STATISTICAL TOOLBOX

Descriptive statistic.

	Month Number	Cancellations	Departure on time	Departure Delayed	Weather	Mechanical Failure	Staff shortage	Other reasons
Mean	6,5	14,28611111	63,5	16,37638889	5,911111	1,616666667	6,4375	0,320833333
Standard Error	0,128739836	1,0161034	3,685236619	1,040731846	0,424605	0,075003219	0,521047476	0,028581284
Median	6,5	6,5	28	6	3	1	3	0
Mode	1	1	10	3	1	0	2	0
Standard Deviation	3,454452288	27,2649153	98,88527512	27,92576586	11,39335	2,012547566	13,9811709	0,766916319
Sample Variance	11,93324061	743,3756066	9778,297636	779,8483986	129,8085	4,050347705	195,4731398	0,58816064
Kurtosis	-1,21689569	34,91553871	15,85562649	18,35256992	33,25156	13,22679667	39,6251617	11,58498684
Skewness	1,23874E-18	5,407654705	3,599652771	3,831790177	5,329798	2,874347671	5,754994674	3,092566484
Range	11	245	777	238	100	16	136	5
Minimum	1	1	0	0	0	0	0	0
Maximum	12	246	777	238	100	16	136	5
Sum	4680	10286	45720	11791	4256	1164	4635	231
Count	720	720	720	720	720	720	720	720
Confidence Level(95,0%)	0,25275091	1,994884159	7,235110277	2,04323642	0,833614	0,147251485	1,022956281	0,056112744

Table 1. descriptive statistic of month number as a Dependent Variable and Cancellations (independent variable 1), Departure on time (independent variable 2), departure delayed (independent variable 3), weather (independent variable 4), mechanical failure (independent variable 5), staff shortage (independent variable 6), and other reasons (independent variable 7).

It has been advised that there are independent variable is important factors which affect flight cancellations.

Interval confidence

interval confidence with 95% level of significance (Cancellation)	
lower bound	6,24724909
upper bound	6,75275091

Null hypotheses and alternative hypotheses

$H_0 : b_{1(coeeficent\ for\ cancellations)} = 0\ and$	$H_1 : b_1 \neq 0$
$H_0 : b_{2(coeeficent\ for\ Departures\ on\ time)} = 0\ and$	$H_1 : b_2 \neq 0$
$H_0 : b_{3(coeeficent\ for\ Departure\ delayed)} = 0\ and$	$H_1 : b_3 \neq 0$
$H_0 : b_{4(coeeficent\ for\ Weather)} = 0\ and$	$H_1 : b_4 \neq 0$
$H_0 : b_{5(coeeficent\ for\ Mechanical\ failure)} = 0\ and$	$H_1 : b_5 \neq 0$
$H_0 : b_{6(coeeficent\ for\ staff\ shortage)} = 0\ and$	$H_1 : b_6 \neq 0$
$H_0 : b_{7(coeeficent\ for\ other\ reason)} = 0\ and$	$H_1 : b_7 \neq 0$

Based on the decision table above using the 95% confidence level, it was decided that the value of the Z statistic is in the rejection area so that it can be concluded that there is an average difference from the independent varible with the rejection area = -1.959964 to 1.959964.

Multiple Linier Regression

In linear regression analysis, we can include more parameters in an effort to find factors that better predict an outcome. This analysis is known as multiple linear regression analysis. Additionally, multiple linear regression analysis can be used to adjust for confounders. In randomized controlled trials, confounding is minimized by randomization, but weak confounding might still be present because of small imbalances of outcome predictors. In a multiple regression model, we can add a mixture of continuous and categorical predictors as well as interaction terms among categorical predictors, or among categorical and continuous predictors, to assess simultaneously the combined effect of those parameters on the outcome. To the previous simple linear regression in which the effect of initial crowding on days to alignment was assessed, we can add sex to see whether it is a significant outcome predictor. The Table shows that in the adjusted model, initial crowding remains a significant predictor (*P* = 0.001), whereas sex shows a nonsignificant association (*P* = 0.62) with days to alignment. The interpretation is as follows: for boys compared with girls, it will take on average 6.7 days more to reach alignment after adjusting for initial irregularity (Pandis, 2016).

