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## Video Gambling Final Report

### **Background**

Since the day it started in 2012, video gambling has divided the state of Illinois. There were promises of great sums of money to be made for both the state and local governments. These great sums have come to fruition. For example, in just December of 2019, Decatur made \$129,642 while the state of Illinois made \$648,214 from the video gambling terminals located in Decatur (Herald and Review, 2019). Admittedly, these are large sums, especially when you consider that these are only the revenues for one month out of the year. However, these large revenues come at the expense of the communities in which gaming terminals are located as many believe that video gambling is detrimental to the communities in which it occurs. For example, as of June 1, 2018, individuals playing in Decatur have lost over 26 million dollars because of video gambling (Horn, 2018). Additionally, it is said that video gambling terminals are more prevalent in lower income communities (Grotto and Kambhampati, 2019b). Video gambling clearly has its advantages as both the state and local governments can profit greatly from it. However, it also has its disadvantages as these large profits come at the expense of the community members of areas where video gambling terminals are located. As can be seen, video gambling is a divisive topic that can have serious effects on a community. This is why many communities are seriously considering if video gambling makes sense for them.

## **Motivation**

The motivation in doing this project was to discover trends in video gambling data and identify correlations and relationships between video gambling revenue and socio-economic and population data. More specifically, Decatur is a city that has video gambling establishments located all throughout the community and Dr. Horn, a biology professor at Millikin and councilman for the city of Decatur, was interested in the impact of video gambling on Decatur. Thus, the project team felt compelled to research and analyze the impact of video gambling on Decatur to hopefully discover some insightful relationships, trends, or correlations that Dr. Horn bring to the attention of other members of the city council.

## **Research Questions**

Throughout the process of working on this project, many questions of the data have been asked. Unfortunately though, not all of these questions were ones that were able to be answered while completing this project. Thus, the following research questions have been the primary focus for this project:

- How is video gambling related to socio-economic data for Decatur? For example, is there a relationship between the locations of video gambling terminals in Decatur, and the money spent at these locations, and median income in the areas surrounding these locations?
- The amount of money spent on video gambling in Decatur has been on the rise, does population have an affect on this rise?
- How is the amount of money that the city of Decatur has made from video gambling related to the amount of money that Decatur citizens have lost from video gambling?

In all, the goal of this research project is to determine how video gambling terminals affect the community and economy of Decatur.

## **Methodology**

This methodology section outlines the steps, in a general sense, taken to complete all parts of this project. Before beginning, it should be noted that all data analysis was done using R and RStudio. However, before any analysis could be done, data had to be collected. The Illinois Gaming Board has revenue reports on a monthly or yearly basis (since 2012) that can be downloaded in csv format. For this analysis, yearly reports were used. So, after downloading a revenue report for each year from 2012 to 2019 (note - the 2019 yearly report only had data from January to November since the year has not finished yet), the reports were imported into R.

Next, the data inside the revenue reports had to be cleaned and joined together into one dataframe. To clean the revenue reports, the first three rows of data were removed from the dataframe as these rows had only one column of data and included information that would not be helpful during the analysis phase. After removing the first three rows of data, the column names were now in the first row. So, for each yearly revenue report, the first row of data was transformed into the column names. Next, a year column respective to the year the report was from was added to each yearly revenue report. Finally, all eight data frames were merged together, any remaining bad data was removed, and all columns were converted to their proper data type. This dataset was called RevenueReport.

Shortly after this data cleaning was completed, the project team met with Dr. David Horn, a Millikin biology professor and councilman for the city of Decatur. In this meeting, the questions that Dr. Horn would have liked to see answered during this analysis were discussed as well as

possible directions and outcomes of the project. At this meeting, Dr. Horn also put the team in contact with Seth Stark, the GIS Administrator for Decatur. A meeting with Mr. Stark was scheduled and at that meeting, possible directions for the project were discussed. Possible data the city might have and how it could be integrated into the project were also discussed. Both meetings were very beneficial and were what led the team to focus on the impact of video gambling on Decatur.

