# Do citizens of a city that owns a local public airport have attachment to the airport and use it?

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Abstract

In this research, it is investigated whether passengers living in a city with a local public airport have attachment to the airport and tend to use it. Focusing on the Greater Kansai area with three airports and Kobe City that owns Kobe Airport as an example, an empirical analysis is conducted by Nested logit model using micro data. The result of the basic model shows that passengers living in Kobe city prefer Kobe Airport compared to other passengers. Additional analysis based on a questionnaire survey revealed that passengers who are attached to Kobe Airport choose it because they love it, which means that the non-economic factor of attachment influences passengers' decisions. The results of this research suggest that enhancing attachment to the airport might be a possible idea for policy makers of airport cities to increase passengers of it.

Key words
Airport choice, Multiple airport region, Airport city, Attachment, Nested logit model

## 1. Introduction

Airports are an essential transport infrastructure for long-distance travel and also contribute to the regional economy of the airport city by making the interaction between cities more convenient. Therefore, with strong requests and support from citizens and industry, some local governments constructed and own their airports. The construction costs of these local public airports are mainly paid for by taxpayers, and if the airports run a deficit, the local government is required to make up the deficit with tax. Nevertheless, the use of tax can be justified as long as citizens need and use the airports. In addition, if more citizens use the airport, the deficit will be reduced or the airport become even profitable, which is positive for the local government's finances. Therefore, it is of great interest to airport city policymakers to find out whether citizens are willing to use their local airports and how to increase the use of them.

There are mainly two situations in which passengers make decisions about an airport use. The first one is the transportation mode choice. For medium-distance travel, passengers can choose from air, rail, bus, car and so on. In countries with high-speed railways, there is fierce competition between airlines and railway companies for inter-city traffic of 500km to 1,000km. In fact, in Japan, passengers can choose from flight and Shinkansen to travel between Tokyo – Hiroshima and Tokyo – Yamaguchi, and the market shares of air transport and railway in these routes are very close[1]. The second situation is airport choice among multiple airports in the same region. For example, London (Heathrow, Gatwick, Stansted, etc.), New York (JFK, LaGuardia, Newark), and the Pearl River Delta (Hong Kong, Shenzen, Guangzhou) are well-known as multi-airport regions. In a multi-airport region, passengers can choose the most desirable airport to maximize their utility. This study focuses on the latter situation, that is, a multi-airport region in order to determine whether citizens of a city with a local public airport prefer the airport over other airports.

In addition, we focus on a psychological factor to explain the background of the decisions made by citizens of airport cities. Previous researches in transportation economics have explained decisions from financial factors such as fares and access costs, and those related to convenience such as the number of flights and airport facilities. However, it was indicated that product loyalty influences purchasing behavior in marketing literature. In the choice of airport, if citizens are attached to their local airport, they may be motivated to use it. Since public opinion plays an important role in

[1] The distance between Tokyo – Hiroshima is 674km, and market share of air transport and railway is 33.8% and 64.3%. The distance between Tokyo – Yamaguchi is 768km, and market share of air transport and railway is 65.5% and 32.6%. Data sauce: 2015 Inter-Regional Travel Survey by Ministry of Land, Infrastructure, Transportation and Tourism

the construction of local public airports, it is quite possible that the citizens who requested or supported the construction of the airport feel a sense of attachment to the airport.

Here, the research questions can be summarized as following:

i) Do citizens of a city that owns a local public airport tend to use it?

ii) Does the psychological factor of attachment influence airport choice behavior?

## 2. Previous researches

Following Harvey [1987] that formulated passengers' behavior based on the discrete choice model, many researches on airport choice problem has focused on passengers' decisions and the factors that influence them. Most of the early studies measured the effects of access time to the airport, access cost, flight frequency and fares (e.g., Innes and Doucet [1990], Windle and Dresner [1995]). Recent researches used Nested logit (NL) model to investigate the combined choices of multiple factors. Pels et al. [2000] and Jung and Yoo [2016] researched decisions on combination of airports and airlines. Zhou et al. [2019] analyzed choice of transportation mode and airline. Although many researches on airport choice exist, only few papers focus on passengers in a specific region or a city. Lian and Ronnevik [2011] and Morimoto [2019] focused on choices of passengers of an airport city and show that those passengers prefer larger airports farther from their place to small local airports in their city because flight frequency is higher at the larger airport. However, these papers didn't analyze the difference of preference between citizens of an airport city and other passengers.

In general, customer loyalty is an important factor in marketing. Jones et al. [2002] found that the source of loyalty is switching costs and that the strength of the customer's connection to a particular product creates consistency in product selection. As for the airline industry, Basso et al. [2009] and de Boer and Gudmundsson [2012] indicated that airlines have strategically introduced frequent flyer programs in order to increase cost of passengers to switch to competitors. This is an example that airlines used economic incentives to strengthen the connection with customers. Although attachment is not an economic factor, psychological connection with a product makes it more expensive to switch to another product. An example of how attachment to a region or home country is reflected in purchasing behavior is "buy local" where people buy local products to support local businesses (Saffu et al. [2010] and McEntee [2010]). As another example, in terms of equity investment, Seasholes and Zhu [2013] showed that individual investors tend to invest in the shares of companies that are geographically close to them. In this way, people are connected to companies and products through

place. Thus, it could be hypothesized that in airport choice situations, people utilize their city's airport because it is in their city. Nesset and Helgesen [2014], Castro and Lohmann [2014], and Bezerra and Gomes [2019] studied on airport loyalty from view point of airport branding and the importance of airport facilities, however, so far there is no research that is related to the hypothesis.

