

# A STATISTICAL ANALYSIS OF DETERMINANTS OF ROBBERY OF FINANCIAL INSTITUTIONS IN FORT WAYNE, INDIANA

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## ABSTRACT

The purpose of this study is to investigate the circumstances of and factors that affect incidences of bank robberies of financial institutions in Fort Wayne, Indiana. In early October 2001, there have already been 16 incidents of bank robberies in Fort Wayne, compared to 11 incidents last year. In this study, we will examine patterns in bank robbery incidents and identify those factors that influence the financial institution to become a target of a robbery attempt. We will use Probit model analysis to estimate a predictive model capable of determining the probability of a financial institution being robbed based on the institution's characteristics. Previous studies have suggested that there is an identifiable pattern to the victimization of financial institutions, and our model will be based on determinants and factors identified from robbery patterns in the area. These determinants may include: the location of the institution with respect to distance from police station, proximity to major arterial routes, freeways, or highways; the presence of uniformed security officers and/or security cameras; branch offices vs. main offices, and number of customer entrances or exits. The findings of this study can help city officials and security authorities to provide a safer environment in which all citizens can work and live safely. In addition, the approach and methods used in this study can be extended to study incidents of bank robberies throughout the United States in general, and the State of Indiana in particular. It is interesting to note that Indiana has seen a rise in bank robberies for three years in a row – with four months left in 2001, there have been 125 bank robberies across Indiana, compared to 136 in 2000 and 95 in 1999. Clearly, there is a need for careful and systematic analysis of this phenomenon. This study is a modest attempt at this important task.

## INTRODUCTION

Robberies of financial institutions have been the subject of numerous studies, the majority of which have focused on the characteristics of the crime and the offender.

What has generally been neglected, however, is the characteristics of the institution being robbed. The understanding of the physical attributes of the financial institution is of particular importance to the police, who expend considerable human resources including the deployment of patrol cars or officers, and the establishment of a bank robbery taskforce. Providing security and safety for the banks requires considerable monetary and non-monetary resources, such as specialized training for a group of officers, the installation of security features, and the assignment of police patrols to the financial institution. In addition, robberies impose significant direct and indirect costs on the financial institutions. These costs include, among others, loss of funds, possible damage to physical and human capital, and loss of business.

This paper is an attempt to investigate whether there are certain characteristics of the financial institutions that make them the target of robbery. Based on these characteristics, one can develop a predictive model that can be used to determine the probability of an institution with particular attributes being robbed. Unlike many other studies that use offender interviews as information sources, this study uses data obtained from police files and from publicly available sources of information regarding robbery incidents and bank characteristics. Data from those banks that fell victim to a robbery as well as banks which escaped this ill are examined to determine the determinants of bank robbery.

Compared with many other states, the number of bank robberies in Indiana has remained relatively low. In 1999 and 2000, there were 95 and 136 robberies of financial institutions in Indiana, compared to greater than 2,000 incidents recorded in California, and greater than 600 incidents in Florida. Despite the comparatively low number of robberies recorded in the State of Indiana, the city of Fort Wayne, however, has experienced a significant increase in bank robberies over the past two years. In 2001, there were 16 bank robberies in Fort Wayne, while there were 11 incidents of such robberies in the year 2000. This reflects an increase of over 45 percent.

The Fort Wayne Police Department has formed a special task force to investigate these bank robberies. While this task force has made some headways, arresting five bank robbery suspects, the problem has hardly been properly addressed. A systematic study of bank robbery is well warranted, as long as this phenomenon continues to be a problem costing financial institutions and the taxpayers of the State large amounts of money.

### **DETERMINANTS OF BANK ROBBERY**

Robberies of banks are, almost exclusively, planned criminal activities. In a 1986 study by Buchler and Leineweber, out of 963 incidents of robberies analyzed, 864 were classified as planned offenses. In a later study, they found that in 84.8% of 351 incidents of solved bank robberies, the robbers admitted to a certain level of planning (Buchler and Leineweber, 1991). Servay and Rehm (1988), in their study "Bank Robbery: The Offender's Perspective," reported that based on their sample, 75% of the bank robberies were planned crimes.

