consequences. Because significant amounts of capital have been invested in these places, airlines, cities, airport operators, and others have a vested interest in seeing that infrastructure continue to expand. However, people who are negatively affected by that infrastructure have a vested interest in seeing no more expansion, or at least in seeing expansion happen somewhere else. Airport expansion conflicts thus endure because of their multi-scalar nature and the difficulty of reconciling an issue that is simultaneously local and global.

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APPENDIX A

FAA LAND USE COMPATIBILITY CHART

Land Type	Land Use	Yearly day-night average sound level (Ldn) in decibels					
		Below 65	**65-70**	**70-75**	**75-80**	**80-85**	**Over 85**
Residential	Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Residential	Mobile home parks	Y	N	N	N	N	N
Residential	Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use	Schools	Y	N(1)	N(1)	N	N	N
Public Use	Hospitals and nursing homes	Y	25	30	N	N	N
Public Use	Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Public Use	Government services	Y	Y	25	30	N	N
Public Use	Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Public Use	Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use	Offices, business, and professional	Y	Y	25	30	N	N
Commercial Use	Wholesale and retail—building materials, hardware, & farm equip	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use	Retail trade—general	Y	Y	25	30	N	N
Commercial Use	Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use	Communication	Y	Y	25	30	N	N
Manufacturing & Production	Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Manufacturing & Production	Photographic and optical	Y	Y	25	30	N	N
Manufacturing & Production	Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Manufacturing & Production	Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N

Manufacturing & Production	Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational	Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Recreational	Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Recreational	Nature exhibits and zoos	Y	Y	N	N	N	N
Recreational	Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Recreational	Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

Key

Y= Land use and related structures compatible without restrictions

N= Land use and related structures are not compatible and should be prohibited

25 or 30= Land use and related structures generally compatible; measures to achieve outdoor to indoor Noise Level Reduction (NLR) of 25 or 30 dB must be incorporated into design and construction of structure

(1)= Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2)= Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3)= Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4)= Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(5)= Land use compatible provided special sound reinforcement systems are installed.

(6)= Residential buildings require an NLR of 25.

(7)= Residential buildings require an NLR of 30.

(8)= Residential buildings not permitted.

APPENDIX B

INTERVIEW QUESTIONS

Questions for mayors or city planners:

1) What can you tell me about the history of land use in your town? Has the airport's presence traditionally been taken into account in land use planning here? If not, when did that start?
2) What kinds of businesses seek to locate near the airport? Where do their employees live? Where do your town's residents work? Are you seeing any effects of globalization, i.e., international companies locating in your town because of the proximity to the airport?
3) How strongly is your community affected by airport noise? Are residents particularly vocal? Is there any pressure to redevelop existing uses to make them more compatible with the airport? How do you balance the interests of businesses with the interests of residents? Do you feel the advantages and disadvantages of being located near the airport are fairly equal for the town overall?
4) How has the proximity of the airport been taken into account in your zoning code? Are there special districts for airport-related development? Are there restrictions on certain types of development? Whose restrictions are they (federal, state, etc)? Has your town ever sought to get those restrictions changed?
5) How would you describe your town's relationship with the airport? With other towns that neighbor the airport? How would you describe your town's relationship with higher levels of government regarding airport issues?
6) How has your town been affected in the past by expansion at the airport? Is there a current expansion plan that will have additional effects? Are there any alternatives that you prefer to such plan?
7) (Boston only) What do you think of the recent push towards regionalization of air transportation in Greater Boston? How did it come about? What does it mean to you? What do you think it means to other cities or airport operators?
8) Anything else you'd like to add? Anyone else I should talk to?

Questions for airport operators:

1) Has the airport's presence traditionally been taken into account in planning land use compatibility with neighboring towns? If not, when did that start?
2) How would you describe your relationship with towns neighboring the airport? With higher levels of government regarding airport issues?
3) Describe any current expansion plans. What do you see as their biggest benefits and biggest negatives? How do you expect they will impact neighboring towns? What mitigation have you provided for? If there is opposition, what are their main complaints?
4) (Boston only) What do you think of the recent push towards regionalization of air transportation in New England? How did it come about? What does it mean to you? What do you think it means to other cities or airport operators? How about arguments about equity or environmental justice?
5) Anything else you'd like to add? Anyone else I should talk to?

Questions for activists:

1) What do you see as the general issues facing your community with regards to air transportation? Noise? Redevelopment? Traffic? Health? Something else? Does your community receive economic benefits that balance the airport's negative effects?

2) Do you see threats to your community as part of a specific expansion plan? What alternative solutions do you offer to the problems expansion seeks to solve?

3) How would you describe your organization's relationship with the airport, historically and in the present? With other towns that neighbor the airport? With other towns across the metropolitan area? How would you describe your organization's relationship with higher levels of government regarding airport issues?

