



A Deeper Assessment of the Economic Impacts of the Proposed Carroll County Regional Airport Expansion

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A Deeper Assessment of the Economic Impacts of the Proposed Carroll County Regional Airport Expansion

Executive Summary

Scope of Analysis

The Carroll County Industrial Authority hired Sage Policy Group, Inc. of Baltimore to address two basic questions regarding the proposed expansion of the Carroll County Regional Airport (DMW).

Question 1: Are the economic and fiscal impact estimates generated by Martin Associates (2006) credible based upon the expressed intentions of current and prospective DMW users?

Question 2: To what extent are the adjacent community's concerns justified and worthy of financial or other redress based upon the experience of similarly situated communities?

Methods

To address these questions and related issues, Sage relied upon a combination of interviews, extensive literature reviews and analysis. Interviews were conducted with current and prospective airport operators/users, residents from surrounding communities, and with relevant government officials from the Federal Aviation Administration, Maryland Aviation Administration, Carroll County Department of the Comptroller and Carroll County Economic Development.

Two separate literature reviews were conducted. The first sought to collect and analyze economic impact studies regarding airport expansions throughout the United States, Canada and Great Britain. The second sought to determine the relationship between airports and housing values, which is presumed to be negative because of noise and other environmental factors.

Findings

1. Carroll County and its broader region would forego significant positive economic and fiscal impacts were the proposed expansion not to move forward.
2. The federal government is paying the lion's share of project expenses, which means that Carroll County's relatively small financial contribution will generate an elevated rate of return.
3. Were the project to falter, DMW stands to lose a considerable amount of market share and airport economic impact would be substantially reduced.
4. The community's concerns regarding the impact on their quality of life and impact on housing values are perfectly legitimate, particularly for those within the 65 DNL area.

5. Similarly situated communities have invested significant resources to offset the impacts of airport expansions upon wetlands and other sensitive environmental elements.

Recommendations

1. The airport expansion project should move forward to allow the broader community to leverage federal and state resources, to trigger substantial positive economic impacts including potentially on industrial parks in and around Westminster, to promote safety and to prevent the loss of a significant fraction of the airport's current base of users.
2. Carroll County policymakers should invest substantial resources to provide soundproofing to homes most affected by airport noise using 55 to 60 DNL¹ as a possible impact threshold. These monies can be raised in part or in whole through surcharges/fees charged to airport operators/users in conjunction with FAA support.
3. Carroll County policymakers should be willing to invest substantial resources to mitigate any environmental harm attributable to the loss of trees, wetlands or harm to wildlife. The study team recommends that environmental specialists be consulted to determine the required level of expenditure. Importantly, the FAA contributes significantly to finance inquiries of this type and ultimately toward environmental compliance.

Concluding Remarks

Undoubtedly, adoption of these recommendations will leave both proponents and the opponents of DMW's expansion somewhat dissatisfied, possibly enraged. However, the bottom line is that the County can ill-afford to forego over \$90 million in investment of which roughly 90 percent is to be financed by a combination of federal, state and private sources. Moreover, the expected economic and fiscal benefits of the proposed expansion will create the resources needed to mitigate harm to adjacent residential communities and to Carroll County's environment.

¹ DNL represents day-night average noise level.

Introduction

The Carroll County Industrial Development Authority hired Sage Policy Group, Inc. (Sage), an economic and policy consultancy located in Baltimore, to conduct a simultaneously more detailed and broader assessment of the economic and fiscal consequences associated with the proposed expansion of the Carroll County Regional Airport (DMW). The project has become the subject of intense scrutiny because of the concerns of communities located immediately adjacent to the airport. Residents of these communities have expressed distaste for the presumed noise, air pollution, traffic, and impact upon property values that an expanded airport might generate. By conducting this assessment, Sage becomes the second consultancy to explore the economic implications of the proposed project.

In mid-2006, Martin Associates supplied estimates of the economic impact associated with the proposed expansion of DMW. The expanded project encompasses the following components:

- Purchase of between 100 and 135 acres;
- Lengthening of the runway from 5,100 feet to 6,400 feet to accommodate larger planes and enhance safety;
- Strengthening of the runway to accommodate heavier planes and to promote longer runway life;
- Removal of the existing runway and taxiway; and
- Improvement of the airport's attractiveness to leading edge private jets such as the Gulfstream G5 and Bombardier Global Express.