Since most bank robberies can be characterized as planned offenses, an attempt can be made to investigate the factors that are taken into consideration during the planning process, and ultimately in deciding which bank to rob. While there have been many studies of robberies of financial institutions, there has not been a systematic, statistical analysis of the factors that influence a financial institution becoming the target of a robbery attempt.

Majority of bank robbery studies have investigated the incidence of bank robbery from the robber's perspective. In an early study, Camp (1968) questioned 132 convicted bank robbers about their offenses. Asked about the specific factors which they considered in selecting a particular institution, by far, a majority of the offenders stated that location was the most important consideration, with escape being the primary concern. Other items that were mentioned with some frequency included the presence of a guard, the size of the facility, proximity to the police station, and the physical structure of the institution. Except for the presence of a guard, very few of the respondents mentioned the presence of a security system.

Buchler and Leineweber (1991) came to the same conclusion as Camp (1968) with respect to escape route being a priority. Their analysis, on the basis of 351 solved bank robberies committed in the federal Republic of Germany between 1977 and 1978, found that in planning their escape, most robbers pay special attention to escape routes and escape vehicles, or to the need to switch get-away vehicles. Research by Leineweber and Buchler (1991) determined that most bank robbers

assess bank location, distance from nearest police station, escape possibilities, and close-by hiding places.

Tiffany and Ketchel (1978) examined physical deterrents that might affect the selection of a bank as a victim. They suggested that visibility, convenience and physical proximity all contributed to the probability of a robbery.

Two additional studies by Saylor and Janus (1981) and Wise and Wise (1984) investigated the relationship between incidences of robbery and interior characteristics of the bank. Saylor and Janus' study revealed that bank size and ease of access were most closely related to the probability of robbery. In addition, banks with more entrances, direct entry from the outside, and more teller stations were more likely to be robbed. The study by Wise and Wise (1984) found that offices with small lobbies, square lobbies, and large distances between tellers generally had a negative effect on the probability of being robbed.

In 1994, the Chicago Police Department, in cooperation with the local FBI Office, researched the problem of a sharp increase in the number of bank robberies in the Chicago area. Their study identified several key factors that influenced bank robbers' decisions to strike certain institutions at specific times.

### **DATA AND METHOD**

The intent of this study is to discover the determinants of robberies of financial institutions in the Fort Wayne, Indiana area. The study will encompass private and publicly held banks, and also credit unions. Throughout this paper, the term "bank robbery" and "robbery of financial institution" will be used interchangeably, but the terminology is meant to include all types of financial institutions.

Any serious and careful study of a phenomenon must start with documentation and collection of data. A major challenge when studying the phenomenon of bank robbery is lack of useful data. In several interviews and discussions with the Fort Wayne Police Department officials, especially those who were in charge of the bank robbery data, we discovered that the Police Department views each incidence of bank robbery as an independent or perhaps isolated case. Therefore, rather than attempting to understand the phenomenon, the pattern of which can be discovered, they approach each robbery occurrence as an independent event. Because of this approach, the data gathered by the police department are not sufficiently rich to allow a comprehensive investigation of determinants of bank robbery - determinants that can help delineate between the banks

that do and those that do not fall victim to robbery attacks.

The police database contained only the name of the institution, its address, the date and time of robbery, and an incident or reference number. None of the factors under study were recorded in the database. This suggests that during criminal investigations there is a lack of attention to the findings of previous research regarding the physical characteristics that may affect the selection of the institution as a robbery target. Therefore, there has been very little importance placed on identifying and collecting data on such characteristics.

In this paper the following factors are studied: 1) proximity to major arterial routes, freeways, or highways; 2) the presence of uniformed security officers; 3) branch office versus main office; 4) proximity to parking spaces or residential areas for get-away or escape planning; 5) location at intersection of major roads; 6) type of traffic on the main roads serving the bank, and 7) proximity to police stations.

