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Passenger Facility Charge Versus Grants: The Best Funding Source for Airport Operation Efficiency in the United States

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THE FLORIDA STATE UNIVERSITY
COLLEGE OF SOCIAL SCIENCE AND PUBLIC POLICY

PASSENGER FACILITY CHARGE VERSUS GRANTS: THE BEST FUNDING SOURCE
FOR AIRPORT OPERATION EFFICIENCY IN THE UNITED STATES

By

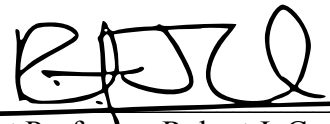
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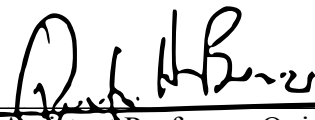
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Abstract

American airports' capital improvements are funded predominantly through grants (Airport Improvement Program) and user fees (Passenger Facility Charge). Using data collected from the Federal Aviation Administration, FlightGlobal, and J.D. Power, this paper conducts a multiple regression model in an attempt to find the effect an increase in the percent that grants make up non-operating revenue has on operational efficiency. On-time departure percentage is used to evaluate operational efficiency. The model finds, with statistical significance, that for every one percent increase in grant percentage of non-operating revenue, there is a 6.41 percent decrease in on-time departures. This paper finds valuable information for policy makers as there is a growing need for funding in our nation's airports. Finally, this paper fills a gap in research regarding the effect of revenue policy on operational efficiency at our airports.

Introduction

Aviation, an industry that makes up roughly 5.4% of the United States' GDP, cannot be successful without modern and safe airports. According to the American Society of Civil Engineers' (ASCE) 2017 Infrastructure Report Card, which "depicts the condition and performance of American infrastructure based on the physical condition and needed investments for improvement," the United States of America's aviation infrastructure earns a "D" rating. For comparison, of the sixteen categories of infrastructure that the ASCE rates, only transit earns a lower rating. The ASCE reports that the investment needed to increase capacity at our airports and improve efficiency to 21st century standards is valued at \$157 billion, yet there is only \$115 billion provided through current funding streams. This lack of funding can create longer flight delays due to outdated technology and unsafe airports and air traffic control systems. The benefits of a fully funded modern aviation system are numerous, allowing for a larger capacity to meet demand, lower burden on our environment, decreased noise pollution, and a less expensive method of transportation and shipping.

Funding the infrastructure needs of America's airports has turned into a political debate. Currently, there are two main sources of non-operating income at airports: grants and passenger facility charges (PFCs). The passenger facility charge, a fee added to the cost of every flight that can be used to fund Federal Aviation Administration - approved projects that enhance safety, security, or capacity; reduce noise; or increase air carrier competition, is capped at \$4.50 per ticket. The current \$4.50 cap took effect in 2001 and has not been adjusted for inflation or increased since. In that time span, the consumer price index has increased an average of 2.05% per year resulting in an increase of 67.6 points. Also, in that time frame, enplanements, the number of passengers that board an airplane at that specific airport, have swelled from

659,422,828 to 829,292,893 passengers, an increase of over 25%. This enplanement growth has accounted for a large increase in passenger facility charge revenue. The federal grant program, the Airport Improvement Program (AIP) is run by the Federal Aviation Administration (FAA) and “provides grants to public agencies – and, in some cases, to private owners and entities – for the planning and development of public-use airports that are included in the National Plan of Integrated Airport Systems” (FAA). The FAA requested a total of \$2.7 billion for calendar year 2017 to fund the program, down from the \$3.1 billion enacted in calendar year 2016.

The political debate is centered on whether airlines and passengers need to pay directly for a public good such as an airport and the effects that an increase in ticket cost would spur. Airlines, argue that passenger demand would decrease with an increase in user fees. For example, Delta airlines states in a press release: “In light of ... other resources already available to airports, hard-working Americans should not have to abide another tax increase on their plane ticket.” (Delta Airlines 2017) The Delta press release also cites a U.S Government Accountability Office study that indicates for every \$1.00 increase in passenger facility charges, demand declines by more than one percent. United Airlines former CEO, Jeff Smisek, said “The proposed increase in the passenger facility charge is just another tax increase that the government is trying to force on consumers who already pay too much in taxes when they fly” (Griffin 2015). Suffice to say that airlines strongly oppose any increase in passenger facility charge due to their stake in profitability and passenger demand.