Decision-makers could have the existing airport runway extended by 1,300 feet, but this would require the runway to be shut down for approximately 10 months. By shifting the to-be-constructed runway to a new but proximate location (over 250 feet and up 600 feet), the existing runway would only be unavailable for roughly one week. This strategy maximizes continuity of operations and thereby minimizes the extent of economic activity foregone.

In conducting the assessment, Martin Associates did not characterize or quantify the economic implications of the proposed airport expansion upon immediately adjacent communities. This in fact appears to be the standard for studies of this type. While this Sage study does not attempt to model these implications statistically², Sage conducted a far-reaching literature review to determine the economic consequences that typically accompany the expansion of regional/reliever airports like DMW. This information should help policymakers determine the types of relief that the broader community may want to offer residents in the event that the proposed expansion moves forward, and will also help to determine which residents are likely deserving of such relief.

² These types of models are terribly complex, very expensive to produce and often produce inconclusive results. That said, Sage has reviewed the results of many of these types of analyses that have been conducted on behalf of other communities in an attempt to make as much information accessible as possible to Carroll County decision-makers in an economical manner.

The manner in which this project is to be financed represents a critical aspect of the public policy considerations at stake. According to publicly available data, the project involves a total cost of approximately \$90 million over the course of six fiscal years.³ Exhibit 1 provides a summary of project costs and sources of funding.

Importantly, the Federal Aviation Administration (FAA) provides nearly 80 percent of the project’s total cost primarily because of their contribution toward the runway expansion. Therefore, a decision to disapprove the project would result in the loss of over \$71,000,000 in federal support for economic activity and development in Carroll County and the broader region. The Maryland Aviation Administration (MAA) will supply another 2.5 percent of funding while the private sector’s contribution is anticipated to approach 9 percent. All told, the County’s contribution, including that of the Airport’s Enterprise Fund, will be slightly less than 10 percent of the overall project’s costs. In other words, every ten cents of County/Enterprise Fund investment will leverage 90 cents of investment from non-County sources.

Exhibit 1: Project Costs and Sources of Funding

Investment Component	Cost	Share of Total
Corporate Hangars	\$9,463,000	10.5%
Fuel Farm	\$501,000	0.6%
Grounds Maintenance Equipment & Storage Facility	\$108,000	0.1%
Runway Expansion	\$74,075,000	81.8%
Security System	\$692,000	0.8%
Terminal Building Expansion	\$934,000	1.0%
T-Hangars	\$4,771,250	5.3%
<i>Project Total Cost</i>	<i>\$90,544,250</i>	<i>100%</i>
Sources of Funding	Inflows	Share of Total
Bonds (Local)	\$8,854,101	9.8%
Enterprise Funds	\$120,525	0.1%
MD Aviation Administration	\$2,223,501	2.5%
Federal Aviation Administration	\$71,334,123	78.8%
Private	\$8,012,000	8.8%
<i>Project Total Funding</i>	<i>\$90,544,250</i>	<i>100%</i>

Source: <http://ccgovernment/carr.org/ccg/budget/07-abudget/airport.pdf>. Percentages may not sum to 100.0% due to rounding.

According to the Martin Associates draft report of June 2006, their study team utilized “interviews with current tenants, local economic data, and DMW airport statistics” to measure impacts in the most defensible manner possible. While this represents a reasonable approach, it is likely true that future economic impact will also be a function of users who presently lack a presence at DMW. In order to determine the reasonableness of the economic impact estimates generated by Martin Associates, Sage interviewed a number of potential users of a post-runway expansion DMW. Exhibit 2

³ Specifically, fiscal years 2007-2012, though this timeline is subject to change based on future policy decisions.

summarizes Martin Associates' estimated direct on-airport impacts generated by the proposed expansion that would be captured within Carroll County's boundaries.⁴

Exhibit 2: Summary of Direct On-Airport Impacts Estimated by Martin Associates Generated by DMW within Carroll County

Category	2006	2010	2015	2020	2025
Direct DMW Jobs	35	49	53	60	69
Direct Personal Income (\$000s)	\$1,660.2	\$2,703.4	\$2,974.5	\$3,412.8	\$4,113.9
Direct Personal Taxes (\$000s)					
State Taxes	\$93.7	\$152.5	\$167.8	\$192.5	\$232.1
Local Taxes	\$77.3	\$125.9	\$138.6	\$159.0	\$191.6
Total State & Local Taxes	\$171.0	\$278.4	\$306.4	\$351.5	\$423.7
Property Tax on Hangars	\$10.6	\$72.7	\$108.4	\$179.6	\$233.1

Moreover, the Martin Associates study team did not investigate the implications associated with an attenuated airport runway shutdown, which would occur whether or not the existing runway is expanded. Without a new runway at some point in the near future, the existing runway will need to be shut down for significant maintenance. This will have the effect of driving existing users away, thereby reducing the airport's current level of economic and fiscal impacts upon the community. Therefore, the opportunity cost associated with not expanding the airport is a function of both positive impact gains and the prevention of economic loss accompanying the no-build scenario.