The explanatory variables used in the model are based on recommendations and findings from previous studies, and the information gathered from interviews with Fort Wayne Police Department officers. In determining geographic profiles for criminal activities, Rossmo (2000) suggests that arterial routes and highways are crucial elements. In addition, Felson (1998) and Rengert (1992) both suggest that risk of crime (bank robbery) is higher in areas close to highways and freeways. It is then expected that the greater the bank's distance from a freeway exit, the less likely it is to be robbed. This, the expected sign for the coefficient of distance from highway is negative.

The results of findings regarding the effectiveness of security officers have been mixed (Camp 1968; Carrol & Loch 1997; Barancik 1998; Mann 2000). Therefore, it is important to statistically test the impact that security officers have on the occurrence of bank robbery. It is reasonable to assume that there is an indirect relation between the presence of security officers and the probability of a bank being robbed. The hypothesized sign for the coefficient of this variable is negative.

Even though only one study mentions that bank robbers are more likely target branch offices rather than main offices (Abraham & Baldassaro, 2001) this factor is included in this study as a possible determinant for bank robbery.

Because most studies identified escape and get-away as primary concerns for robbers, the proximity of the bank to parking areas such as shopping mall or grocery store parking lots, is also an important factor to be studied. The parking areas serve as inconspicuous

places for robbers to hide their get-away vehicle or exchange vehicles. Therefore, the closer the proximity to such areas, it is hypothesized that the greater the chance of robbery occurring, and the expected sign for the distance to parking area coefficient should be negative. Another determinant related to escape planning is the bank's location at the intersection of two roads. Intersecting roads offer two escape routes, therefore it can be expected that bank robbers would prefer to rob banks located at crossroads because of the greater potential for escape.

The type of traffic also plays an important role in the escape plan. One way roads provide robbers with escape in only one direction. While two directional roads are preferable, the multi lane roads with greater and faster traffic can potentially affect the decision to rob a particular financial institution.

Finally, the proximity to police stations is also a credible factor (Leineweber & Buchler, 1991). The closer the bank is to the police station, the faster the police response time. For a bank robber, a few miles, or even a few minutes, may be the difference between a clean get-away and apprehension. Therefore, we expect that the farther away from the police stations, the greater the chances of the bank being robbed. This variable is expected to be positively related to the likelihood that a bank will be robbed and the variable should appear in the model with a positive sign. The presence of surveillance equipment is a factor that has been cited by several studies. However, this factor is not included in our study, primarily because virtually every bank today is equipped with surveillance devices.

For modeling purposes, this study uses the Probit model to predict the probability that a bank, given its specific attributes, will be the target of a robbery attempt. The Probit model transforms the dichotomous dependent variables into probability.

The form of the Probit model used is:

$$Y = \alpha_0 HWY + \alpha_1 PARK + \alpha_2 POLICES + \alpha_3 SECUR + \alpha_4 BRANCH + \alpha_5 INTERS + \alpha_6 TRAFFIC + \epsilon$$

where

$$Y = \begin{cases} 1 & \text{if the bank was robbed} \\ 0 & \text{if the bank was not robbed} \end{cases}$$

The explanatory variables are:

HWY = distance to freeway or highway exits (in miles)  
 PARK = distance to parking area for getaway

vehicle (in miles)  
 POLICES= distance to nearest police station (in miles)  
 SECUR = presence of uniformed security officers (1 – present, 0 – not present)  
 BRANCH= type of office (1 – branch office, 0 – main office)  
 INTERS = location at intersection of two roads (1 – yes, 0 – no)  
 TRAFFIC= type of traffic (1 – one way, 2 – two way)

In this model, the goal is to determine the probability that a particular bank with a given set of attributes (HWY, PARK, POLICES, SECUR, BRANCH, INTERS, TRAFFIC) will be robbed, or alternatively, will not be robbed. As shown in the model, each coefficient  $\alpha_1, \alpha_2, \alpha_3, \dots, \alpha_n$  represent, ceteris paribus, the effect of a change in the respective determinant on the probability of the bank becoming the target of a robbery attempt.