The originality of this research is to focus on regionality and the psychological factor. While previous studies have investigated the general effects of various factors such as airport access, ticket price and airport facilities on passengers' decision, this research analyzes regionality in choosing an airport. That is, this research tries to answer the research question whether passengers of an airport city behave differently from those in other cities because of attachment to the airport. For this purpose, behaviors of passengers in Greater Kansai Area (GKA) in Japan are analyzed. In GKA, there are three airports, Kansai International Airport (KIX), Itami Airport (ITM) and Kobe Airport (UKB). Only UKB is a local public airport owned by Kobe City. Using the micro data, this research examines whether citizens of Kobe City are likely to choose Kobe Airport compared to other passengers. The detail of GKA and the three airports are introduced in Section 2.

The structure of this study is as follows. Chapter 3 introduces GKA and the three airports. It describes the history of Kobe Airport, and why the area is a suitable subject for the study of passengers' regionality. In Chapter 4, the research method and the data used in the study are explained. The analysis in this study is based on the standard NL model, however, a new variable is added to capture the preference of Kobe City citizens. Chapter 5 discusses the results of the analysis. Some additional questions are examined. The first question is whether only the citizens of Kobe City prefer their local airport, or passengers who live near other airports also prefer them. Second one is whether passengers living in cities around Kobe City also behave similar to Kobe City citizens. Chapter 6 examines the relationship between airport choice and attachment based on the questionnaire survey. Chapter 7 is the concluding remarks.

## 3. The Greater Kansai Area and the three airports

In this section, we describe GKA and the three airports. GKA is the grayed-out area shown in Figure 1, and is defined as the 1.5% urban employment area centered on Osaka City. It is the second largest metropolitan area in Japan, with a total population of about 20 million. It is the second largest metropolitan area in Japan with a total population of approximately 20 million. GKA includes Kyoto, the historical tourist city and Kobe, the international port city. There are three airports in GKA, i.e., ITM, KIX

and UKB. The airports are located in close proximity to each other and the distance between the airports are only 20-40km. Thus, GKA can be considered as a multi-airport region, and passengers can choose which airport to use. Table 1 summarizes the basic information about each airport. Only KIX is the international airport and serves as an international gateway to GKA. Although ITM is easily accessible from major cities, international flights are prohibited, and only domestic flights are allowed. However, ITM roles as the main domestic airport whose share of domestic passengers is 63% due to its convenience access. UKB is a small airport with one runway and serves only domestic flights.

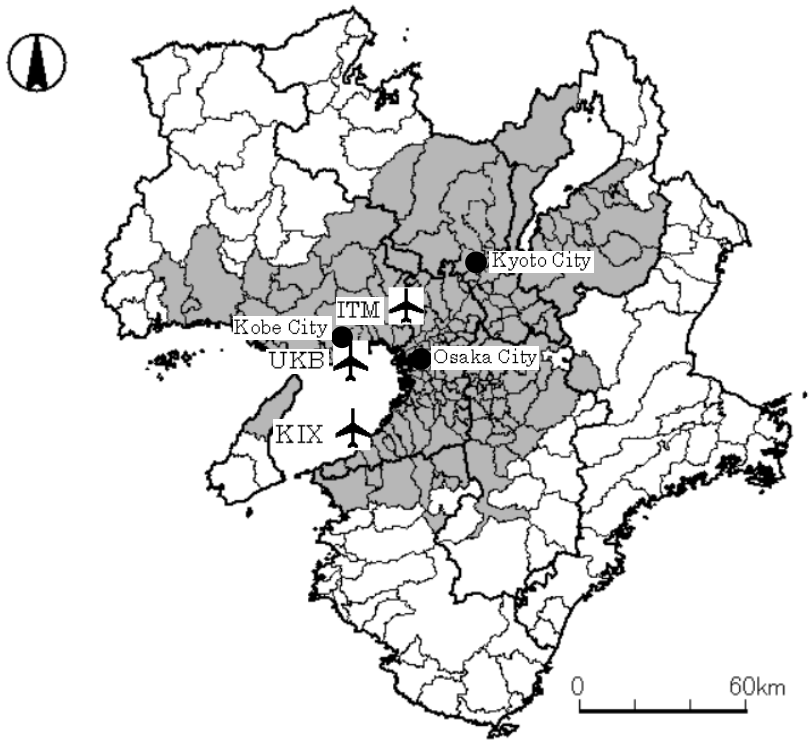


Figure 1: The greater Kansai and the three airports

Table 1: Basic data of the three airports

| | | KIX | ITM | UKB |
|---|---|---|---|---|
| Open (year) | | 1994 | 1939 | 2006 |
| Ownership | | Company owned by national government | National government | Kobe city |
| Operation | | The three airports are integrally operated by the private company, Kansai airport, since 2018 | | |
| Runways (m) | | 4000 | 3000 | 2500 |
| | | 3500 | 1828 | |
| Passengers (2018, Thousands) | International | 22,439 | | |
| | Domestic | 6,513 | 16,184 | 3,182 |
| Direct routes (Summer, 2019) | International | 75 | | |
| | Domestic | 17 | 26 | 7 |
| Access time to major cities by train (minutes) | Osaka city | 45 | 22 | 48 |
| | Kyoto city | 108 | 63 | 79 |
| | Kobe city | 98 | 46 | 18 |