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	6,986764491	0,160966346	43,40513	2,5798E-202	6,670739793	7,30278919
Cancellations	-0,18535717	0,225708603	-0,82122	0,411793567	-0,628490127	0,257775788
Departures_On_Time	-0,0067076	0,002981789	-2,24952	0,024783711	-0,012561733	-0,000853458
Departures_Delayed	-0,03963438	0,008820026	-4,49368	8,1661E-06	-0,056950708	-0,022318054
Weather	0,368247603	0,223067914	1,650832	0,099213294	-0,069700898	0,806196104
Mechanical_Failure	0,369811732	0,284952249	1,297802	0,194774913	-0,189634082	0,929257546
Staff_Shortage	0,071713274	0,241037862	0,297519	0,76615719	-0,401515568	0,544942115
Other_Reasons	0	0	65535	#NUM!	0	0

A multiple linier regression with dependent variable (number month) and independent variable (cancellations, departure on time, departure delayed, weather, mechanical failure, staff shortage, and other reasons).

The regression equation :

$$y = b_0 + b_1 + b_2 + b_3 + b_4 + b_5 + b_6 + b_7 + \varepsilon$$

y = number month
b_0 = intercept
b_1 = cancellations
b_2 = departure on time
b_3 = departure delayed
b_4 = weather
b_5 = mechanical failure
b_6 = staff shortage
b_7 = other reasons
ε = eror term

So that the regression equation is obtained as follows based on the multiple linear regression table

$$y = 6{,}987 - 0{,}185_{cancellatioms} - 0{,}007_{DON} - 0{,}039_{DD} + 0{,}368_{Weather} + 0{,}369_{MF} + 0{,}072_{SS}$$

Based on the above equation, it can be concluded that the variables Cancellations, Departure ontime, and departure delayed negatively affect the number of months which means it can reduce the value of the number of flights each month and for the Weather, Mechanical Failure and Staff shortage variability has a positive effect which means it does not affect the number of airplane passengers every month.

Regression Statistics	
Multiple R	1
R Square	1
Adjusted R Square	0,99859944
Standard Error	6,27769E-15
Observations	720

Looking at table regression statistic, we determine a r square of 0,204275173. To raise the r square of the first SLR, the variables are combined which resulted in the rise of the r square to 0,204275173. This therefore shows that 20,43%% of the variation dependent variable (number month) and independent variable (cancellations, departure on time, departure delayed, weather, mechanical failure, staff shortage, anf other reasons).

ETHICS TOOLBOX

Should airlines ask their staffs to take early retirements in order to save costs during the pandemic?

The cancellation of flights forced Qantas, Jetstar, Virgin and Rex to implement temporary stand downs until flying can resume. The Australian Government announced new support through the Retaining Domestic Airline Capability program, which gives eligible airlines $750 per week for frontline employees that are otherwise unable to access COVID-19 disaster payments. Additionally, the government extended a number of existing aviation support programs until the end of the year. Despite the reduced number of flights, the industry remains optimistic that demand for domestic travel, especially to leisure destinations, will bounce back strongly when vaccination targets are reached and border restrictions are eased. The ACCC has recently heard concerns from some airlines that airports may seek to significantly increase charges to airlines in order to recover lost profits from the pandemic. The report explains that the ACCC believes such actions would be inconsistent with the Australian Government's Aeronautical Pricing Principles and would be a clear example of airports systematically taking advantage of their market power.

Step 1.

To save finances and maintain the airline business, further analysis needs to be carried out, about the need for employees to take early retirements, it can be seen from the data that has been analyzed that many passengers canceled their flights for security reasons during the pandemic, many countries are not ready to cope with these changes so it can be concluded that good for airlines ask their staffs to take early retirements in order to save costs during the pandemic.

Step 2.

An assumaptions The airlines ask their staff to take early retirements It is very important to do because it can help to save costs during the pandemic. Nearly half of employers also allow retired employees who are still collecting benefits to stay on as consultants or contingent workers, easing their own transition out of the workforce while helping to train the next generation of workers.