After meeting with Dr. Horn and Mr. Stark, it was evident that we should study trends, relationships, and correlations between video gambling and Decatur. Thus, data about video gambling licensees was downloaded and imported into R and socio-economic data was accessed in R through the tidycensus package. After being downloaded, the video gambling licensees data was cleaned to include only establishments located in Decatur and the following columns: license number, address, city, state, zip, and county. This dataset was uploaded to the website GeoCodio so that the latitude and longitude for each address could be obtained. Then, this dataset of licensees was merged with the revenue report for 2019. This dataset was then used, with the help of the tidyverse and ggmap packages, to create the first of many visualizations, a heat map of establishments with the most money played. To go along with this heat map, the tidycensus package and an API was used to pull in data about the median income for Macon County by census tract. This dataset was then paired down to include only census tracts in Decatur. Next, this dataset was used, with the help of the tidyr and ggplot2 packages, to create a heat map of median income per capita by census tract for Decatur.

After creating these more specialized visualizations, it was time to start analyzing the data and creating data visualizations using primarily the RevenueReport dataset. Many different

visualizations, including pie charts, bar charts, and line charts, were created using this dataset and the ggplot2 package. Other R packages, such as dplyr, tidycensus, tidyr, tidyverse, and more, were used for data analysis and manipulation.

Clearly, this does not appear to be a more general overview of the methodology, yet it is. Other forms of data cleaning and manipulation, suching aggregating data, creating new data frames, or deleting rows and columns, were required to create all the visualizations below. After all data cleaning and manipulation was completed, analysis of the data was done. The results of the analysis, as well as the data visualizations, can be seen in the results section below.

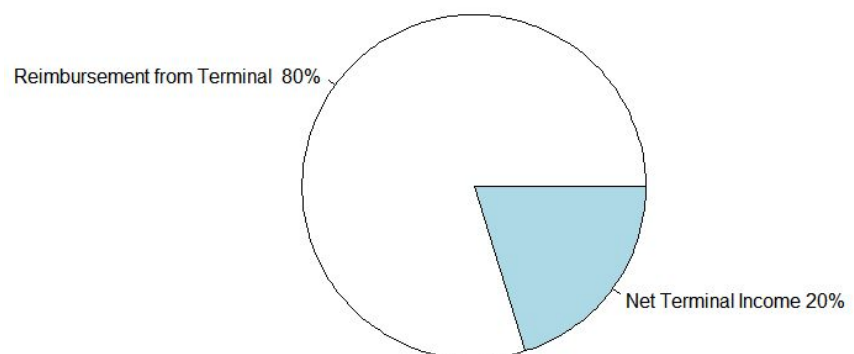
## Results

This section provides results from the research and analysis that was completed throughout this project. Each piece of analysis and its result is briefly discussed and necessary explanations, clarifications, or limitations relating to the analysis or result are made. It should also be noted that all results do not include Cook County as video gaming is not allowed in Cook County.

Before diving deep into the results of this project, it is important that magnitude of money that is being spent on and made off gambling understood. Thus, here are some quick calculations that the team did show how much

money is involved in gambling. Decatur citizens have lost \$142,703,876 on gambling since it

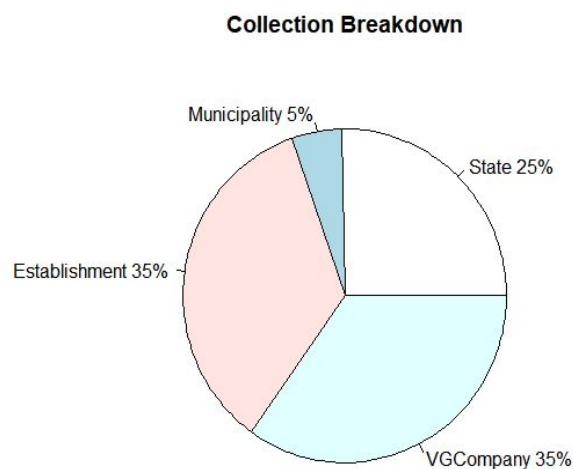
**Reimbursement from Terminal Vs Net Terminal Income**



was legalized in 2012. Decatur has made \$7,135,305 from video gambling since it was legalized in 2012. Finally, in 2018, the average gambling loss per capita was \$409.99. This doesn't seem terrible at first glance. However, when you consider per capita includes persons who are not yet of gambling age, this becomes slightly worrying.