The reason of the coexist of the three airports is as follows. In the past, ITM was the only airport in GKA, but due to the rapid increase in demand for air travel caused by the rapid economic growth. Thus, it was not possible to provide enough slots for flights, and congestion became a problem. Since ITM was located in urbanized area, there was no room for expansion and the noise problem was getting worse, so in the 1970s the Japanese government took the initiative to construct a new airport to serve as a gateway to GKA. At the first, Kobe City was chosen as the location of the new airport, but the city refused to accept it because airports were treated as nuisance facilities at the time. As a result, Senshu area in southern Osaka Prefecture was selected as the final construction site, and KIX opened in 1994. After that, Kobe City has changed its mind about the need for the airport to revitalize the local economy and provide convenience for the citizens of Kobe. However, it was no longer possible to construct the third airport in GKA as a national project, so Kobe City needed to construct it itself. The construction of the airport has been a point of contention in many mayor elections because it required huge payment from tax and the issuance of municipal bonds. After all, in the 1997 and 2001 elections, the pro-airport mayor was elected. Finally, Kobe Airport was opened in 2006 with the support of citizens as well as politicians. The three airports were operated separately until 2018 (KIX was managed by the national government owned company; ITM was by the national government; UKB was by Kobe City), which made it impossible to achieve total optimization. Thus, the three airports were privatized under the concession system and operation of them were integrated into one concessionaire private company, Kansai Airport Co., Ltd. Although UKB was privatized, Kobe City keeps the ownership of UKB and the contract with Kansai Airport includes the clause that Kobe City receives revenue-linked concession fee[2]. Thus, UKB

[2] If operating revenues exceed 2 billion yen in a year, Kobe City receives 3% of the exceeded revenue.

is still property of Kobe City and it is still important for Kobe City to increase passengers because a certain portion of the revenue is returned to the city.

Next is the outline of the air transport market in GKA. In 2015, the three airports served flights to six cities in common: Sapporo, Sendai, Tokyo, Nagasaki, Kagoshima and Naha. When traveling to or from these cities, passengers can choose an airport to use from the three airports. Figure 2 is an overview of the airport choice behaviors. Figure 2-1 shows the selection rate of UKB for each departure point. 40-60% of passengers whose origin or destination is Kobe City selected UKB, which indicates that UKB has the largest share on flight demand of Kobe City. However, it is clear from Figures 2-2 and 2-3 which show the selection rates for ITM and KIX that passengers tend to choose the airport closest to their origin or destination because of the easy access to the airport. Therefore, to conclude whether Kobe City citizens prefer their airport, it is necessary to control factors that can influence the airport choice decisions such as access time and cost to the airport. For this purpose, NL model that is discrete choice model is used in this paper.

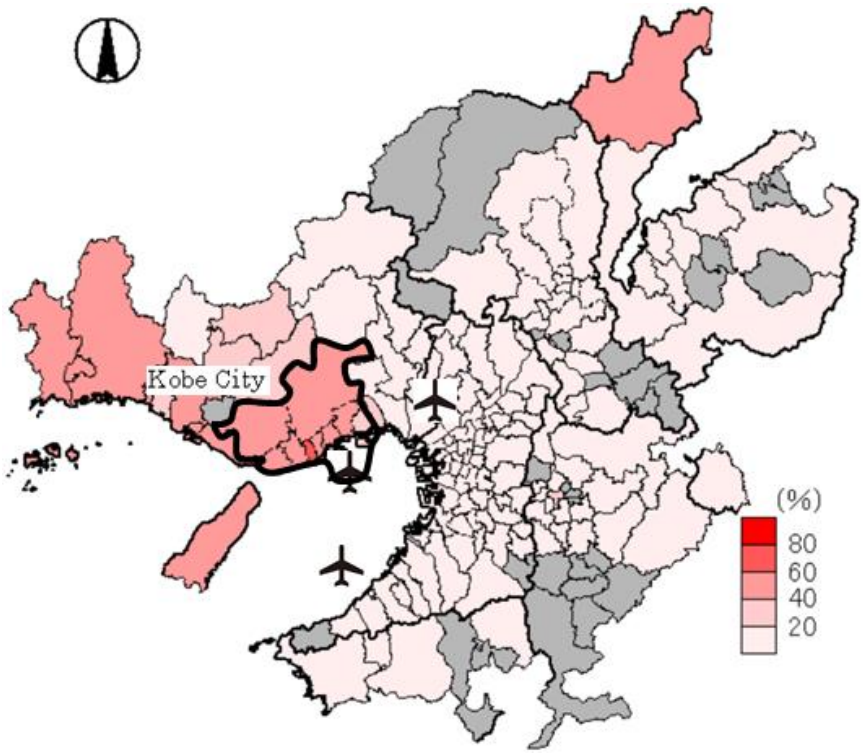


Figure 2-1: Selection rate of Kobe airport (UKB)

