

Reaction to
Erie International Airport
Runway Extension Economic Analysis
Prepared by Eclat Consulting, Inc, July 2007

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I. Introduction

I have been asked to provide thoughts on the Eclat Consulting report, dated July 2007, on the economic impact of the proposed Erie International Airport runway extension project. In this report I provide some background thoughts on the decision process for public investments like this, on economic impact analysis, and my reaction to the Eclat Economic Analysis. I have *not* attempted to provide a full-fledged economic impact analysis of my own.

I hasten to point out that I am not an expert on airports or their impacts on local economies. But as a professional economist my impression of the Eclat report is that it is logical and reasonable. Their estimates of the potential economic impact of the runway extension project on the Erie economy necessarily rest on a number of assumptions, and in this report I will identify and evaluate some of their key assumptions. Any economic impact study such as this must choose some assumptions on which to base its results, and it is possible to question or quibble with some of the assumptions in any such study. But even if we use a much more pessimistic set of assumptions than Eclat chooses, the result is that this project would appear to generate a very large economic impact for the region.

This report will identify issues in the Eclat analysis that Erie officials might want to consider as they make their decisions concerning investment in the Erie International Airport runway extension project.

II. Background

In any project that involves investment of funds, it is typical for the investor to ask what kind of payback will result from their investment. Investment projects typically return the initial investment plus a reasonable profit to compensate for the risk taken by the investors as well as the loss of the use of their funds during the period of the investment. As private investors consider their investment alternatives, they typically focus on the payback they personally will receive, without much consideration of the impact of their investment on others who are not putting up their own funds.

However, projects that involve major investments of *public* money in regional infrastructure, such as an airport runway extension, require a broader view in the decision-making process. Such projects may return benefits to the immediate investors (in this case the airport), but they also have effects on a broad range of people who are not directly part of the investment. For example, if an airport enhancement results in more travelers coming through the local area, local firms may experience more business in the form of food purchases, hotel and motel rentals, retail and service purchases, etc. These businesses receive a benefit that they did not pay for directly. Economists call these “external benefits” since they are external to the immediate participants in the transaction (the buyer and the seller/constructor of the airport enhancement.)

When external benefits and costs are involved in a transaction, the private market may not yield a correct answer and it may make sense for the government to become involved in the project. Consider a situation in which a project were to result in private benefits (to the airport and airlines) of, say, \$3 million and external benefits (to others in the local community) of \$6 million, for a total of \$9 million. If the project costs \$4 million the private investors would not have an incentive to invest in the project since they would incur a loss. However, from the community’s point of view this is a profitable project which would yield a net benefit of \$5 million to the community overall. In such a case, it may make sense for the local government to find a way to invest \$1 million to ensure that the project happens.

In cases where there are no external benefits and costs, private investors can be counted on to carefully evaluate the costs and benefits of any particular investment project since they will reap the benefits or the losses of the project directly. It’s their own money, and people are typically quite careful with their own money. When external costs and benefits are involved, this evaluation becomes more problematic. Government officials are making decisions about spending someone else’s money. And individual local citizens and businesses face the prospect of helping to pay for a project which may not benefit them personally, or of getting benefits far exceeding their own contributions. In such cases we may expect people to use the political system to push for their own best interests, perhaps at the cost of the region overall.

III. Economic Impact Analysis and Multipliers

Economic impact analysis attempts to take account of the external benefits from a project. Most fundamentally, it estimates the total (private and external) impact of a project on a local economy. Given data on the initial impact of a project on the principal players (here the airport, airlines and their customers), it provides estimates of the amount of impact that will be felt by the local firms that are suppliers of the original project (the indirect effects of the project.) Beyond this, impact analysis recognizes that those who earn income from the project will spend some part of that income locally, and these expenditures will create jobs and income locally, which will then create new impacts of their own. These effects are called “induced effects”, and they refer to the re-spending that occurs from an initial infusion of cash into a local economy. At each step of the process some of the initial money is spent locally while some leaks out the region, so each successive re-spending round is a little smaller than the previous one. This means there is a finite effect on the region which can be estimated mathematically; the re-spending doesn't go on forever.¹

Thus, a project that brings \$1 million of new business into the area initially may have an ultimate effect that is larger than the initial \$1 million. If the new business were to result in a total of \$2.5 million of new expenditures, we would say there was a multiplier of 2.5 at work on this project.