Step 3.
Air travelers just endured another weekend of widespread flight delays and cancellations. Airlines cancelled more than 5,100 flights that had been scheduled from Thursday, Aug. 4 through Monday, Aug. 8, and close to 30% of the flights that did take off were delayed. It's something that's become all too common this summer, as airports have been busier than at any time since the pandemic began, but airlines struggle to meet the surge in air travel demand.

Step 4.
The airlines Must dare to take a firm stance in order to be able to defend the company from bankruptcy due to the lack of passengers and the number of passengers who cancel their flights due to the pandemic, this is a strong consideration for the company to continue to survive in its business.

Step 5.
This step is very wise to do because during this pandemic many countries have carried out massive restrictions to give permission for outsiders to enter their countries. This is used as a very relevant reason for the airlines to ask their staffs to take early retirements in order to save costs during the pandemic.

Step 6.
Reducing the number of workers is the greatest priority as an attitude of the pandemic decrease the number of passengers, provide comfort to passengers, and to assist the government in restoring the company's economy and being able to survive the pandemic.

Step 7.
The conclusion is necessary for airlines to ask their staffs to take early retirements in order to save costs during the pandemic and the company's economy and being able to survive the pandemic.

INFORMATION TOOLBOX

Situations

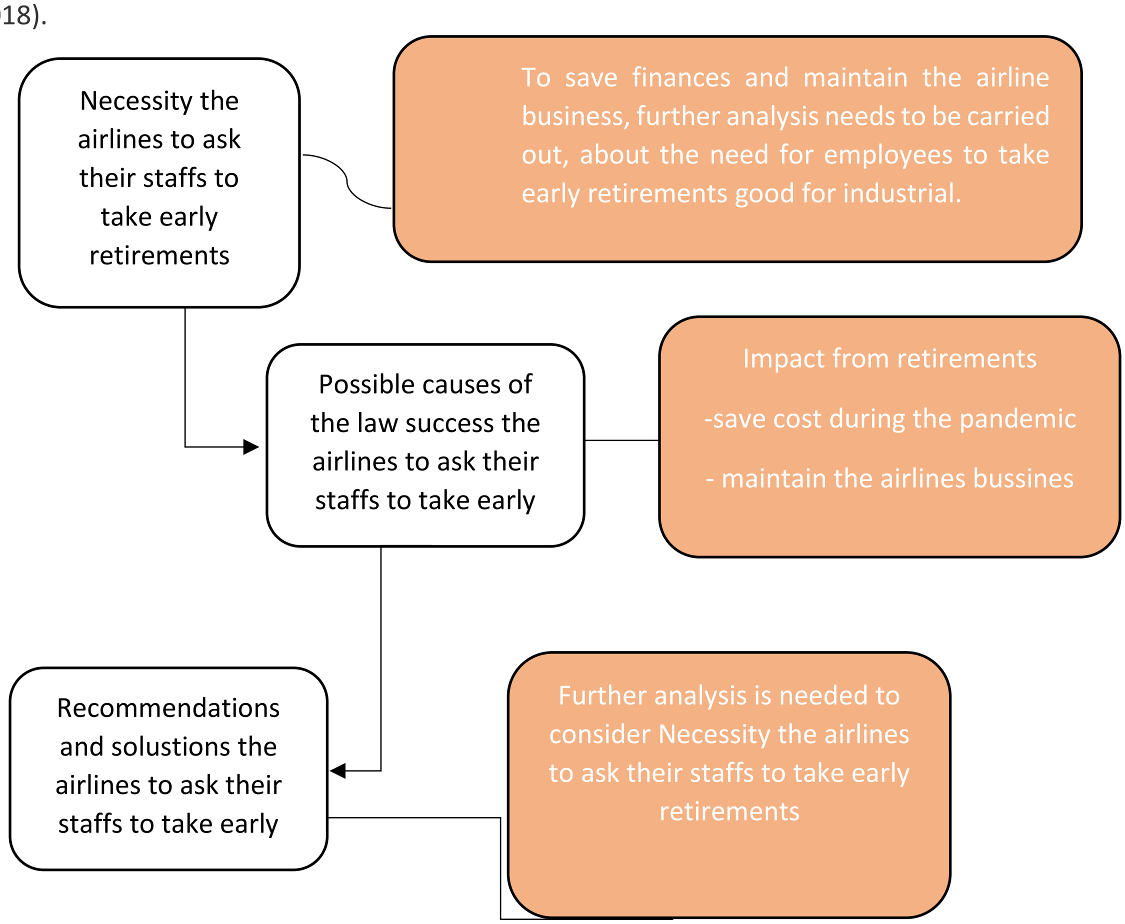
For tens of thousands of airline workers that have either lost their jobs or have been stood down because of international travel bans imposed due to the COVID-19 pandemic, finding new work has not been easy. In March, Virgin Australia stood down 8,000 of its 10,000 staff in response to the crisis. Weeks later the airline was placed into voluntary administration and has since been purchased by American private equity group Bain Capital. Under the new owner 3,000 jobs are expected to go, leaving 6,000 Virgin staff remaining. Meanwhile, Qantas announced in June that it was sacking at least 6,000 workers and would continue to stand down a further 15,000 while international travel bans remained in place. The airline also said about 100 aircraft would remain grounded for up to 12 months, some longer, and six 747s would be retired early. Qantas also revealed plans to save $100 million per year by outsourcing its ground handling work at major Australian airports. This could affect another 2,500 people. While the airline sector has been one of the worst-hit during the crisis, many workers have been redeployed into other services-oriented industries such as retail and health care.