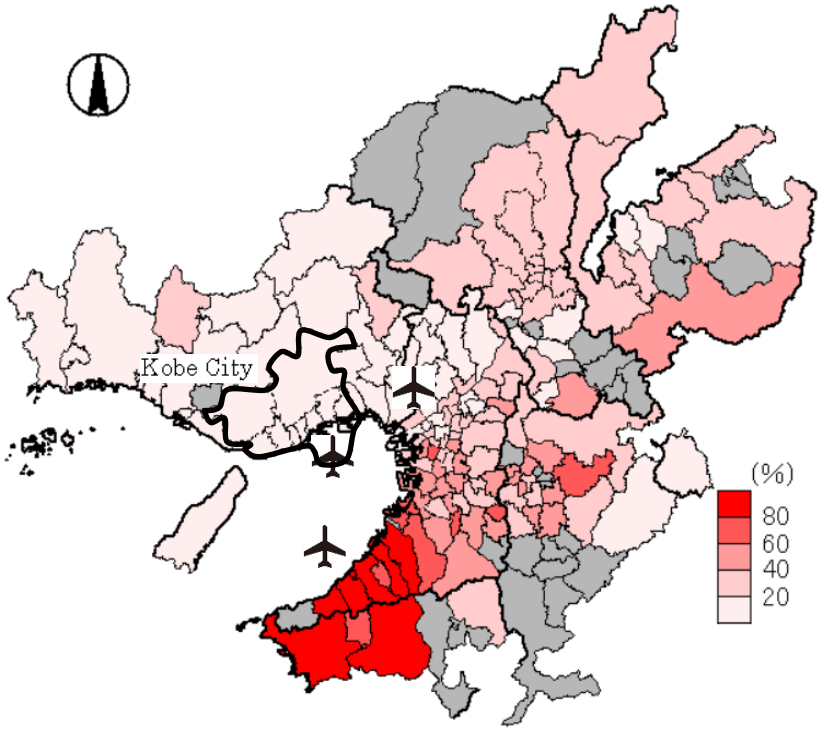


Figure 2-2: Selection rate of Kansai international airport (KIX)

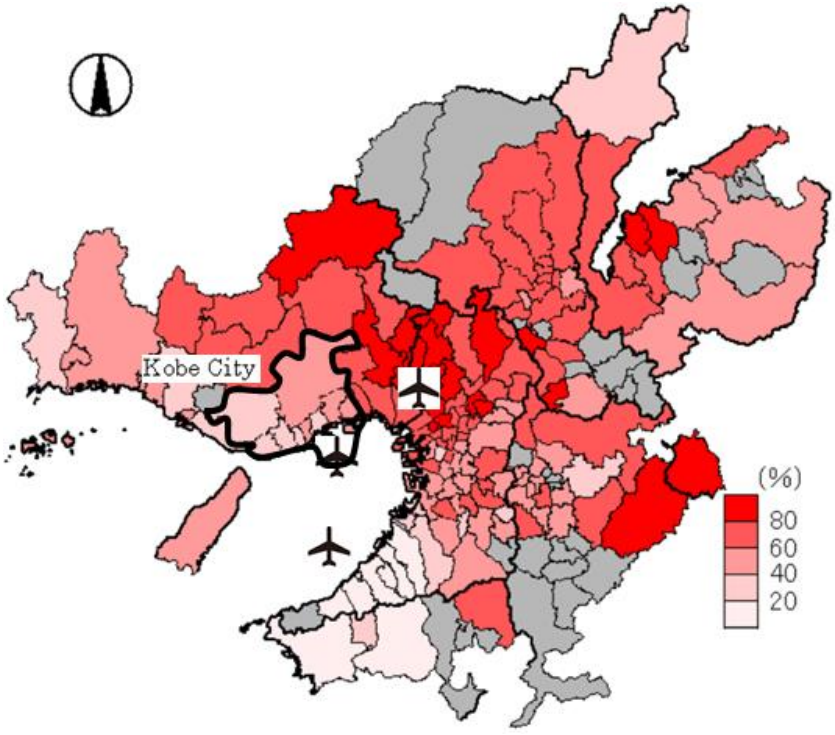


Figure 2-3: Selection rate of Itami airport (ITM)

4. The Model and data

4.1. Modeling passengers' behavior

NL model is used to formulate passengers' airport choice behavior. The decision tree of passengers is as shown in Figure 3, where passengers decide airline type, that is, full service carrier (FSC)[3] or low cost carrier (LCC)[4] at the first level and an airport from among KIX, TIM, and UKB at the second level. The alternative sets at the first and second level are denoted as $t \in \{FSC, LCC\}$ and $a \in \{KIX, ITM, UKB\}$.

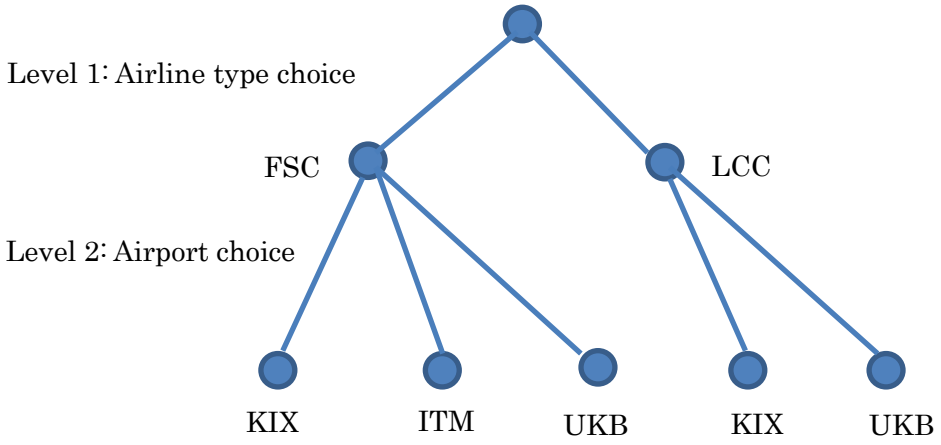


Figure 3: Decision flow of passengers

Explanatory variables are set to explain passengers' decisions at each level. For airline type selection at the first level, it is expected that decision making will differ depending on whether the purpose of the trip is business or not. Business passengers generally have a high time value and require on-time performance, whereas low ticket price is important for leisure passengers because they purchase tickets at their own expense. Thus, a dummy variable ($BUSINESS_n$) that represents business passengers is used to capture the effects of travel purpose. Here, $n \in \{1,2,\dots,N\}$ denotes numbers of passengers.

Access time ($ATIME_{an}$), access ($ACOST_{an}$) and scheduling cost ($SC_{tan}$) are used as explanatory variables for the airport choice at the second level. In addition to them, a dummy ($KOBE_{an}$) for Kobe City citizens is created. Access time and access cost are included in the analysis because passengers are expected to take into account the accessibility to each airport in choosing the airport. In addition, scheduling cost is used

[3] In this research, FSC refers to JAL and ANA and the airlines that code-share with them (except Jetstar).