Economic impact analysis involves three effects: direct, indirect, and induced. The **direct effect** reflects the initial increase in demand coming into the region as a result of the new project or the new order for goods. In the case at hand, if the airport runway extension were to lead to new passengers for ERI from outside the region who spent \$x million dollars in the local area, that would be the direct effect on the Erie economy. The **indirect effect** is the impact on the suppliers of the firm involved in the direct effect. The airport and airlines will need to purchase fuel, maintenance services, parts, light bulbs, labor, etc. The amount spent as a result of these purchases comprise the indirect effects. If the initial industries buy more of their inputs locally, the indirect effects will be greater. And all of these industries will undoubtedly employ labor, and thus both the direct and the indirect effects will generate new income for Erie residents. As these workers spend part of their income locally, these expenditures will generate jobs for retail and service workers locally. These impacts are the **induced effect**.

The total effect on the local economy is the sum of these three effects:
total effect = direct effect + indirect effect + induced effect.

¹ For example, consider a situation in which a new order for \$1 million of Erie-made products is received by a local firm. That firm hires more labor and buys other inputs to produce their products. Perhaps 40% of the amount (\$400,000) goes to other firms in the region. Those firms then buy inputs, and perhaps 40% of their purchases (\$160,000) stay in the region. These re-spending effects continue, with 60% leaking out of the region at each step. The stream of re-spending will get smaller and smaller at each step until it become negligible. If there is 40% re-spending in the region at each round, the total effect will be 1.66 times the original amount, or \$1.66 million. This means the original \$1 million of new sales generated another \$660,000 of local business; there is a multiplier of 1.66. If, instead, 50% were to stay in the region at each round, the multiplier would be 2, and if 60% were to stay in the region, it would be 2.5. The greater the local re-spending (and the lower the leakage out of the region) at each round, the larger the multiplier.

And the multiplier is the relationship between the total effect and the initial or direct effect:

$$\begin{aligned} \text{total effect} &= \text{multiplier} \times \text{initial (direct) effect} \quad \text{or} \\ \text{multiplier} &= \text{total effect} / \text{initial (direct) effect}. \end{aligned}$$

The size of the multiplier is often a crucial issue in public investment projects since it helps determine if the region's payback from an investment warrants use of local funds--funds which have alternative uses. Naturally, those who support a particular project will hope to see a large multiplier, and those opposed to the project will expect a small multiplier. In order for good decisions to be made for the benefit of the local community, decision-makers must have access to an objective estimate of the multiplier. The multiplier will vary from project to project and industry to industry depending on such things as whether the initial inputs are purchased locally or imported from outside the region, what percentage those who earn new income spend rather than save, and how much of the spending is done on locally produced goods and services.

There are a few generally-recognized sources of such multiplier estimates, one of which is the Regional Input-Output Modeling System II (RIMS II) of the U.S. Bureau of Economic Analysis (BEA).² This system is widely used for economic impact analysis. It is based on data collected for the national input-output program (which measures how much industries buy from and sell to other industries), then adjusted using each specific area's industrial mix to create estimates more appropriate for the local area. It must be remembered that these are just estimates, however, and not guarantees. The multiplier process is inherently quite complicated, and it would be virtually impossible to track every dollar of new income that results from a particular project.

In their report on the Erie Airport runway extension, Eclat Consulting Inc. referred to the RIMS II multipliers but also considered a set of economic impact analysis reports for several other airports and regions, finally settling upon a multiplier of 2.0 which they deem "very conservative" (p. 22). Multipliers from other areas may or may not be appropriate for Erie, since each area has its own industrial structure and consumption patterns, meaning that each area will have its own leakage and local re-spending rates.

Typically larger areas are more industrially diversified and encompass a greater variety of inputs and therefore have less need for imports, and also offer consumers more local choices for their consumption dollars with less need to buy from the outside. As a result, larger areas tend to have smaller leakages and larger multipliers than smaller areas. Several of the airport multiplier studies mentioned in the Eclat report are clearly for areas much larger than Erie (e.g., Dulles and National Airports, Denver International, Nashville, State of Arizona), but others may be more comparable. Presumably to compensate for this, Eclat chose a multiplier near the lower end of the range (1.5 to 8.6, p. 22) of those multipliers.³

² Information on the RIMS II system can be found online at: <http://www.bea.gov/regional/rims/index.cfm>.