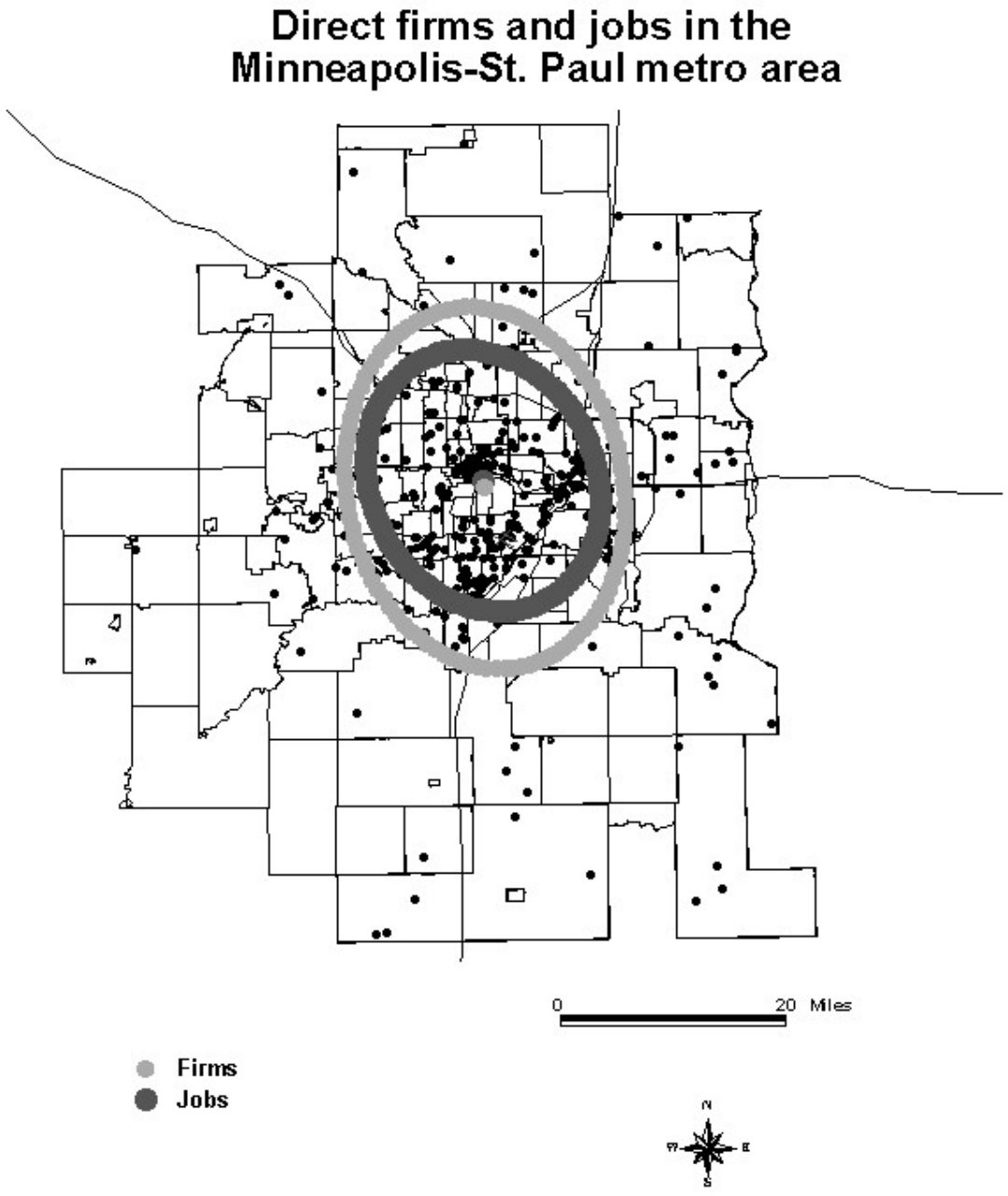
4) (Boston only) What do you think of the recent push towards regionalization of air transportation in Greater Boston? How did it come about? What does it mean to you? What do you think it means to other cities or airport operators? What about arguments on equity and/or environmental justice?

5) Anything else you'd like to add? Anyone else I should talk to?

APPENDIX C

MAPS OF FIRM AND JOB DISTRIBUTION FOR MINNEAPOLIS-ST. PAUL METROPOLITAN AREA

There are four maps in this appendix, elaborating on the data presented in Chapter 5. The first shows the distribution of firms that represent the direct economic impact of Minneapolis-St. Paul International Airport, such as air transportation, hotels, and car rental firms. The second map shows the distribution of firms in the sectors identified in Chapter 3 as being most likely to use air transportation, either for cargo or passengers. The third map shows the distribution of firms in those sectors that are particularly likely to use air cargo as identified by Loughlin (1996). Finally, the fourth map shows the location of firms identified by Zaidi et al. (2001) as being of particular economic importance to the Minneapolis-St. Paul metropolitan area. All of the maps show a similar pattern, with firms being concentrated to the west and north of the metro area, not to the south where the airport lies.