The claim that demand will decrease is a contentious and important aspect of the passenger facility charge. Proponents of the passenger facility charge argue that airline tickets are not an overly elastic good, and the increase in funding can ultimately decrease the cost of plane tickets in the long term by making a more efficient aviation system. This would be the

result of decreased taxi times, lower fuel consumption, and modernized equipment. This political debate must take place as the need for funding may increase and capacity at airports are reached or exceeded by current passenger demand.

This paper will determine whether grants or user fees are more effective in funding United States of America's airports. Data collected from the Federal Aviation Administration will be examined to find which funding stream leads to a more efficient commercial passenger airport, quantified by on-time departure information. The paper will also include a comparative case study between two airports showing why there are practical downsides to selecting a single funding policy.

I argue that as the percent that grants make up non-operating income increases, commercial passenger airport efficiency will decrease. The findings will indicate that airports reliant on grant funding versus passenger facility charges are less efficient. I will control for the size and growth of the airport, quantified by enplanements and percent change in enplanements between calendar year 2015 and 2016. This model will find information to support or deny this hypothesis through both statistical analysis and a brief case study.

Literature Review

Despite the importance of the subject, little has been written on whether passenger facility charges or Airport Improvement Program funding leads to a more efficient airport. Very few studies have focused on transportation, specifically aviation, funding in any capacity. Ubbels and Nijkamp (2002) describes the general problem with transportation funding. "In most countries, support for public transport has traditionally been financed from general taxation... the major problem with these forms of financing is that there is considerable competition for funds, and public transport often falls behind spending for other public services such as

education and health”. After completing a comparative case study of unconventional funding streams of urban public transport, Ubbels and Nijkamp finds that earmarked charges generally make for a reliable and stable funding stream, “it appeared that there are various cases where charges or taxes are hypothecated to fund public transport. Most of these categories provide a relatively stable, dedicated funding source with a high level of practicality.” (Ubbels 2002) The study also states that “traditional ways of funding public transport have been withdrawn or are viewed by many Americans as politically problematic.” Ubbels raises an important note regarding the politics of traditional funding methods: grants can often be used as a political piece rather than a practical and objective form of revenue for public goods. The Airport Improvement Program is predominantly allocated based on passenger enplanement which takes most of the politics out of the federal airport grant program. Because of this, both airport funding streams are not political and based on usage.

Many papers suggest that user fees are more popular than grants to fund public goods such as airports. Bowker, Cordell, and Johnson (1999) conclude that 95% of individuals studied felt that some user fees should be charged to fund public goods, in this case public lands. Kulash (2001) argues that user fees do not just offer funding for investment but can spur efficiency. By encouraging airports to compete for passengers or airlines to increase income, user fees can make airports find cost effective methods to improve the customer experience and operating efficiency. These efficiency gains come at a cost, with other research finding unintended consequences with user fees. One paper outlines findings that show user fees are regressive and negatively impact the poor (Gertler and Sanderson, 1987). This argument is instrumental to this paper as it is the basis for many airlines’ opposition to an increase in the passenger facility charge

cap, that demand would decrease due to higher plane tickets. Also, consumers are much more likely to support methods that decrease their cost to travel on face value.

Yet, only two papers have focused specifically on the passenger facility charges and the Airport Improvement Program debate. “For airport finance in the U.S., as mentioned before academic research to support and inform the heated policy debate on whether and ways to reduce federal government aids is almost non-existent” (Chang, Park, Zou, Kafle, 2016). The first, published in 2015, found that the passenger facility charge has a positive impact on airport productive efficiency. Zou, Kafle, Chang, & Park, argue that “the results are not surprising, given the greater flexibility airports have in utilizing PFC than Grants, and they clearly support the argument about efficiency improvement benefits by using more PFC in place of AIP grants in airport production process.” (Zou, Kafle, Chang, & Park, 2015) The paper describes productive efficiency as total enplanements, aircraft operations, the amount of cargo handled, and non-aeronautical revenue. These variables do not indicate which funding stream will increase operational efficiency which can lower the overall cost of air travel for passengers.