Previous research indicated that a video gaming terminal must pay out at least 80 percent of all the money that goes into the terminal back to the customer (Illinois General Assembly). This means the Net Terminal Income, or money that is made from a terminal, can be no more than 20 percent of money put into that terminal. It felt necessary to ensure that this was the case and to see if machines put out anymore than 80 percent of all money played. As can be seen below, since the legalization of video gaming terminals in 2012, all machines in Decatur have paid out exactly 80 percent back to customers and the net terminal income has been exactly 20 percent. No more, no less.

This breakdown was then taken one step further. From the 20 percent that is kept, the

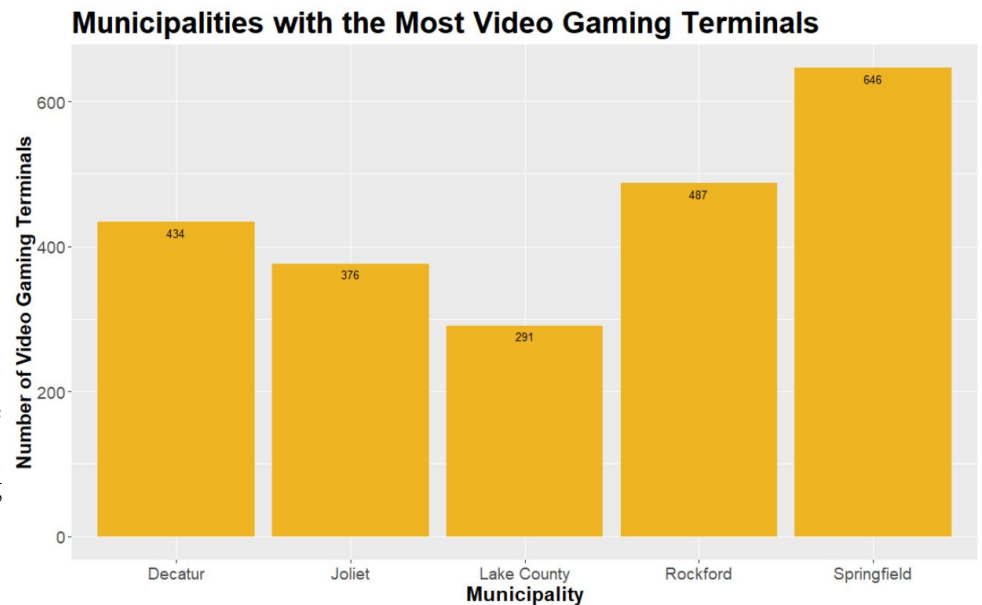


percentages that an establishment (where the terminal is located), the vendor (the owner and servicer of the terminal), the state, and the local government keeps was calculated. The result of this calculation can be seen to the left. The establishment and video gaming company each get 35 percent

of the profits, the state gets 25 percent of the profits, and the municipality government gets only 5 percent of the profits.

The next finding is one that starts to help answer the question of how video gaming terminals impact the city of Decatur. First though, it must be established that previous research has found that there is a significant negative correlation between the number of video gaming machines and the average household income

(Grotto and Kambhampati, 2019a). While accurate and usable data to verify and show this on our own was difficult to find, the municipalities with the largest number of video gaming terminals is shown. This is not



an ideal visualization as a correlation surely would have been better but it does show that