Obesrvations

From the MLR above, cancellation and staff shortage is statistically significant with number month and it has a positive correlation. From this, we can conclude that there is a possibility where variable independent statistic significant.

Argument structure graph

Argument structure graph aims to provide clear and concise explanations so that it is easier to understand. Accumulating evidence indicates that student attendance is closely tied to a range of educational outcomes, and yet millions of students are chronically absent each year. Under the Every Student Succeeds Act (ESSA), schools are now held accountable for their students' attendance at a scale this country has never before seen. As such, this is a crucial time to understand what research and evaluations suggest about what schools can do to move the needle on student attendance. As researchers work toward understanding the impact of different interventions and practices, and how results vary by grade level, on-the-ground experiences in schools highlight the pervasive use of incentives from pre-K to grade 12. Schools have employed a wide range of incentives to improve attendance, with varied levels of success. Unfortunately, there is little guidance on what policymakers and practitioners ought to consider when deciding if incentives are an appropriate intervention, and then how to design incentives in ways that align with the nature of specific attendance barriers and problems. This article presents a framework to fill that gap. We outline the design considerations when creating attendance incentives and offer guidance to practitioners deciding what to implement in their school (Balu and Ehrlich, 2018).



Statistical:

- ✓ The sample is randomly generated, therefore, there is a possibility that certain groups in the population are not considered.
- ✓ The larger the sample size, the more accurate the data can represent the population which in this case, are the students. The sample size used in this study is 720, which is used to represent all the employed who take the vaccination.
- ✓ It is almost impossible to establish causation since there might be a confounding variable that affects both dependent and independent variables.
- ✓ Correlation does not equal causation and there is no way to test this.

Biases:

- ✓ Availability bias: This report is based only on the variable chosen from the given data.

Internal validity:

- ✓ Due to using a sample and not the whole population as the data, it is inevitable that there will be a sampling error.
- ✓ Confoundment is also an issue since it is hard to ignore other variables that might affect the results

Refferences

Pandis, N., 2016. *Multiple Linier Regression Analysis*. American Jounal of Orthodontics & Dentofacial Orthopedics: 149 (4)-581. Doi: https://doi.org/10.1016/j.ajodo.2016.01.012.

Balu, R., and Ehrilch, SB., 2018. Journal of Education for Students Placed at Risk (JESPAR). (2018). *Making Sense out of Incentives: A Framework for Considering the Design, Use, and Implementation of Incentives to Improve Attendance*. [online] Available at: [Accessed 23 Nov. 2022]