Direct firms and jobs in the
Minneapolis-St. Paul metro area
0
20 Miles
Firms
Jobs
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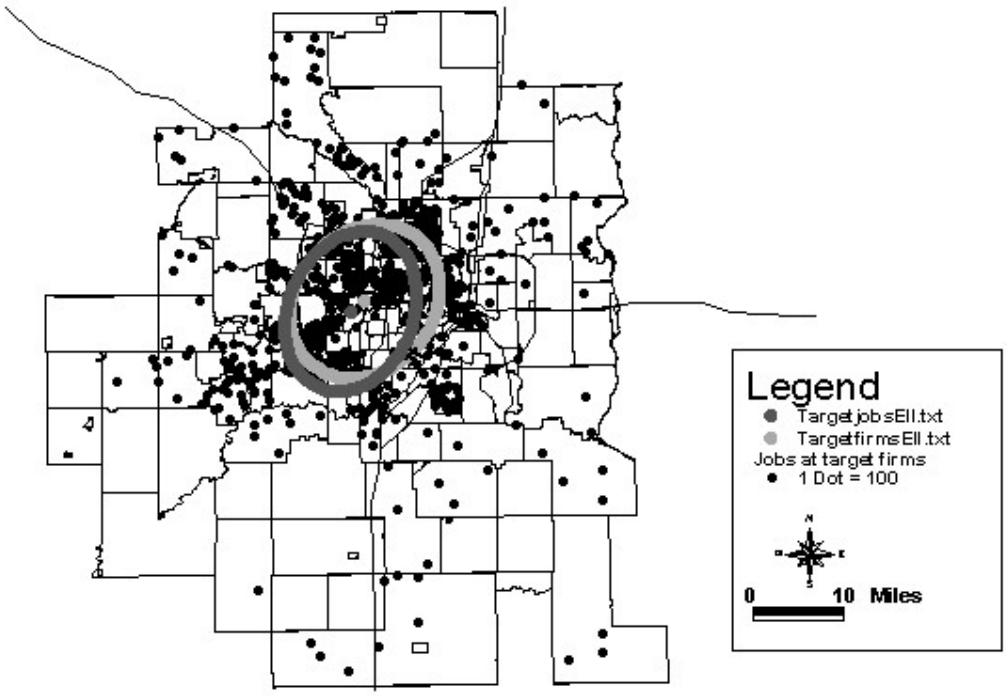
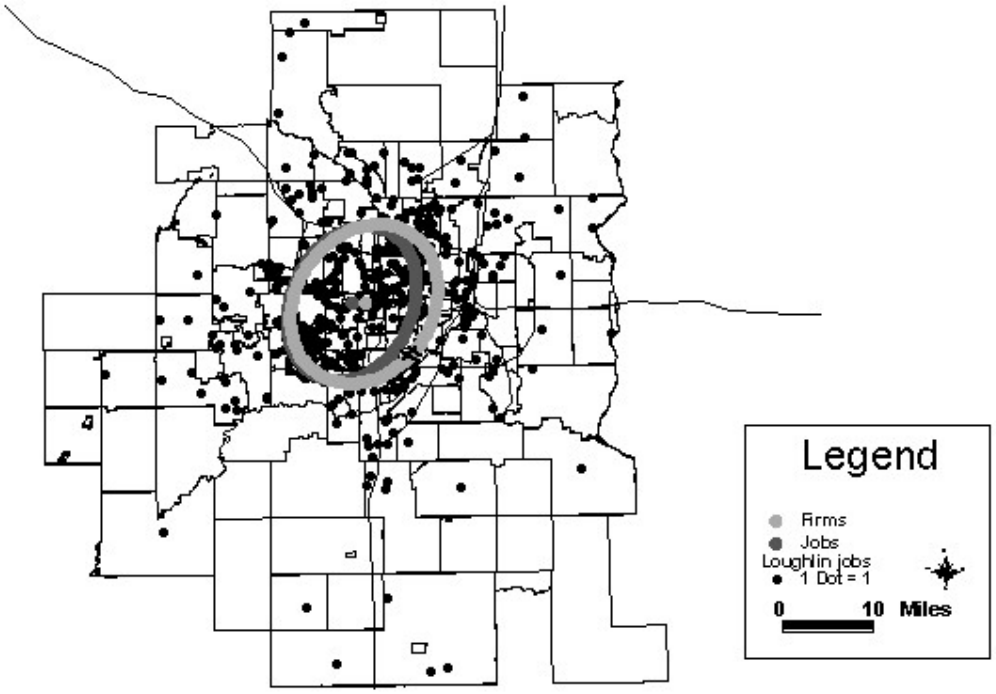
Targeted Sectors



Firms Identified by Loughlin as Using Air Cargo



Target Firms Likely to Use Air Transportation