Ultimately, Sage sought to answer two analytical questions:

Question 1: Are the economic and fiscal impact estimates generated by Martin Associates credible based upon the expressed intentions of current and prospective DMW users?

Question 2: To what extent are the adjacent community's concerns justified and worthy of financial or other redress based upon the experience of similarly situated communities?

⁴ Martin Associates states that its estimated Carroll County-specific impacts are probably conservative. In order to isolate the impacts of DMW to Carroll County, Martin Associates utilized their in-house data, which suggests that roughly 59 percent of DMW employees reside in Carroll County. By contrast, the Carroll County Economic Development data indicate that approximately 75 percent of employees reside within the county. The effect is to suppress Martin Associates' estimates of personal income effects and local income tax collections (see p. 6 of the Martin Associates June 2006 draft).

Economic/Fiscal Impacts

In order to determine the reasonableness of estimated economic and fiscal impacts, Sage interviewed a mix of current and potential airport users. The goal of the interviews was to determine how the actions of these airplane operators would change if the proposed airport expansion moves forward. Questions regarding jobs created, average incomes and investments were asked of each member of this class of interviewees. In all, eleven interviews were conducted of this type. Two other potential interviewees were contacted but did not return communications. All interviewees were guaranteed confidentiality which precludes a listing of their names, titles and corporate affiliations, but did permit a level of candor that otherwise would not have existed.

To augment interview findings, Sage also conducted a literature review to determine the level of consistency the Martin Associates estimates' have with those of other analytical teams. A certain level of consistency is effectively guaranteed since as Martin Associates points out in its June 2006 draft report, the "methodology used in this analysis has been similarly used to assess the economic impacts at 34 general aviation/commuter airports...including Baltimore-Washington International Airport . . . and Harrisburg International Airport."⁵

- Interview Results

In conducting the interviews, the Sage study team fully recognized that airplane operators might have an incentive to exaggerate impacts since they typically want the expansion to take place and therefore want to put the best economic face upon it. In response, Sage did two things. First, all interviews were conducted by Sage economist Anirban Basu, the most senior researcher on the Sage staff and an analyst with immense experience in primary data collection. Second, respondents were asked highly specific questions regarding their intentions. The accuracy of statements/perceptions was gauged where possible. While these steps in and of themselves cannot eliminate hyperbole, they add to the credibility of interview results.

Without exception, both current and prospective users of the airport expressed great enthusiasm about the proposed airport expansion and unalloyed confidence that the expansion would generate significant economic and fiscal returns for Carroll County. All interviewed airplane owners/operators predicted greater use of the airport and additional purchases of fuel, which directly benefits the County finances.

With respect to fuel, several airplane operators stated that they couldn't fuel their planes completely in Carroll County because a 5,100 foot runway does not permit it. Carroll County receives a share of fuel sales and fuel sales contributed in excess of \$1.5 million to Airport revenues in FY2006.⁶ A longer runway would permit complete fueling which in turn would maximize Carroll County's fuel sales-related revenues.

⁵ Martin Associates, Draft Report, Preliminary Findings, The Local and Regional Economic Impacts of Proposed Runway Expansion at Carroll County Regional Airport (DMW), June 7, 2006, at 2.

⁶ Carroll County Comptroller's Office.

Moreover, because planes must take off and land more quickly from a shorter runway than a longer one, the noise signature associated with takeoffs and landings is elevated. The implication is that a longer runway would reduce the average decibel level, *ceteris paribus*, associated with takeoffs and landings.

A number of pilots with whom we spoke also suggested that a longer runway would significantly improve safety since with a 5,100-foot runway, “there is simply no room for error”. Of course, from the perspective of the surrounding community’s safety, the impact of a longer runway is ambiguous, since the improved safety per flight could conceivably be more than offset by an increase in the number of flights.