³ We note that in *The Economic Benefits of Air Transport, 2000 Edition*, the Air Transport Action Group (ATAG) cites a multiplier range of 0.4 to 2.4 (p. 12). ATAG is a self-described "leading proponent of aviation infrastructure development." See: <http://www.icao.int/ATWorkshop/EconomicBenefitsAirTransport.pdf>

To evaluate if Eclat's 2.0 multiplier is reasonable, I referred to the RIMS II multipliers themselves.⁴ The RIMS II multipliers for Erie County show a value of 1.4348 for Air Transportation (industry 29) for the final demand multiplier for output, and 1.6247 for Other Transportation and Support Activities (industry 35, which includes airport operations).⁵ This means that for every hundred dollars of new demand that comes into the area for air transportation services, there is a total of \$143.48 in total output generated in Erie County, and \$162.47 for each new \$100 of demand for airport operations, after all the effects are taken into account including the initial effect. These are a bit lower than Eclat's estimate of 2.0 (or \$200 for this example.)

Additionally, according to the BEA, \$100 of new final demand in the air transportation industry in Erie will generate a total of \$30.35 in new earnings of households in all industries after the multiplied effects, and \$69.10 in new earnings for \$100 of new demand for airport operations. And for every \$1 million of new final demand (adjusted to 2004 dollars⁶) in the air transportation industry, there will be 7.47 new jobs created in total in Erie, and 17.04 new jobs for every \$1 million of new demand for airport operations.

But we need to note that the new demands coming into Erie from the runway extension are not all in the form of sales by the air transportation or airport industries. To the extent that the new dollars come into retail, service, accommodation, and other industries, we should consider their multipliers, too, since they may be higher—or lower. The Erie RIMS II output multipliers are 1.5912 for retail, 1.5608 for accommodations, 1.6298 for food service and drinking places, 1.5984 for amusements, gambling and recreation, and 1.7152 for performing arts, museums, and related activities. The highest output multiplier in any of the 60 industry categories in the RIMS II multiplier table for Erie is 1.8720 for the "other transportation equipment manufacturing" industry, which includes locomotive manufacturing. Thus, even the largest RIMS II multipliers are less than 2 for Erie County.

My analysis here simply reports the RIMS multipliers, without considering the complications that are often involved in doing an economic impact analysis. And RIMS is not the only source for multipliers for this kind of analysis. Consideration of these factors may convince Eclat that a multiplier of 2.0 is warranted, based on their experience and studies done for other airports and areas, especially if those airports and areas are comparable to ERI and Erie.

⁴ These RIMS II multipliers are based on BEA's 2004 national annual input-output accounts and BEA's 2004 regional economic accounts. Multipliers based on these sources were first released in November 2006.

⁵ The BEA's industry 35 includes actual airport operations, but also a number of other transportation support activities such as scenic and sightseeing transportation, support activities for water and road transportation, and freight transportation arrangement.

⁶ The adjustment to 2004 dollars is necessary since the RIMS tables are based on 2004 inter-industry expenditure patterns. The adjustment factor from 2007 dollars to 2004 dollars is approximately .912. In other words, multiply the 2007 value by .912 to get the equivalent 2004 amount for use in calculating the RIMS employment multipliers.

IV. The Government Sector

However, the RIMS II multipliers do NOT include the impact on the government sector. From local government's point of view, the increased business locally might be expected to generate new revenues. Expanded airport business, along with its indirect and induced effects, will mean greater incomes locally, and thus greater income taxes for the areas that impose income taxes. Greater local sales will mean greater sales tax revenues for the State. More visitors staying in local hotels and motels will yield increased hotel/motel tax revenues. To the extent that expanded economic activity increases demand for houses and property, property values in the area may rise. If periodic reassessments and/or home sales capture this, increased property taxes may result. If the higher income also results in home expansion and remodeling, the property tax base will rise and property tax revenues with it.

These amounts are not typically included in an economic impact analysis since they represent money coming from Erie County residents and going to Erie County governments. They do NOT represent an increase in income or wealth locally, just a redistribution. But to the extent that taxes are paid locally by people from outside the region, these amounts do represent an increase locally. Such is the case with sales and hotel/motel taxes paid by visitors to the area.

More local visitors may also mean a greater demand for government services in the form of increased police and fire protection, lifeguards, more traffic, etc. Local government officials may wish to consider whether the increased activity will have a greater impact on revenues generated or on increased expenditures. And in the future, if local tax increases would be necessary to support this project, that would reduce the positive impact, of course.

V. New Final Demand

To calculate the expected economic impact of the runway expansion project, the multiplier must be applied to the new demand coming to the region from the project. The Eclat report details several possible sources of new revenues, including increased passenger services and increased cargo services. Since these numbers are the base multiplied by the multiplier, they will play a crucial part in the estimates of economic impact. It makes sense to review them.