The second paper, sought to discover the substitutability between the two funding streams. The study found that the passenger facility charge can be used to substitute Airport Improvement Program funds (Chang, Park, Zou, Kafle, 2016). According to the findings, airports can use PFC’s for 8 - 35% of the current amount of grant funding they collect (Chang, Park, Zou, Kafle, 2016). Finally, the paper finds it is not viable for non-hub airports to substitute PFC funds which will be further examined in the below case study (Chang, Park, Zou, Kafle, 2016). Both of these papers fill gaps of knowledge but do not focus on which funding stream will lead to an increase in operational efficiency, which is where much of the political debate is centered.

Airports are very useful cases to look at the user fee and grant debate. Because of the economic impact of airports on their surrounding community, user fees can be viewed as a way to provide a “free ride” to the benefits an airport gives to many community members who do not travel frequently. This includes the many economic benefits to the local community and shipping/cargo infrastructure provided by the airport. Those who do not directly utilize the airport can argue that user fees are more effective because there is no fair and impartial way to tax a community to fund grants given how airports are owned and operated. Because of their structure and the benefits airports provide, viewing airports as a public good gives a strong glimpse into this debate. Policy makers can use the findings of this paper as an addition to the overall funding debate surrounding public goods.

Prior research shows the positive and negative aspects of relying on user fees to pay for public goods and which funding stream can increase production at airports. My goal is to provide the unique emphasis on operational efficiency at airports, specifically using the passenger facility charge and grants. By discovering the impact that the type of funding stream has on airport efficiency metrics, this paper will provide further information for those who make policy decisions regarding the future of airport funding. An airport’s economic impact goes far beyond those who directly use an airport’s services. Shipping, shared ideas and innovation all spur economic development in the areas serviced by a specific airport. The policy decisions that politicians make surrounding airport funding will have wide ranging effects on the industry and local communities throughout the country. But to make good decisions, policy makers need a good estimate of effects.

Data

To help answer the question, I collected airport financial data and on-time departure information for 60 large and medium hub designated airports. All financial data is collected from the Federal Aviation Administration’s database on airport’s budgets. This information was pulled from the Compliance Activity Tracking System (CATS) which gathers and publishes Congressionally mandated airport financial information. This data was received through the Federal Aviation Administration’s online database. All financial data is for calendar year 2016. This is a new data set, compiled specifically for this research model.

The two dependent variables used are J.D. Power’s 2017 North American Airport Satisfaction Study and on-time departure information collected by FlightGlobal, an aviation data and analytics company. The J.D. Power 2017 North American Airport Satisfaction Study “measures overall traveler satisfaction by examining six factors (in order of importance): terminal facilities; airport accessibility; security check; baggage claim; check-in/baggage check; food, beverage and retail.” (2017) The on-time departure information is the percent of on-time departures during the month of May 2017. On-time departure information is a good depiction of the efficiency of an airport due to the variables reaction to the quality of infrastructure and capacity and its effect on cost effectiveness.

Table 1: Independent Variables Summary Statistics

	<i>Mean</i>	<i>Max / Min</i>	<i>Standard Deviation</i>
<i>Percent of grant in funding</i>	<i>25%</i>	<i>100% / 0%</i>	<i>22.08%</i>
<i>PFC Revenue</i>	<i>46,681,377</i>	<i>\$201,145,586 / \$0</i>	<i>42,600,000</i>

<i>Grant Revenue</i>	<i>15,340,371</i>	<i>\$98,880,600 / \$0</i>	<i>19,300,000</i>
<i>Enplanement Growth</i>	<i>3.93%</i>	<i>10.71% / -3.84%</i>	<i>3.54%</i>
<i>Enplanements 2016</i>	<i>12,005,699</i>	<i>50,476,272 / 2,077,810</i>	<i>10,600,000</i>

The airports that are included in this study are large and medium hub airports as defined by the Federal Aviation Administration. In total, 60 airports are included in the dataset. Airports are from no specific geographic area (Hawaii and Alaska both have airports included), cover a wide range in city size, from Kahului to New York, and have a variety of growth rates.