By the completion of interviews, Sage had compiled a lengthy list of statements characterizing the economic impacts that individual businesses will have at the airport and in Carroll County depending on whether or not the runway expansion moves forward. One current user stated that they would leave DMW unless the runway project moved ahead, taking 16-18 employees with them. This interviewee estimated that were the runway shutdown for 10-12 months, more than half of the small operators currently located at the airport would leave, with many not returning even after improvements to the current runway were completed. This interviewee also stated that most corporate users would also leave and that they would not come back.

The potential loss of business should be an important consideration for policymakers. The Martin Associates’ report estimated the extent to which economic activity would be augmented were the proposed expansion at DMW to move forward. But that study team did not estimate the impact of the loss of business if the proposed expansion project fails to move ahead. A comprehensive treatment would take into account the totality of impact, comparing the differential in outcomes under two scenarios: one with the expansion project and one without. This interviewee and others suggested that whatever occurs at DMW, status quo economic activity is not among the conceivable scenarios.

Another existing user of the airport estimated that were the expansion to move forward, they would increase their fuel purchases from 110,000 gallons per year to 160,000. Yet another stated that if the proposed airport expansion moves forward, they would build a 145 x 125 foot hangar that would represent \$1.5 million in new investment. This interviewee also estimates that their fuel purchases would be in the range of 200,000 gallons per year and that their investment would also be accompanied by 9-10 new employees. Moreover, though certain aspects of their plans remain unclear, the company would be in a position to build another two corporate hangars at DMW in the future.

Among those interviewed, the single most significant investment identified through the interviews involved a stated intention to construct \$3.5 million worth of new buildings were the expansion to move forward. Twenty additional workers would accompany this investment.

Indeed, the interviews identified significantly more jobs to be added at DMW than the Martin Associates analysis would suggest. This is remarkable since the group of commercial users interviewed likely represents a fraction of potential future airport users.

Both current and prospective users pointed out that DMW possess tremendous operational advantages in the post-9/11 world. Security measures in Central Maryland have made flying to BWI and Dulles more onerous and intimidating. This positions Carroll County's regional airport for more growth that would have been anticipated pre-9/11. The implication of the interviews is that the Martin Associates estimates represent a significant understatement of the economic and fiscal impacts associated with the proposed airport expansion.

- Literature Review Findings and Environmental Scan – Brief Synopsis

Sage compiled and analyzed airport-related economic impact studies from Maryland and Pennsylvania to Canada and England. The goal of this part of the study was to determine whether estimates of economic and fiscal impacts generated by Martin Associates are in line with those of others.

As an example, the University of Connecticut's study of an airport expansion at Tweed-New Haven Airport projected that the number of jobs attributable to the airport's expansion would roughly quadruple from the status quo of 1,111 jobs to 4,332 jobs over the course of roughly a decade and a half.⁷ The airport's expansion was also predicted to increase airport-related personal income from \$41.6 million to nearly \$157 million.⁸

Similarly, estimates of economic impact of a proposed airport expansion at the Abbotsford International Airport Authority, the fourth busiest airport in British Columbia, Canada, estimates that their runway expansion will boost the airport's economic impact from \$225 million currently to nearly \$300 million while creating an additional 600 full-time jobs for the region.

Positive economic impacts accompany small, medium and large airports alike according to available literature. The Cincinnati/Kentucky International Airport represents a prime example of large airport impacts. While this airport is substantially larger than DMW, the magnitude and form of its economic impacts provide some insight into the manner in which economic impact is generated in an increasingly global economy. The Cincinnati/Northern Kentucky International Airport is now one of America's busiest and fastest growing and as of 2006 boasted daily nonstop flights to five European cities.⁹ Business and government leaders believe the airport's spin-off effects to be a powerful economic driver. For instance, the number of foreign-owned companies operating in the region has more than tripled since 1987, from 70 then to roughly 250 today.¹⁰ A recent study by the Aviation Policy Program at George Mason University determined that the number of high-technology jobs in the Cincinnati region had leapt from 65,000 in 1989 to almost 80,000 in 1996, with the airport cited as an important growth factor.¹¹

⁷ CCEA, University of Connecticut (2002). *Tweed-New Haven Airport: An Economic Impact Analysis*, at 4.

⁸ *Id.* at 6.

⁹ Green, R. K. (2006). *Airports and Economic Development*, Department of Business, School of Business, the George Washington University, at 3.

¹⁰ *Id.*

¹¹ *Id.* at 4.