[4] LCC refers to Peach, Jetstar and Skymark.

to represent the convenience of flight schedule. Scheduling cost refers to the cost to adjust schedule when there is a difference between the desired departure time and the actual departure time. The $KOBE_{an}$ dummy which is the originality of this paper is set to capture the preference of Kobe City citizens for UKB. Note that ticket price is an important factor in decision making (Chang and Sun [2012] and Jung and Yoo [2014]) but cannot be included as an explanatory variable due to the nature of the data as discussed below.

4.2. The micro data and explanatory variables

The micro data is from the "Travel Survey for Domestic Air Passengers" conducted by Ministry of Land, Infrastructure, Transportation and Tourism (MLIT) in 2015. The advantage of the survey is that it covers all boarding passengers on all flights on the survey date (October 21, 2015), which allows to avoid sampling bias. The overall survey has 166,791 responses for a 59.6% response rate. This data is categorized into Revealed Preference (RP) data because it is a collection of actual passengers' behavior. The reason to use RP data is directly captures the reality. However, RP data has a disadvantage that it does not provide information on alternatives that were not chosen. For this reason, ticket price can't be included in the analysis of this research. In contrast, Stated Preference (SP) data that is collected by questionnaires or interviews has the advantage that the decision-making situation for all alternatives is clear because researchers set hypothetical alternatives and respondents choose from them. Thus, researchers can include factors that they want to focus on. However, SP data has a large problem that there can be a gap between the actual behavior and the answer because respondents don't well recognize their preference. Comparing advantages and disadvantages of both type of data, this research adopts RP data to capture the actual behaviors because, in general, passengers decide their choice without recognizing attachment to a specific airport.

The analysis targets passengers whose origin or destination is in GKA, and who took a flight on Sapporo or Naha route. Although all the three airports have routes to Sendai, Tokyo, Nagasaki and Kagoshima as well, these routes are excluded from the analysis. This is because passengers firstly make a mode choice from air or rail on these short haul routes and thus passengers' decision-making does not conform to the airport choice model in this research. According to the Inter-Regional Travel Survey conducted by MLIT, the share of traffic between Osaka and Tokyo was 71.6% for railways and only 18.6% for flights, and about half of passengers to/from Sendai, Nagasaki and Kagoshima took railways. In this study, passengers under 15 years old are excepted

from the data set because they are more likely to just accompany their parents or other adults rather than chose the airport by themselves. Therefore, 3885 samples remain for the analysis and the descriptive statistics of the sample are summarized in Table 2.

Table 2: Sample data

| | | | | |
|---|---|---|---|---|
| Total samples | | | 3885 | |
| Travel purpose | Business | | 1024 | 26.4% |
| | Leisure | | 2861 | 73.6% |
| Airline type and airports | KIX | | 1281 | 33.0% |
| | ITM | FSC | 997 | 25.7% |
| | | LCC | 906 | 23.3% |
| | UKB | FSC | 386 | 9.9% |
| | | LCC | 315 | 8.1% |
| Average access time (min.) | | | 71 | |
| Passengers living around airports | Around ITM | | 121 | |
| | Around KIX | | 49 | |
| | Around UKB | Kobe | 289 | |
| | | Amagasaki | 88 | |
| | | Nishinomiya | 93 | |
| | | Ashiya | 29 | |
| | | Akashi | 53 | |
| | | Kakogawa | 40 | |

The explanatory variables are set as followings. In the “Travel Survey for Domestic Air Passengers”, the purpose of the trip is asked in one of four choices: "Business", "Sightseeing", "Visiting relatives and friends" or "Others”. Then, $BUSINESS_n$ dummy is one when the travel purpose is “Business” and airline type is LCC, and zero otherwise. Two variables, $ATIME_{an}$ and $ACOST_{an}$, are used to describe airport access. Since the survey asked for the origin or destination at city level, the central station of the city is assumed as the departing or arriving point of travels. The access time (in minutes) and cost (in thousands of yen) by train from the central station of each city to airport $a$ are used as the values for $ATIME_{an}$ and $ACOST_{an}$. In calculating $SC_{tan}$, it is assumed that the scheduling cost is proportional to the inverse of the number of flights. Therefore, $SC_{tan}$ of airline type $t$ at airport $a$ is calculated as $1/f_{ta}$. Here, $f_{ta}$ denotes flight frequency. The flight schedule of October 2015, when the survey was conducted, is used for the values of $f_{ta}$. The $KOBE_{an}$ dummy is set to 1 if a passenger is Kobe City citizen and his/her departure airport is UKB. Note that origin/destination cities and residential cities are distinguished in the database since the survey asked for these places separately.

5. Results and discussion

5.1. Basic model

Table 3 shows the results of the basic model analysis described above. Decisions on the airline type choice at the first level are different by travel purpose. The coefficient of *BUSINESS* is negative at the 0.5% significance level, which indicates that business passengers are more likely to choose FSCs rather than LCCs compared to non-business passengers. This may reflect the tendency of business travelers who place a high value on on-time performance and business environment during flights and at airports. In addition, according to Miliotiet al. [2015], business travelers value FFP in their choice of airline. For these reasons, they prefer FSCs that in general provide high quality services.

*ATIME* and *ACOST* that affect airport choices at the second level are negative at the 0.5% significance level. This indicates that passengers prefer airports with shorter access times and lower access costs. Although *SD* is not statistically significant at even 10% level, the sign is negative. This implies that frequent flight services attract passengers because they can take a flight that fits their schedule. The reason *SD* is not statistically significant is that non-business passengers don't avoid alternative with low flight frequency as discussed in subsection 5.2. The signs of the coefficients of explanatory variable are consistent with intuition. Previous papers such as Ong and Tan [2010], Baser and Bhat [2004], and Hess and Polak [2005] also showed similar results. Thus, it can be considered that the model adequately captures passengers' behavior.