The average airport enplanement, the number of passengers that board an airplane at that specific airport, is over twelve million passengers, with an average growth between 2015 and 2016 of nearly four percent. A distinct difference in the average grant and passenger facility charge revenue can be seen. The average passenger facility charge revenue for the dataset is \$46,681,377 while the average grant revenue is \$15,340,371. This difference is a significant reason for this research question to be raised as the passenger facility charge is the new prominent form of non-operating income.

The average J.D. Power's Airport Satisfaction Rating score is 3.35 and the data is separated by airport size. The average percent of on-time arrivals is 80.7 percent, with a wide maximum and minimum size range. The highest performing airports are Ted Stevens Anchorage International and Honolulu's Daniel K Inouye International airport, notably collecting zero grant

dollars in 2016. The lowest performing airports are Los Angeles International and Newark Liberty International airports.

The two control variables used are the 2016 enplanements and enplanement growth rate between 2015 and 2016. These variables account for the size of the airport, which can greatly affect the amount of grants and PFC revenue the airport collects. By controlling for the percent change in enplanements, the study takes into account the economic activity of the area and capacity changes. This variable also accounts for service changes that could have happened at the airport.

Table 2: Dependent Variable Summary Statistics

	Average	Max/Min
J.D. Airport Satisfaction Ratings	3.35	5/2
Percent of On-Time Departures	80.7	93.8/66.3

Figure 1 shows the negative correlation between grant percent of total non-operating revenue and percent of on-time arrival. As shown by the line of best fit, there is a downward slope, depicting a decrease in on-time arrival percentage as grants make up more of a percent of non-operating revenue. This negative correlation coincides with the hypothesis that an increase in the percent of grants in non-operating revenue results in a decrease in on-time departure percentage or efficiency. The outlier on the graph, shown as having 100% grant percent of total non-operating revenue is Memphis International Airport. We will discuss this case in our brief case study below.