The nation looks even more enviously at Dallas (home to DFW airport). DFW is the nation's second-busiest airport and is routinely viewed as one of the nation's greatest drivers of economic activity. The number of jobs in the region's Metroplex, as the four county region surrounding the airport is known, has soared more than 148 percent since 1970 when construction of DFW began. During this same period, national employment expanded 67 percent.¹²

Indeed, study after study indicates that airport expansions and operations are closely related to economic and tax base expansion. One need only look at Maryland to determine that this is true. Recent years have watched a formidable commercial sector expand around BWI Marshall airport, including hotels, office buildings, retail and industrial facilities. Washington County has also experienced significant economic impact from its expanded airport, though presently no definitive analysis has been done to quantify these impacts and it would be premature to do so given ongoing investment and job creation.

It is also worth noting that the Westminster area is home to five industrial parks, including the Westminster Air Business Center immediately adjacent to the airport. Though Carroll County economic development officials suggest that the airport is yet to have a noticeable impact on many of these industrial parks, it is possible that the airport will generate spillover benefits for them in an expanded form, including for the proximate 63-acre Westminster Technology Park. By relegating its impact estimates to on-airport effects, Martin Associates did not attempt to calculate the magnitude of these impacts, but they are likely to be non-zero.

The case of the New Bedford Regional Airport in Massachusetts provides an example that is in keeping with DMW's size and circumstances and may help to guide policy. New Bedford serves as an aviation hub for Southeastern Massachusetts because of its position between Boston and Providence. The New Bedford Airport Commission recommended the development of the airport as a regional cargo facility given the operational constraints at both Boston Logan and TF Green (Providence). However, as with DMW's expansion, significant local opposition emerged due to concerns over increased noise and the environmental impact upon local wetlands. In order to deal with these concerns, the expansion project has set aside \$15 million for wetlands replication. This is significant given the fact that the overall project cost is just \$30 million, or roughly one-third of the cost of DMW's proposed expansion.

Our interviews with current and prospective users of the airport suggest that there are other ways to mitigate the real and perceived harm associated with airport expansion. For instance, two airplane operators suggested that fees should be paid to the community whenever a plane lands at DMW between the hours of 11pm and 7am. Though a complete ban on such landings is probably beyond the bounds of practicality (as one pilot remarked, "when a plane's got to land, it has got to land"), it would not be unreasonable to establish a fund from such payments that would address a particular community concern or set of concerns such as soundproofing of homes or wildlife impacts.

¹² Id.

Community Concerns

Martin Associates was not asked to determine community concerns nor did they. One of Sage's primary goals was to properly identify and rank the community's concerns regarding the proposed expansion and to use available research and literature to evaluate the reasonableness of such concerns and if possible place some monetary value upon them. The study team also sought to identify any creative approaches other communities have utilized to allow for as much harmony between residents and their government as possible.

- Interview Results

To establish the community's perspective on the proposed airport expansion, Sage contacted fifteen residents, of whom twelve responded to requests for interviews. Though this is admittedly not a large number, the primary issues facing residents who oppose the expansion became clear after only a handful of interviews. It should be noted that not all residents living proximately to the airport are opposed to the expansion though most with whom we spoke (10 out of 12) were opposed. Our small sample also should not be viewed as a representative one since one organization opposed to the expansion, the Carroll Joint Neighborhood Association, constituted a significant fraction of those with whom we spoke.

As with proponents of the airport expansion, opponents have an incentive to exaggerate perceived or real harm. To counter this, all interviews were handled by Anirban Basu with emphasis placed on specificity. The accuracy of statements/perceptions was gauged where possible.

Though many interviewees hesitated to rank their list of concerns, airport noise was the most frequently mentioned and discussed. Most respondents were generally familiar with the FAA's rules and regulations regarding noise and noise contours and the fact that there is little federal relief available for adversely affected properties that do not meet the minimum thresholds for harm. These respondents also understood that the County could still provide relief in various forms, either through the purchase of properties, grants for soundproofing or through a set of other means.

But for the most part, project opponents do not see a middle ground. In the words of one member of the Carroll Joint Neighborhood Association, "the airport should stay as it is". Attempts to suggest compromise rarely met with any useful commentary. To quote another interviewee responding to the question of whether there existed a fair middle ground simply said, "to tell you the truth, no."

Part of this may be due to the elevated level of distrust that currently exists between residents in opposition and County government. That said, a number of respondents from the surrounding area suggested that while they completely opposed runway expansion, they were less concerned by the addition of corporate hangars and other amenities at the airport not linked to the runway. In addition to noise pollution, citizen opponents were

concerned with air pollution, water pollution¹³, traffic, associated loss of home value, wetlands and impact on wildlife.¹⁴

The interviews revealed a number of misconceptions that have spread throughout the community. These include:

- the notion that Boeing 737s will land at DMW post-runway expansion;
- that no member of the community was aware of several airport expansion planning meetings; and
- that the airport enterprise fund has been losing money.