For passenger services, Eclat applies a factor of \$75 per passenger arriving and departing. Thus, a person flying into ERI for a visit and then flying out is assumed to spend \$150 locally on average (\$75 as an arriving passenger and \$75 as a departing passenger.) The \$75 estimate comes from the ATAG study "The Economic Benefits of Air Transport—2000 Edition" (p. 14), and is the medium value (vs. \$225 for high, and \$35 for low.) Since the estimates of economic impact rely so heavily on this base, it may make sense to try to confirm the reasonableness of this estimate. This is not to cast aspersions on the ATAG estimate, but since ATAG describes itself as a proponent

of aviation infrastructure development, it might be prudent to confirm their estimates from another source.

It is not completely clear if these estimates are based on all U.S. airports or not, since ATAG cites “many studies” as the source for its estimates. If the estimates include a high proportion of “full service” airports such as Pittsburgh that include a much broader variety of on-site eating and shopping options than ERI, there may be reason to expect a lower value for Erie than the average. But without confirming data, this is just speculation. The \$75 estimate per operation may be a very reasonable estimate, but it is not immediately clear. (Lest we give a misleading impression here, perhaps we should mention that even with a much lower dollar value per operation, the economic impacts of this project for Erie appear to be quite significant. This issue will be addressed in section IX of this report.)

The new business used as the base for the multiplied effects assumes that all of the new passengers will be from outside the area, or will be recovered revenues from current Erie residents who are flying out of competing airports currently. Eclat indicates that the latter is a significant market since “past studies have indicated over 65% of the air passengers in Erie’s logical market area use other airports” (p. 11). The actual multiplied effects will be smaller than those estimated to the extent that seats on the new flights are taken by Erie residents who begin flying to Florida or Mexico for vacations instead of spending their vacation money locally.

Similarly, the beneficial impacts will be less if the new carriers take customers away from existing flights. That would mean simply a redistribution of existing business rather than an increase. To the extent that new carriers like Allegiant focus on a different market segment than ERI’s existing scheduled air carriers (for example focusing on full-service vacation packages), then they will not compete with existing carriers and competition for existing ERI passengers would not occur. This appears to be the case for Allegiant, according to the PennDOT Bureau of Aviation’s *Pennsylvania Air Service Monitor*, which identifies Allegiant as “A Different Kind of Airline.”⁷ The article also cites the fact that Allegiant is expanding rapidly, especially in underserved mid-size airports.

VI. Factoring In Uncertainty

As for the expected new passenger service, the letters from Allegiant Air and Apple Vacations certainly do not commit them to new operations at Erie International. Allegiant says that the runway extension “would increase the likelihood that we would give serious consideration to the addition of Erie service.” Apple says that they “are interested in initiating charter service from Erie” and if the runway length were adequate it “would allow us to revise our business plan to include ERI in the future” and that they “would consider sponsoring weekly non-stop flights...”

⁷ PennDOT Bureau of Aviation, *Pennsylvania Air Service Monitor*, July 2007, p. 2

Eclat acknowledges that none of the four possible increases in airport activity is certain, but apply likelihood probabilities of each to take this into account (p. 19.) This seems a reasonable approach to the analysis, and a good way to factor in the uncertainty.

Of course, the results depend crucially on the actual probabilities for each project. For example, dropping Allegiant out of the calculations changes the total impact results--and payback period--considerably. But we note that if Eclat's lowest likelihood probabilities are applied, the expected total economic impact is still nearly \$9.9 million annually, using their other assumptions and methodology. It remains to the readers of this report to decide if those low likelihood probabilities are reasonable or not.

We note that while population has been stable (i.e., not growing) in Erie County since about 1976, both incomes and employment have been on an upward trend in Erie County--although at a slower rate than nationally. Higher income would be one factor that might be expected to lead to increased air transportation.

VII. Other Issues

This analysis does not take account of the economic impact locally of the actual construction of the runway extension. To the extent that the construction part of the project brings dollars in from outside the region, it will create a multiplied impact on the local economy. The RIMS multiplier for final demand in the construction industry is 1.7702 for Erie County. So each \$1 million of money from outside the Erie area spent on construction can be expected to generate a total of over \$1.77 million of local production. The Eclat report is not intended to focus on that part of the project, but local decision makers may wish to keep this important effect in mind as they make their decisions. The numbers are large.

But we should note here that *local* money spent on this project should NOT be counted as part of the base to be multiplied. Presumably that money would have been spent on other programs or projects locally, and thus would have been part of the local economy in any case. It does not represent an addition to the local economy.

VIII. Typical Caveats in Multiplier Analysis

Economic impact analysis assumes that if economic expansion occurs, the local area has enough excess capacity (unemployed or available resources) to meet the need. This will probably be a non-problem for the Erie area except, perhaps, if there are very specialized resources involved, and increasing demand for them would drive up their price.