Table 3: Modeling results of the basic model

| | | Coef. | Std. Err. | t-value |
|---|---|---|---|---|
| First level | BUSINESS | −0.6110 *** | 0.0850 | −7.19 |
| | | | | |
| Second level | ATIME | −0.0067 *** | 0.0016 | −4.14 |
| | ACOST | −0.5630 *** | 0.1342 | −4.20 |
| | SD | −0.3652 | 0.2272 | −1.61 |
| | KOBE | 0.2186 *** | 0.0763 | 2.87 |
| | | | | |
| Constant (First level) | FSC | (base) | | |
| | LCC | −0.3010 *** | 0.0776 | −3.88 |
| | | | | |
| Constant (Second level) | ITM | (base) | | |
| | KIX | 0.3887 *** | 0.0863 | 4.50 |
| | UKB | −0.2783 *** | 0.0836 | −3.33 |

*** Significant at the 0.005level.
** Significant at the 0.01 level.
* Significant at the 0.05 level.

The *KOBE* dummy which is the main focus of this research is positive at the 0.5% level of significance. This means that Kobe City citizens tend to choose UKB compared to other passengers even after controlling all factors that could influence passengers' decisions.

5.2. Results by travel purpose

Next, passengers' decisions are analyzed by travel purpose to check whether business and non-business travelers have different preferences. Since the data were analyzed separately for business and non-business passengers here, *BUSINESS* dummy is excluded from the explanatory variables of the first level. Tables 4-1 and 4-2 summarize the results for business and non-business passengers, respectively. For both types of passengers, *ATIME* and *ACOST* are negative at the 1% or 0.5% level of significance, which is the same as the results of the overall analysis. While *SD* is negative for business passengers at the 5% level, the sign of *SD* isn't significant for non-business passengers. The background of this result can be considered that schedules of business passengers to attend meetings and visit their customers is fixed, while non-business passengers have a flexible schedule. Loo [2008] also reported that business passengers place more importance on flight frequency than non-business passengers. *KOBE* dummy is significantly positive at the 5% level for both type of passengers. Therefore, it is found that Kobe City citizens tend to choose UKB regardless of their travel purposes.

Table 4-1: Modeling results using business passengers' data

| | | Coef. | Std. Err. | t-value |
|---|---|---|---|---|
| Second level | ATIME | −0.0091 ** | 0.0036 | −2.51 |
| | ACOST | −0.7904 ** | 0.2930 | −2.70 |
| | SD | −1.5225 * | 0.7604 | −2.00 |
| | KOBE | 0.4594 * | 0.2130 | 2.16 |
| | | | | |
| Constant (First level) | FSC | (base) | | |
| | LCC | −0.7203 *** | 0.1669 | −4.26 |
| | | | | |
| Constant (Second level) | ITM | (base) | | |
| | KIX | 0.4267 *** | 0.1523 | 2.80 |
| | UKB | −0.0121 | 0.1612 | −0.07 |

*** Significant at the 0.005level.
** Significant at the 0.01 level.
* Significant at the 0.05 level.

Table 4-2: Modeling results using non-business passengers' data

| | | Coef. | Std. Err. | t-value |
|---|---|---|---|---|
| Second level | ATIME | −0.0059 *** | 0.0018 | −3.22 |
| | ACOST | −0.4979 *** | 0.1525 | −3.26 |
| | SD | 0.1350 | 0.2263 | 0.60 |
| | KOBE | 0.1648 * | 0.0784 | 2.10 |
| | | | | |
| Constant | FSC | (base) | | |
| | LCC | −0.3620 *** | 0.0828 | −4.37 |
| | | | | |
| Constant | ITM | (base) | | |
| | KIX | 0.3703 *** | 0.1068 | 3.47 |
| | UKB | −0.3839 *** | 0.1223 | −3.14 |

*** Significant at the 0.005level.
** Significant at the 0.01 level.
* Significant at the 0.05 level.

The following two questions still need to be cleared before the result about the regionality of Kobe City citizens' behaviors is definitively concluded.

Q1: Do citizens of airport cities, not just the Kobe City citizens, generally tend to use the airport in their city?

The research question is whether the citizens prefer the "city-owned" airport such as UKB. Thus, it is necessary to examine whether there is any difference between local public airports and other airports.

Q2: Do not only Kobe City citizens but also people living in the neighboring cities of Kobe City tend to use UKB?

It is worth clarifying whether the regionality of the preference to UKB is specific to Kobe City citizens or common in people living near Kobe City.

To answer the above questions, additional analyses are conducted with new regional dummies for the passengers' place of residence.

5.3. Decisions of passengers near other airports

To clarify differences in behavior between Kobe City citizens and passengers living near other airports, two regional dummies, *AKIX* and *AITM*, are added to the basic model. AKIX is a dummy variable for passengers living near KIX. "Near KIX" is defined as Izumisano City, Sennan City and Tajiri Town, where KIX is located. This variable takes 1 for passengers who live in these cities and choose KIX, and 0 otherwise.

Similarly, *AITM* is set for citizens of Toyonaka City and Itami City, where ITM is located. The results of the model with the additional dummy variables are shown in Table 5.