According to interviews with FAA and MAA officials, airport expansion plans will offer sufficient pavement strength to accommodate 737s. However, no current or prospective airport user announced an intention to fly a 737 into DMW, and all expressed doubt with respect to the likelihood of any user utilizing DMW for such a purpose.

With respect to planning meetings, at least one member of the opposition informed us that he had been aware of all seven meetings and that others did not know because they had missed announcements in the newspaper. That said, there is at least anecdotal evidence suggesting that the County could have done more to alert citizens to these meetings. An important aspect of this study was to gauge fully the community's concerns and this was done through the interviews and by reading commentary submitted by community activists, including on a number of occasions directly to Anirban Basu's e-mail.

Finally, information provided to Sage by the Carroll County Department of the Comptroller indicates that the airport has generated positive net income for the past four fiscal years. Between fiscal years 2003 and 2006, the Airport generated nearly \$1.9 million in excess revenues. A publicly available summary of Airport revenues and expenses is provided in Exhibit 3.

¹³ Including via de-icing.

¹⁴ Most residents interviewed have moved to their current location within the last sixteen years, many within the past eight. The airport is able to trace its history back at least five decades.

Exhibit 3: Airport Revenue and Expenses

	2006	2005	2004	2003	2002
Revenue					
Rent	\$517,732	\$472,539	\$353,763	\$156,533	\$143,281
Fuel Sales	\$1,523,726	\$1,268,475	\$662,347	\$354,796	\$205,772
Capital Contributions ¹⁵	\$348,858	\$1,288,611	\$511,521	\$315,834	\$13,566
Operating transfer-County	\$83,020	\$44,053	\$58,176	\$142,405	\$44,240
Other	-	\$3,796	-	\$25,000	\$9,468
Total Revenue	\$2,473,336	\$3,077,474	\$1,585,807	\$994,568	\$416,327
Expense					
Salaries	\$182,310	\$159,740	\$96,725	\$82,472	\$77,741
Operating Expenses ¹⁶	\$1,790,569	\$1,569,749	\$832,208	\$700,760	\$286,918
Interest	\$138,741	\$144,323	\$132,137	\$133,179	\$145,796
Depreciation	\$123,428	\$118,050	\$23,792	\$24,029	-
Total Expense	\$2,235,048	\$1,991,862	\$1,084,862	\$940,440	\$510,455
Excess (deficiency) of revenue over expense	\$238,288	\$1,085,612	\$500,945	\$54,128	(\$94,128)

Source: Carroll County Department of the Comptroller

- Literature Review Findings

Perhaps no variable encompasses as much information as the value of homes. This single variable reflects the quality of local schools, air quality, proximity of hospitals, square footage, acreage, available employment opportunities, local crime statistics, the quality of architecture, landscaping, closet space, newness of windows, granite/corion, climate, water quality and general upkeep of the neighborhood. In sum, home values reflect the quality of life and opportunity that a home affords its denizens. Anything that compromises quality of life therefore reduces the value of the home.

Based on this insight, economists have modeled the impact of various changes in given environments to determine their impact on home values and by implication on the quality of life, including the impact of airport expansions. Economists do this typically by estimating hedonic models.¹⁷

The literature regarding the impact of airports on home values is mixed, though the majority of studies seem to indicate some statistically significant negative impact

¹⁵ Capital contributions include reimbursements from the FAA and MAA.

¹⁶ Operating expenses include non-capitalized capital outlay for projects reimbursed by the FAA and MAA.

¹⁷ Hedonic means of or relating to utility.

attributable to noise.¹⁸ However, measuring the impact of airport noise is a bit of a moving target since exposure to noise has been reduced through operating requirements, quieter aircraft, and by soundproofing or purchase of surrounding residential properties.¹⁹ As a result, there has been a dramatic decline in the number of persons exposed to significant noise levels of 65 decibels (dB) or more over the past twenty-five years.²⁰

At prolonged exposure to 65 dB and above, the most typical effects upon humans are annoyance, interference with speech and learning and potential sleep disturbance.²¹ At noise levels exceeding 75 dB, the EPA (1982) warns that more severe health effects may occur for some portion of the population, including temporary hearing loss.²² Analysts frequently use the concept of day-night average noise level, or DNL, to characterize the level of noise (decibels) experienced over time.