Inter-regional feedbacks may mean that the actual effects will be greater than the multiplier indicates. This can occur when the focus area and the project are large enough that the increased demand for inputs from neighboring areas actually results in

increased demand from the initial area. For example, this would occur if a new manufacturing plant were to locate in Erie and buy a very large number of tools from Crawford County, and in turn those toolmakers ordered new molds from Erie die makers. The amounts involved in the airport expansion project are not of sufficient magnitude to be concerned about this impact.

Another typical concern is about the timing of the estimates and the multipliers. The RIMS multipliers cited in this report are based on 2004 data and are quite current. The runway construction project would presumably take place over several years in the future and it is possible that the industrial structure of the region could change in that period. If that were to occur, the multipliers would no longer be accurate. However, it appears unlikely that these effects would be a major concern for the case at hand. If we were considering the location of a new medical equipment manufacturing facility (instead of an airport extension), and a major local supplier that this firm is depending on for a source of inputs were to suddenly shut down, then obviously the original multipliers would no longer be appropriate. The incoming firm would need to buy more of its inputs from outside the area, and the new multipliers would be less than the old ones. Given the nature of the inputs in the runway extension project, this is not likely to be a concern.

The time frame of the investment and the returns is always an issue of concern. The investment funds frequently have to be provided up front, while the returns from the investment occur further in the future. A full analysis might take into account the interest rate (or discount rate) of the decision maker, as well as the timing of returns on alternate projects. The runway extension project would require funding initially, but would not reap benefit until the extension was built and the new services were up and running, perhaps not until 2011 or later. But we should remember that a one-time outlay of funds leads to an ongoing annual benefit to the region.

IX. Final Conclusions

This report has attempted to point out issues that Erie officials might want to consider as they make their decisions concerning investment in the Erie International Airport runway extension project.

One thing is clear: if the Eclat numbers are accurate, the payoff on this project for the region is very large and very rapid—less than one year for the \$12.5 million local investment cited in Eclat's report! If Eclat's expectations about new passenger and cargo service are even half correct, the payback to the Erie area of the local investment would still be less than two years. After the payback, the Erie area would continue to reap economic benefits for the life of the runway extension.

But let us consider more pessimistic assumptions for the sake of argument. If the expenditure per passenger is only the \$35 "low" value, instead of the \$75 "medium" value cited by Eclat, and if the likelihood of each project is the "low" value instead of the

“medium” value used by Eclat, the total effect would still be nearly \$5 million per year, giving a payback to the region of less than three years. If we take an even more pessimistic assumption that the true multiplier is not 2.0, but a much lower (and arbitrarily pessimistic) 1.2, with the other pessimistic assumptions listed above, the payoff per year is nearly \$3 million, giving a payback of 4.2 years (ignoring interest costs).

This report has not attempted to incorporate increases in economic development generally that may result from the airport expansion. To the extent that this improvement in infrastructure makes the Erie region more attractive to businesses beyond those mentioned in the Eclat analysis, the runway extension project may yield still larger benefits to the local economy, especially over the long term.

Regarding the relationship between airport activity and economic development, Green (2007, p. 96) says “There can be no doubt that there is a strong correlation between the presence of an airport and economic success.”⁸ Even beyond the simple correlation, Green finds a statistically significant causal relationship between various measures of airport activity and population and employment growth in 83 U.S. metropolitan areas. He concludes “passenger boardings per capita and passenger originations per capita in the nation’s largest metro areas are powerful predictors of population growth and employment growth.” (p. 110) In other words, the more active the airport, the greater the population and employment growth of the area. Similarly, Brueckner’s study of 91 U.S. metro areas (2003, p. 1455) concludes that: “The evidence confirms the common view that good airline service is an important factor in urban economic development.”⁹ Brueckner quantifies the impact of good air service: “The empirical results show that a 10 per cent increase in passenger enplanements in a metro area leads approximately to a 1 per cent increase in employment in service-related industries.” (p. 1467)

These conclusions suggest that, depending on the time horizon of Erie decision-makers and their list of other potential projects, investment in the Erie International Airport runway extension is certainly a project worth considering because the expected payoff for the region is very large and very rapid, and the economic impact of the construction spending is also large. ■

⁸ Green, Richard K. “Airports and Economic Development.” *Real Estate Economics*, v. 35, #1, p. 91-112.

⁹ Brueckner, Jan K. “Airline Traffic and Urban Economic Development.” *Urban Studies*, v. 40, #8, pp. 1455-1469.