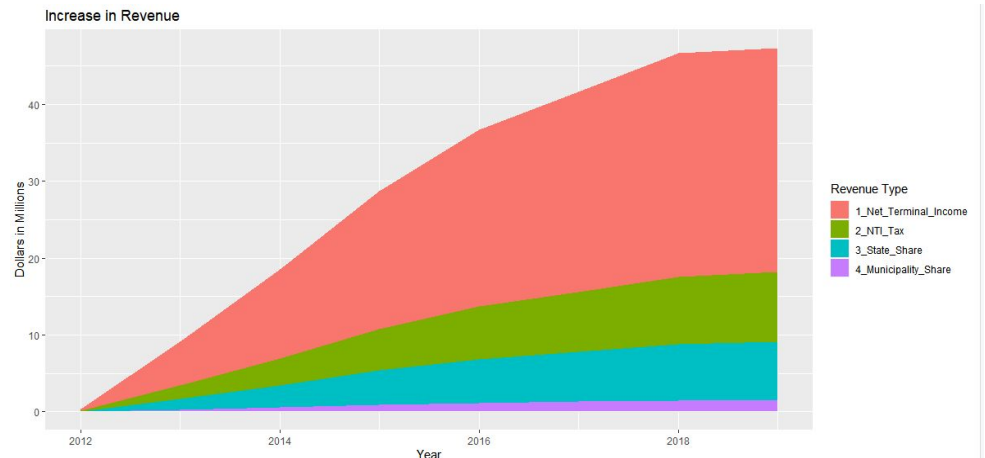
Decatur ought to carefully consider the number of video gaming terminals they have in the city.

It is dangerous to conclude from the previous research and this chart that Decatur is in a very bad spot financially. However, Decatur should carefully consider the fact that there is a significant negative correlation between the number of video gaming machines and the average household income and the fact that they have the third most video gaming terminals in the state. This is not an ideal path to continue down.

As just mentioned, Decatur has a large number of video gaming terminals. This must mean the city makes large sums of money, right? Unfortunately, the answer is not as straightforward as

one might think. The city does make large sums of money. However, the city's revenue from video gambling is quite disproportionate to the amount of money that is both played and lost by the citizens of Decatur. The next two visualizations will help show this.

Though it may not look like much, Decatur is still receiving a million dollars a year from video gaming. In proportion to the others who receive a part of the



revenue, Decatur's revenue is miniscule. Majority of the money received from taxes goes to the state, which hurts Decatur's economy as they are not being reinvested into Decatur's economy. The green area shows how much the video gaming company has made over the years.

As can be seen, Decatur does make large sums of money off of the video gaming within the city. However, this next visualization will show us truly how disproportionate the numbers are for how much citizens are losing from gambling and how much the city of Decatur is profiting off gambling. It was mentioned above, but Decatur only gets five percent of all money lost while gambling by their citizens. That is a large disparity between money citizens have lost and money that Decatur receives and

the graph shown below shows that disparity on a yearly basis. Decatur should seriously consider

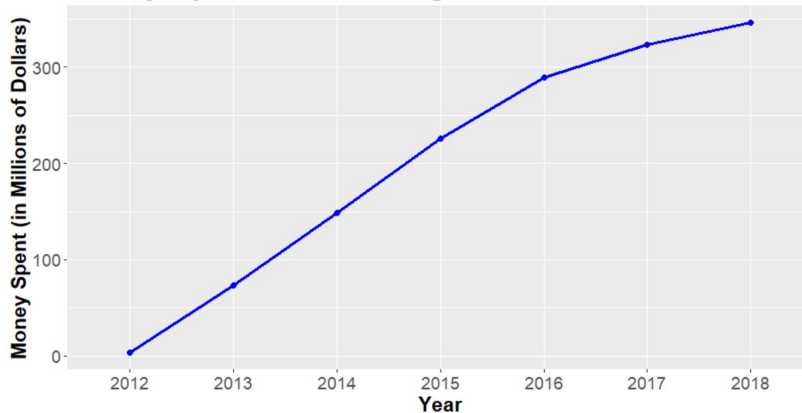




what it would take to get more of the money that citizens lose back (taxes currently say local government only gets five percent) as it is their citizens losing money.