### STATISTICAL RESULTS

**Table 1. Estimation Results of Profit Model<sup>+</sup>**

	Model 1	Model 2	Model 3	Model 4
<b>HWY</b>	-0.26 (-1.87) *	-0.36 (-3.20) ***	-0.33 (-2.38) **	-0.31 (-2.10) **
<b>PARK</b>	-0.71 (-2.55) ***		-0.51 (-2.03) **	-0.53 (-2.03) **
<b>BRANCH</b>	0.94 (3.88) ***			
<b>INTERS</b>		0.67 (1.67) *		0.77 (1.87) **
<b>POLICES</b>		0.211 (2.65) ***		
<b>TRAFFIC</b>			0.76 (3.79) ***	0.55 (2.49) ***
<b>Log Likelihood</b>	-23.88	-22.18	-24.42	-22.65

\*\*\* Significant at 10% \*\* Significant at 5%  
 \* Significant at 1% + Numbers in parentheses are t statistics

Table 1 presents the results of estimation for four different models. The data set contained 32 banks that were robbed and 21 that were not robbed. Therefore, the models were estimated using 53 observations.

Even though seven independent variables were identified as potential determinants of bank robbery, none of the models contained more than four independent variables. This was done in order to have

more reliable estimates with sufficient degrees-of-freedom.

In Table 1, the coefficients for all variables enter the models with the appropriate signs. The coefficient of HWY is negative and significant at ten percent in model 1, five percent in models 3 and 4, and one percent in model 2. The coefficient of PARK is negative and significant at five percent in all models 3 and 4, and one percent in model 1. In model 1, the variable BRANCH is estimated with a positive sign, which is significant at the one percent level. The variable POLICES is positive and significant at the one percent level in model 2. The variable INTERS is positive and significant at the ten percent and five percent levels in models 2 and 4, respectively. The coefficient of TRAFFIC is positive and significant at the one percent level in models 3 and 4.

### DISCUSSION AND CONCLUSION

In this paper we have identified factors that affect the probability that a bank will become the target of a robbery. The findings show a statistically significant and negative relation between a bank's distance from highway as well as parking lots. Therefore, it is advisable that when choosing a location for the bank, attention be paid to this strategic matter. In addition, locations that are in close proximity to a police station should be more desirable if incidents of robbery are to be avoided. Furthermore, the evidence shows the type of traffic surrounding the bank and whether or not the site is a "branch" also affects the probability of robbery. Perhaps, reinforcement of security for branch offices needs to be considered more seriously.

Other implications of this study is emphasis on better education of the police and their division of bank robbery task force, who deal with this issue on a first hand basis. Informed investigators are in a position to collect valuable and useful data on characteristics of robbed banks that make it possible for scholars to study the problem systematically.

Robbery of financial institutions is a serious matter that requires careful attention. To say the least, millions of dollars of taxpayers' money are spent to combat this problem. These tax dollars spent on bank robbery task forces (which use a wide range of resources from electronic equipment to officers with specialized training); and prosecution and incarceration of bank robbery offenders, could instead be allocated for constructive needs such as education. This, in turn, will help build a better and stronger community. In addition to public costs, there are significant private costs to financial institutions that are operating under constant threat of the next robbery attack. The costs to the banks

include buying expensive electronic security systems, hiring security officers, dealing with injury of employees and loss of business. The findings of this study show that it is possible and quite fruitful an endeavor, to study the robberies of banks as a discernible phenomenon for which determinants can be discovered. Future studies using richer databases can serve the common good.

While the data gathered throughout this study relate specifically to bank robberies in Fort Wayne,

Indiana, the findings of the study can be applied to financial institutions throughout the United States in general, and can help to explain the factors that affect the probability of a bank being the target of robbery(ies). This information is useful in curtailing the problem.

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