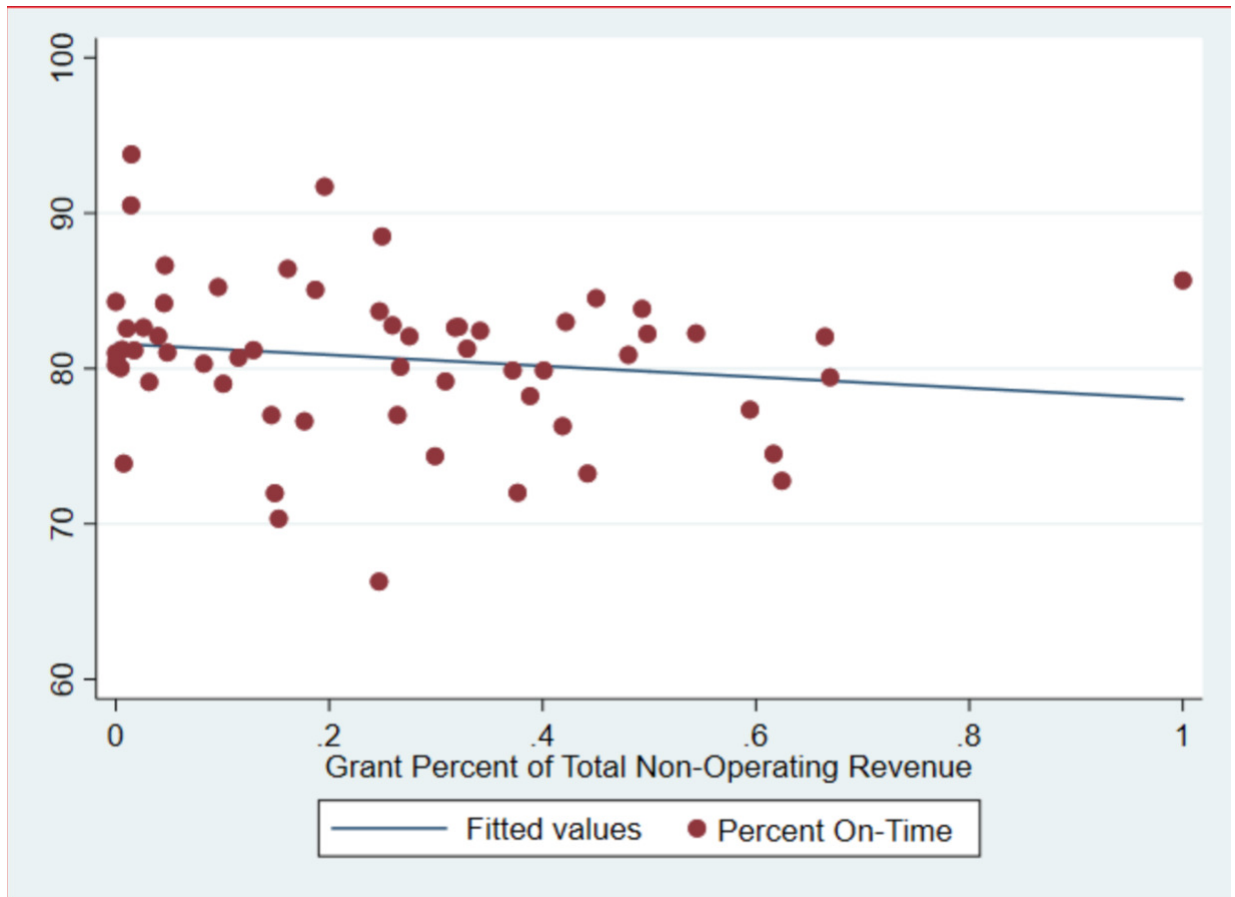


Figure 1: Scatter plot with line of best fit

Analysis

Using the statistical software STATA, a multiple regression analysis was run. As shown by Table 3, with a one percentage point increase in grant percent of non-operating revenue, there is a 6.41-percentage point decrease in on-time departures at the airport. The regression coefficients are statistically significant. A one percentage increase in percent of grants in non-operating revenue would bring on-time departures to 74.29. With this information, I can conclude that funding airports predominantly through grants has a negative effect on operational efficiency, specifically on-time departure information. The adjusted R-squared is 23 percent, indicating that with just three variables the findings of this paper account for 23 percent of the variability of the model.

Table 3: Regression Data

	Coefficient	Standard Error	P-Score	T-Score
Grant percent of non-operating revenue	-6.41	2.72	.022	-2.35
<i>Controls:</i>				
2016 Enplanement	-2.46	.69	.001	-3.57
2015-2016 Growth	-36.61	16.22	.028	-2.26
Constant	122.99	11.22	.000	10.97
N	60			
F-Test	6.82			
Adjusted R-squared	0.23			

Case Study

To get a sense of the mechanism and downfalls of the passenger facility charge versus grants, the paper will look at Memphis International Airport and Buffalo International Airport. Both airports are medium sized hubs that have just over two million enplanements per year. The areas around these two cities are comparable in size and economic output, making these two airports sound choices for the paper's comparative case study. This case study also introduces a major fault with the passenger facility charge.

Buffalo International Airport, also known as Greater Buffalo International Airport and Buffalo Niagara International Airport, serves the Buffalo New York and southern Ontario Canada region. According to the United State Census Bureau, the Buffalo metro area has roughly 1.15 million people living in it. Niagara Falls, a very popular tourist destination and National Heritage

Area is also serviced by this airport. The airport did collect passenger facility charges and grants in calendar year 2016.