Table 5: Modeling results with AITM and AKIX dummies

| | | Coef. | Std. Err. | t-value |
|---|---|---|---|---|
| First level | BUSINESS | −0.6114 *** | 0.0850 | −7.19 |
| | | | | |
| Second level | ATIME | −0.0061 *** | 0.0015 | −4.04 |
| | ACOST | −0.5788 *** | 0.1358 | −4.26 |
| | SD | −0.3616 | 0.2206 | −1.64 |
| | AITM | 0.2404 * | 0.1131 | 2.13 |
| | AKIX | −0.6138 ** | 0.2225 | −2.76 |
| | KOBE | 0.2054 *** | 0.0727 | 2.82 |
| | | | | |
| Constant (First level) | FSC | (base) | | |
| | LCC | −0.3096 *** | 0.0756 | −4.10 |
| | | | | |
| Constant (Second level) | ITM | (base) | | |
| | KIX | 0.3959 *** | 0.0868 | 4.56 |
| | UKB | −0.2554 *** | 0.0790 | −3.23 |

*** Significant at the 0.005level.
** Significant at the 0.01 level.
* Significant at the 0.05 level.

The results for *BUSINESS*, *ATIME*, *ACOST*, *SD* and *KOBE* are largely similar to those in the basic model. The coefficient of *AITM* is significantly positive at the 5% level, which indicates that passengers living near ITM also tend to use the airport in their cities. ITM was scheduled to be closed after the opening of the new airport, KIX. However, ITM has survived due to the campaign by the local government to continue its operation. This history may influence the preference of the citizens of the two cities. On the other hand, *AKIX* is negative at the 1% level of significance. This indicates that passengers living near KIX are rather reluctant to use the airport. In summary, the answer to Q1 is "In general, not all passengers have a preference for their local airports" Further investigation is needed for this point to clarify what factors shape preferences to local airports.

5.4. Decisions of passengers around Kobe City

Next analysis is on the decision makings of the citizens of the five neighboring cities of Kobe. The location of these cities is depicted in Figure 4. The curves in the figure represent the trunk railway lines. We introduce *AMAGASAKI*, *NISHINOMIYA*, *ASHIYA*,

*AKASHI* and *KAKOGAWA* as new dummies. Each variable takes 1 when the address is in each city and the choice of airport is UKB, and 0 otherwise. The results of the model with these dummy variables are shown in Table 6.

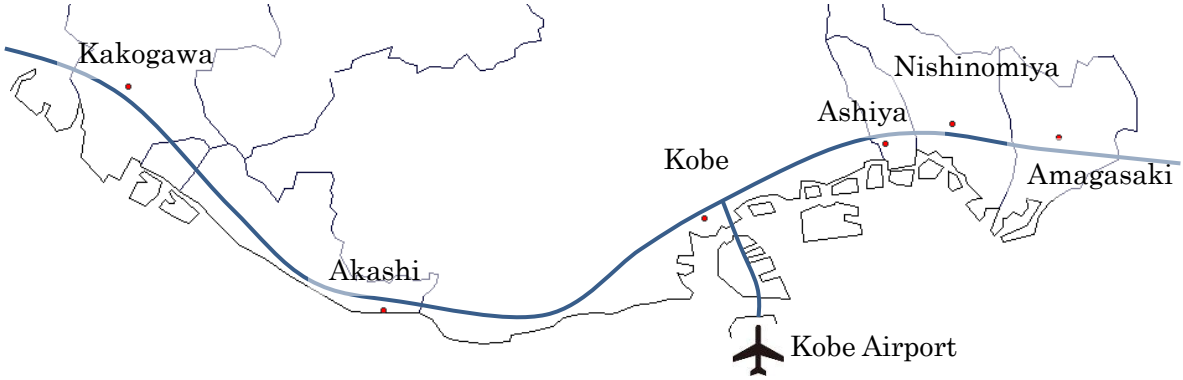


Figure 4: Map around Kobe City

Table 6: Modeling results with dummies for cities near Kobe City

| | | Coef. | Std. Err. | t-value |
|---|---|---|---|---|
| First level | BUSINESS | −0.6098 *** | 0.0850 | −7.17 |
| | | | | |
| Second level | ATIME | −0.0068 *** | 0.0016 | −4.15 |
| | ACOST | −0.5644 *** | 0.1363 | −4.14 |
| | SD | −0.3571 | 0.2436 | −1.47 |
| | AMAGASAKI | 0.0340 | 0.1040 | 0.33 |
| | NISHINOMIYA | 0.2470 * | 0.1023 | 2.41 |
| | ASHIYA | 0.3926 * | 0.1739 | 2.26 |
| | KOBE | 0.3195 *** | 0.0949 | 3.37 |
| | AKASHI | 0.5798 *** | 0.1986 | 2.92 |
| | KAKOGAWA | 0.1459 | 0.1419 | 1.03 |
| | | | | |
| Constant (First level) | FSC | (base) | | |
| | LCC | −0.2882 *** | 0.0786 | −3.67 |
| | | | | |
| Constant (Second level) | ITM | (base) | | |
| | KIX | 0.3821 *** | 0.0849 | 4.50 |
| | UKB | −0.3594 *** | 0.0976 | −3.68 |

*** Significant at the 0.005level.
** Significant at the 0.01 level.
* Significant at the 0.05 level.

In this model, the coefficients for *BUSINESS*, *ATIME*, *ACOST*, *SD* and *KOBE* are almost the same as in the basic model, respectively. The dummies for Nishinomiya, Ashiya and Akashi, which are very close to Kobe City, are significantly positive while

that for Amagasaki and Kakogawa, which are relatively farther away from Kobe City, are not statistically significant. This result means that the preference for UKB is limited to passengers living in places very close to Kobe City.