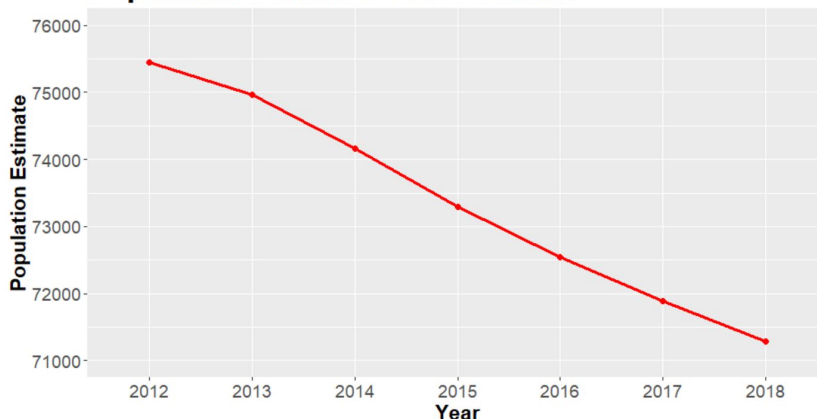
One area to research brought up by Dr. Horn was that the amount of money spent on video

### Money Spent on Gambling



gambling in Decatur has been on the rise, so does an increase in population have an affect on this rise? Oddly enough, the relationship between the population of Decatur and money being played on video gaming terminals is an inverse one. Money

### Population Estimates for Decatur



spent on gambling is on the rise, yet the population of Decatur has decreased slightly since video gambling was legalized in 2012. This is a slightly concerning trend.

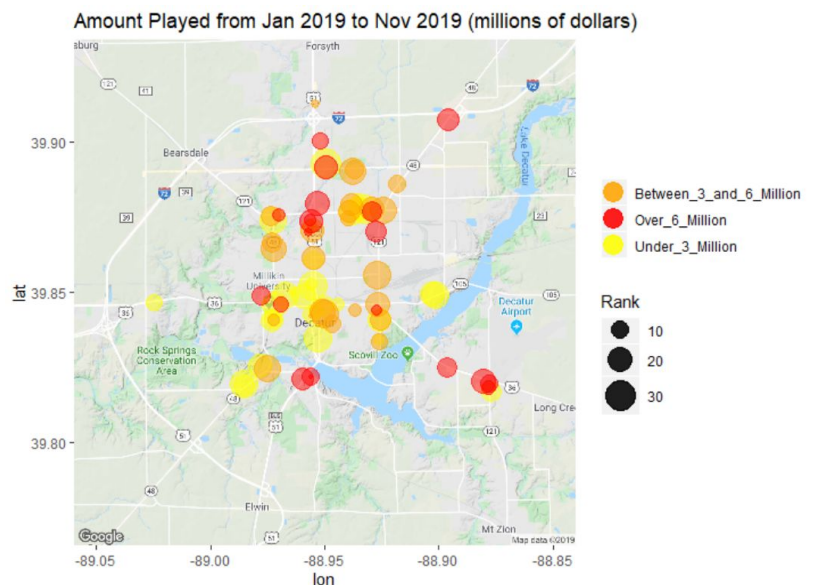
The last finding in this research project is another that is slightly concerning. Two graphs were created for this last finding and can be seen below. First, a graph with locations of video gaming establishments was created. In this graph, each establishment in Decatur is mapped and how much money that was played at that location from January 2019 to November 2019 is represented by the color and size of the dots at that establishment location. Each color yellow (less than \$3,000,000), orange (\$3,000,000 to \$6,000,000), and red (more than \$6,000,000) represents how much money has been played at that location. The size of the dots represent if the

number is closer to the low end of the range (smaller) or the high end of the range (larger). Next, a map of the median income per capita in Decatur (separated by census tracts) can be seen.

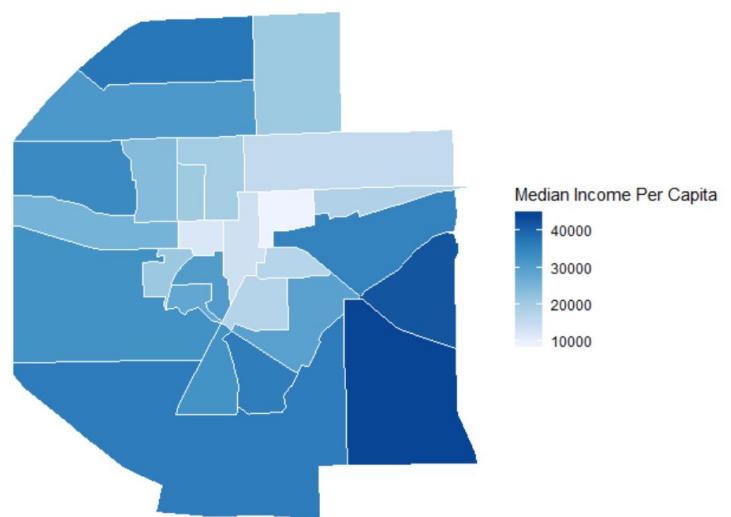
Lighter blue is lower income, darker blue is higher income. It is important to note that the map of money played at each establishment is from January to November of 2019 where the map of median income is from the 2017