The primary issue therefore becomes measuring the economic value of quietude. Economists frequently do this hedonically by calculating a Noise Depreciation Index (NDI), which measures the percentage decline in the price of housing for each unit increase in noise exposure. Nelson (1980) found that NDI averaged 0.58 percent for the 18 airport studies he examined. In other words, residential property values fell 0.58 percent for every decibel increase in airport noise.²³

More recent studies by Pennington, Topham and Ward (1990) and Collins and Evans (1994) examine the relationship between noise and property values in Manchester, England. The 1990 study reports no relationship between housing values and noise in Manchester during the period 1985-1986.²⁴ The 1994 study team reexamined the Manchester data and reported that noise does indeed exert a negative effect. The impact of airport noise in the Manchester area was subsequently examined again by Tomkins, Topham, Twomey, and Ward (1998) using 1992-93 data. They estimate a noise discount at 0.84 percent per decibel.²⁵

Uyeno, Hamilton and Briggs (1993) report an estimated NDI of 0.68 using data for the Vancouver area in 1987. Lipscomb (2003) finds that the change in noise level cause a statistically insignificant change in housing sales price for a small city located outside of Atlanta. Nelson (2004) conducts a meta-analysis of airport noise and property values that

¹⁸ It is for this reason that we have focused upon noise as opposed to other variables such as air quality, traffic, etc. The economic literature focuses almost exclusively on the impact of airport noise on housing values and quality of life.

¹⁹ Nelson, J. P. (2003). *Meta-Analysis of Airport Noise and Hedonic Property Values: Problems and Prospects*, Pennsylvania State University, at 1.

²⁰ *Id.*

²¹ *Id.* at 3.

²² *Id.* According to results derived from the Integrated Noise Model (INM) regarding DMW, there are approximately 181 acres of land within the existing day-night average noise level (DNL) 65 dB contour, roughly 181 acres of land within the year 2010 DNL 65 dB contour; approximately 202 acres of land within the 2015 DNL 65 dB contour; and approximately 246 acres of land within the 2025 DNL 65 dB contour. The FAA, EPA and HUD have each accepted the INM as a standard.

²³ Nelson, J. P. (1980). Airports and property values, *Journal of Transport Economics and Policy*, pp. 37-52.

²⁴ Jud, D. & Winkler, D. (2006). *The Announcement Effect of an Airport Expansion on Housing Prices*, Bryan School of Business & Economics, University of North Carolina – Greensboro, at 93.

²⁵ *Id.*

encompass 33 estimates of noise discount for 23 airports in the United States and Canada. His results indicate a noise discount between 0.50 and 0.60 per decibel. Importantly, properties would sell at approximately 10-12 percent less if located at 75 dB rather than 55 dB.²⁶

In September 2006, the Federal Reserve Bank of St. Louis published one of the most recent reports on the subject, finding that homes located in the 70 DNL contour command significantly lower prices, *ceteris paribus*. However, their results at the 65 DNL contour level were statistically insignificant. Exhibit 4 summarizes many of the major findings in the literature.

Exhibit 4: Summary of Select Reviewed Literature Findings related to Airport Noise and Residential Property Values

Author(s)	Year of Study	Area Analyzed (if specified)	Property Value Discount
Nelson	1980	N/A (Survey of literature)	0.58% per decibel
O'Byrne, Nelson & Seneca	1985	Atlanta, GA	Not statistically significant
Pennington, Topham & Ward	1990	Manchester, England	No relationship
Uyeno, Hamilton & Briggs	1993	Vancouver, Canada	0.68% per decibel
Tomkins, Topham, Twomey & Ward	1998	Manchester, England	0.84% per decibel
Espey, Lopez	2000	Reno-Sparks, NV	2.4% for homes subjected to 65+ decibels
Lipscomb	2003	Atlanta, GA	Not statistically significant
McMillen	2004	Chicago, IL	9.0% for homes subjected to 65+ decibels
Nelson	2004	N/A (Survey of literature)	0.5% to 0.6% per decibel
Cohen, Coughlin	2006	Atlanta, GA	20.8% for homes at or above 70 DNL; 65 DNL not statistically significant
Jud, Winkler	2006	Greensboro/High Point/Winston Salem, NC (airport expansion)	9.2% for homes within 2.5 miles from airport; 5.7% for homes in the next 1.5-mile band.