In summary, the answer to Q2 is "Yes". The reason why citizens in the three cities close to Kobe City have similar preference to that of Kobe City citizens may be that the cities are economically and socially connected to Kobe City. This hypothesis can be examined based on commuting rates to Kobe City and the immigration rate from Kobe City. Table 7 summarizes the population of the five cities, the number of people commuting to Kobe City and the number of people moving-in from Kobe City based on the National Census in 2015.

Table 7: Commuting rates to Kobe City and moving-in rates from Kobe City

| | Population | Workers and students | Commuters to Kobe city | | Immigrants from Kobe city between 2010 and 2015 | |
|---|---|---|---|---|---|---|
| Amagasaki | 452,563 | 211,334 | 12,013 | 5.7% | 3,475 | 0.8% |
| Nishinomiya | 487,580 | 231,862 | 27,419 | 11.8% | 7,467 | 1.5% |
| Ashiya | 95,350 | 44,045 | 9,863 | 22.4% | 2,975 | 3.1% |
| Akashi | 293,409 | 142,234 | 40,972 | 28.8% | 9,064 | 3.1% |
| Kakogawa | 267,435 | 133,674 | 16,398 | 12.3% | 2,605 | 1.0% |

Firstly, the moving-in rates of the three cities with significantly positive regional dummies are higher than that of other cities. More than three percent of the population of Ashiya and Akashi city moved in from Kobe City in the five years between 2010 and 2015. Including people who moved in before that period, a larger proportion of population are originally Kobe City citizens. Thus, it is not surprising that these people have similar preferences to those of Kobe City citizens.

Second, commuting rates to Kobe City of Nishinomiya, Ashiya and Akashi tend to higher than that of other cities (Kakogawa's commuting rate is slightly higher than Nishinomiya). Commuting rates of Akashi and Ashiya are over 20%, so it can be said that these cities have strong social and economic connection to Kobe City. While passengers in areas strongly connected to Kobe City prefer UKB, decisions of passengers in areas with relatively weak connection to Kobe City are not statistically different from average preferences of all passengers. People who commute to school and work in Kobe City may have opportunities to visit UKB for school events or to take flights from UKB for business trips. Thus, it is possible that these social and economic connections may make their airport choice decisions similar to Kobe City citizens.

6. Does attachment to the specific airport affect airport choice?

Section 5 has indirectly presented the attachment and preference for city-owned airports based on actual passengers' decisions. However, since the RP data didn't include a variable related to attachment, it was not possible to explicitly describe these direct links. Therefore, an additional survey to Kobe City citizens was conducted to determine whether their attachment to UKB is linked to their airport choice.

The survey was conducted on the web using the services of Macromill Inc. Respondents were selected at random from among the monitors registered with Macromill. Note that the respondents may be biased towards those interested in airports and travel because the monitors could decide whether to respond the survey after seeing the title of it. There were totally 206 respondents, 103 men and women each in their 30s to 50s. The survey asked respondents to select a flight to take from six flights departing from the three airports. The combination of airlines, airports and fares for each flight reflects actual market conditions. See Table 8 for the detail of the flights. The respondents were also asked about their attachment to UKB and why they chose that flight.

Table 8: Flight choice set

| Departure | Arrival | Airport | Airline | Fare |
|---|---|---|---|---|
| 8:00 | 9:55 | KIX | JAL | 14,300 |
| 8:00 | 9:50 | ITM | ANA | 14,730 |
| 8:10 | 9:55 | UKB | Skymark | 10,770 |
| 8:20 | 10:05 | ITM | JAL | 14,730 |
| 8:20 | 10:15 | KIX | Peach | 10,190 |
| 8:25 | 10:20 | UKB | ANA | 13,870 |

The number of respondents who answered they had attachment to UKB was 98, of which 89 chose to fly from UKB. Conversely, 108 respondents were not attached to the airport, and 99 of them chose to depart from UKB. The selection rates for Kobe Airport are 90.8% for with-attachment group and 91.7% for without-attachment group and there is no large difference between the two groups in airport choice. However, these two groups answered differently to a question about the reason to choose the flight. 19.1% of respondents with attachment answered that they chose a flight from UKB because they love the airport. Conversely, no respondent without attachment answered this reason to choose a flight from UKB. This result indicates that the psychological factor of attachment to a specific airport can be a reason to use it. So, it might be a

possible idea for policy makes of airport cities to hold events such as runway walk and field trips for their citizens so to enhance attachment to the airport and increase passengers of it. Actually, Kobe City and UKB invited children to one day schools, and the participants got attachment to the airport.

## 7. Conclusion

In this paper, an empirical analysis is conducted using micro data to examine whether passengers in a city with a local public airport tend to choose the airport. The analysis took GKA with multiple airports and Kobe City as an example. The basic model showed that Kobe City citizens have a preference for the local public airport compared to passengers in other regions. The additional analysis on airport choice for non-Kobe citizens provided two results. Firstly, residents in not all airport cities are likely to choose their local airports. Secondly, passengers living in cities that are very close to Kobe City and socially and economically connected to it also tend to use UKB. This means that passengers in those cities have the similar preference to Kobe City citizens. Finally, the questionnaire survey revealed that people who are attached to UKB choose it because they love it. This result suggests that attachment to a specific airport can be a reason to use it.

Although this research obtains meaningful results, future tasks to be researched are still left. The RP data used in the analysis has the disadvantage that it can include only observable variables. For this reason, it is not possible to directly confirm whether passengers' decisions are affected by the attachment to a specific local airport. Therefore, this study indirectly demonstrated the existence of the relationship between attachment and airport choice based on the additional questionnaire survey. In order to draw direct conclusions about the psychological factors behind passenger preferences and decisions, it is needed to conduct a survey to collect SP data that includes both of attachment and airport choice.

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