5-year American Community Survey.

This should not be an issue as the median income would most likely have not made any drastic changes over the past couple of years. Also, the median income map is not a perfect map of Decatur as the census tracts for Macon County had to be paired down to get as close to a map of Decatur as possible. Please note, these two maps are unfortunately not to scale. So, interesting things about these two graphs is that if one looks closely, it can be seen that a majority of video gaming establishments are located in Decatur's



Median Income Per Capita in Decatur, IL



Source: US Census/ACS5 2017

inner city. One can also see that many of these establishments have very large sums of money being played on their video gaming terminals. Additionally, Decatur's lowest income areas are

located in or around the city's inner city. This is interesting as it appears that the gaming establishments in the lowest income areas have the most amount of money being played. More video gaming terminals in an area is not necessarily a cause for the media income to be lower in that area. However, it does go hand in hand with the research that states that there is a significant negative correlation between the number of video gaming machines and the average household income. This is certainly an interesting finding and can be beneficial to helping answer the research questions, yet also shows promise for more data discovery and analysis to be done.

### **Conclusions and Discussion**

Video gambling can lead to addiction and does not offer a substantial benefit to the community. The amount of revenue generated from the terminals does not have a great enough benefit to the municipality that it is located in. Video gambling takes money out of the community member's pockets and little is reinvested back into these communities. In relation to the city of Decatur, video gambling offers little benefit from the reparations that it receives from taxes. Decatur's citizens are losing millions on video gambling, which is detrimental to the city's ability to grow. Video gambling generates large amounts of revenue and could offer some benefits, but currently is offering little to no support to the cities who pay the biggest toll from their operations. Some possible ways to make this problem better would be for Decatur to simply cut down on video gambling as they clearly do not benefit as much as some may think. This option would stop people from spending as much money and be able to reinvest it in the community, but the citizens could keep playing. The next option would be to increase the payout percent. The law says that the minimum payout is eighty percent, which is what they all pay. If the payout percent increased, then players would not lose as much and be able to keep their

money. The issue with increasing the payout percent is that there would be less money being brought in from taxes, but the citizens get to keep more for themselves and which would benefit the community. The best option for making video gambling beneficial would be raising the taxes and changing the distribution of them. The income is currently being split evenly three ways, but the establishment and gaming company should not get that much. Increasing the taxes and giving more to the city could make it worthwhile, but the minuscule amount that Decatur currently receives from video gambling offers the city no advantages.

### **Next Steps**

While the conclusion made from the research that video gambling is detrimental to the city of Decatur as a whole, further steps and research can be taken. There would be two purposes of the next steps. One purpose would be to continue with more detailed analysis that can be used to support the current conclusion. This could be done by searching for data that would allow more analysis on the correlation of video gaming machines and the average household income. This data could also be used to create our own correlation matrix. Another way in which more research and data analysis could help support the conclusion is by creating more detailed spatial analyses through overlaying graphs for easier viewing and analysis and more. Research into the reasoning behind why gaming establishments in the lowest income areas have the most amount of money being played and why the Decatur population is decreasing, yet money being spent on gambling is rising would also be good areas for future research.

The second purpose of the next steps in this project would be, after doing more research and data analysis to support the findings, to raise awareness about the negative effects of video

gambling on Decatur. This may involve presenting the findings and conclusions to members of the Decatur city council or presenting at conferences.

In all, the next steps taken will help push this project forward and will hopefully lead to even more insightful findings and progress.

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