From a public policy perspective, it is important to note that the impact of noise on property values is non-linear. In other words, the irritation to humans from noise is greater per dB increase at higher levels of noise than per dB increase at lower levels of noise. Theebe (2004) analyzed 160,000 transactions in the Western portion of Holland and identified very little impact of noise below 65 dB from trains, vehicular traffic and airplanes on property values.²⁷ However, estimates of negative impact were considerably larger between 66 and 75 dB, particularly for more expensive properties. Nelson (2004) points out that normal background levels in urban areas are approximately 50-60 decibels during daytime hours and 40 decibels during nighttime.

²⁶ Jud and Winkler, *op. cit.* at 94.

²⁷ *Id.* at 94.

Sage's interviews with current and prospective airport users also pointed out that the most modern aircraft are significantly quieter than older aircraft. As an example, Gulfstream G4s and G5s are substantially quieter than G2s and G3s. With many communities placing greater restrictions on permissible noise levels, older aircraft are in the process of being phased out quickly.

However, these interviews also reveal that once an airplane has its wheels in the air, there is little governmental influence over how courteously a pilot flies. The implication is that noise will be an ongoing airport issue, including at DMW.

Findings and Recommendations

- Findings
 1. From our analysis of the proposed expansion of DMW and the experience of other communities, it is apparent that Carroll County and its broader region would forego significant positive economic and fiscal impacts were the proposed expansion not to move forward.²⁸
 2. The fact that the federal government is paying the lion's share of project expenses signifies that Carroll County's relatively small financial contribution to the project will be associated with an elevated rate of return.
 3. Were the project to falter, DMW stands to lose a considerable amount of market share and airport economic impact would be substantially reduced.
 4. The community's concerns regarding the impact on their quality of life and impact on housing values are perfectly legitimate. The bulk of available research indicates that there is a statistically significant negative relationship between airport noise and property values.
 5. Similarly situated communities have invested significant resources to offset the impacts of airport expansions upon wetlands and other sensitive environmental elements.
- Recommendations
 1. The airport expansion project should be allowed to move forward to allow the broader community to leverage federal and state resources, to trigger substantial positive economic impacts including potentially on industrial

²⁸ One could organize the discussion around the concept of opportunity cost. In this case, the question is whether the loss of economic impact associated with a failure to expand the airport plus the loss of existing business due to airport shutdown/runway maintenance is greater than, less than, or equal to harmful community effects. Analytically, the following equation must accurately summarize the airport expansion for it to be justified.

Positive Carroll County economic impacts + preservation of existing Carroll County activity that would otherwise be lost > harmful Carroll County community effects. We judge this statement to be true and it is true in large measure because the community captures all of its economic benefits while only paying 10 percent of the project's financial cost.

- parks in and around Westminster, to promote safety and to prevent the loss of a significant fraction of the airport's current base of users.
2. Carroll County policymakers should invest substantial resources to provide soundproofing to homes most affected by airport noise. Based on available research, policymakers may want to utilize 55 to 60 DNL as an impact threshold and as the basis for action, with the greatest relief provided to households expected to encounter sound levels approaching the FAA's 65 DNL guideline. Monies could be raised in whole or in part through a surcharge on fuel or other fees paid by airport users. Since current and prospective airport users have stated in interviews with Sage that the impacts to their operations will be positive and large, it seems reasonable to ask them to contribute to supporting the surrounding community's quality of life in exchange for an expanded and significantly more functional airport. Indeed, several current airport operators have stated that they would be willing to contribute along these lines as long as they were guaranteed that their monies were only being used to benefit the affected community. The FAA may also provide additional resources.
 3. Carroll County policymakers should be willing to invest substantial resources to mitigate any environmental harm attributable to the loss of trees, wetlands or harm to wildlife. There is precedent for this in other communities. Sage is not in a position to recommend an amount to be budgeted, but recommends that environmental specialists be consulted to determine the required level of expenditure. Importantly, the FAA contributes significantly to finance inquiries of this type and ultimately toward environmental compliance.

Conclusion

The proposed expansion of the Carroll County Regional Airport has generated much excitement, rage, distrust and frustration. This study has attempted to highlight objective economic considerations in order to help policymakers and other stakeholders evaluate the benefits and costs of the expansion.

This study concludes that the impacts on the broader Carroll County community will be highly positive, translating into substantial investment, job creation, income generation and tax base formation. The study also concludes that the impact on the community immediately surrounding the airport is likely to be negative and that government expenditures should be made to offset the most significant negative impacts of the airport, particularly those related to high decibel levels. County spending to mitigate any environmental impacts is also justified.

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