Memphis International Airport is the only major commercial airport serving the city of Memphis Tennessee. According to the United State Census Bureau, the Memphis metro area is home to nearly 1.35 million people. Known for its cargo prominence due to Fedex using it as their base hub, Memphis airport is the number one busiest cargo airport in the United States and the second-busiest in the world. In calendar year 2016, the airport had 23,734 commercial passenger aircraft operations to the 137,808 cargo aircraft operations. (Memphis 2016) Because of its heavy cargo traffic, the airport decided not to collect any passenger facility charges, funding its capital improvements predominantly through grants. Given my results, this reveals a serious problem with the passenger facility charge in its ability to only benefit airports that have heavy commercial passenger traffic.

The mission, listed above, for the passenger facility charge applies to all airports in the United States' aviation system. But not all airports in the United States of America focus on commercial traffic. For cargo heavy airports like Memphis International, this limits the amount of income they can make even though their facilities and traffic rivals larger hubs. This problem can also be crossed over to general aviation heavy airports, with most of their flights not having to pay the passenger facility charge.

The main difference between Memphis International and Buffalo International can be found in their key stakeholders. Memphis airport's focus is on improving cargo infrastructure for their main client, FedEx, while Buffalo has a much larger focus on passenger experience and commercial aviation infrastructure. The difference in focus and the diverse needs of each type of stakeholder accounts for most of the differences between Buffalo and Memphis. This can be

shown quantitatively by looking at the percent of capital construction costs that are dedicated to the terminal. In Memphis, the average percent from 2007 to 2011 was 8.63. In Buffalo, the average percent was 41.76. This striking difference can be seen among similar cases. This does not hold for overall capital construction costs, as Memphis has spent more on average than Buffalo over the same time period.

With little investment in terminal facilities, Memphis International Airport has lagged behind Buffalo International Airport in increasing efficiency and capacity for commercial aviation. One of Memphis Airports terminals, B Concourse, has not be modernized since 1963, 55 years ago. This terminal serves a main legacy carrier, Delta, as well as Allegiant Airlines. A current proposed plan would update the airport to handle passengers more efficiently and offer more services. The plan, nearly fully funded by grants, is long overdue. The gap in modernization can be attributed to the lack of funding coming from the passenger facility charge. This comes as a change to an airport that often lags behind in customer satisfaction, efficiency, and customer options.

Given the size and traffic of Memphis International Airport, it would be impossible to fully fund the needed capital improvement costs by the passenger facility charge. Buffalo International and Memphis International airport have different key stakeholders which effects where money is invested. These cases show how the passenger facility charge is a key funding source for commercial passenger aviation but cannot serve as a sole funding source for heavy multi-purpose airports such as Memphis.

Conclusion

This paper fills a much-needed gap of research that will inform policy makers into which funding stream is best for the United States of America's airports. Today's two current funding

streams, the passenger facility charge and the Airport Improvement Program have been proven to be complementary in nature, but with current politics and the increase in needed investment, these two funding policies alone may be insufficient to fund the United States' aviation system's needs.

The findings of this paper indicate that there is a negative correlation between reliance on grants and the airport's operational efficiency. With over a six-percentage point decrease in on-time departures for every one percent increase in grants percent of non-operating income, the effect is large enough to warrant a review of current policy. These findings take into account the size and growth rate of the airport and are statistically significant. Focusing on operational efficiency is important given the effect that it has on customer experience and the cost to both the passenger and airline. Also, by increasing operational efficiency, an airport will decrease delays and taxi times, resulting in lower emissions and an increase in passenger satisfaction.

Further research is needed to find which funding policy is best, but with the information present, the passenger facility charge is the premier current alternative. In prior research, user fees are found to be more reliable and popular with the public. The policy decision surrounding the passenger facility charge cap requires a future study to find the size of effect a higher fee would have on ticket demand and airport revenue, yet their revenue has already been found to be a viable substitute to grants (see Literature Review). Pushes to privatize airports and incentivize private investment have become more common, but there are currently no private airports in the United States of America's commercial aviation network and the position is often met with moral argument because of airports designation as a public good. With limited options, the government must find ways to refine the current funding policy options and rely on the solution that spurs airport operational efficiency.

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