

Effect of Natural Disasters on Local Economies: Forecasting Sales Tax Revenue after Hurricane Ike

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One of the main objectives of this paper is to provide insight to understand the effect of natural disasters on local government finance. That is, to analyze local governments' sales tax revenues after Hurricane Ike. Three Texas cities are examined: League City, Pearland, and Sugarland. Based on data collected from the Texas Comptroller's Office and the US Census, we found local governments experience a short-term increase in sales tax revenues and a long-term decline after the hurricane strike the region. On average, a major hurricane has a two-year impact on local government economy. The findings are essential for practitioners because in order to have a prosperous recovery after natural disasters, public managers have to prepare financially for short term changes in their sales tax revenues.

INTRODUCTION

While economists have examined financial impact of natural disasters at the country level, only few researchers have analyzed the relationship between natural disasters and local government revenues (Pelling *et al.* 2002). The effect of natural disasters on an economy has been measured in terms of direct (i.e., loss of property and life) and indirect effects (loss of employment and population, property tax revenues). Although studies have found conflicting results regarding the impact of disasters on economic growth, it is important to note that indirect effects of natural disasters are not always negative (Skidmore and Toya, 2002). For instance, researchers find positive indirect effect of disasters on an economy, whereby an affected area experienced a short and long-term economic growth (Cuearesma *et al.*, 2008). Majority of studies examining the implication of natural disasters on economic growth tend to examine country level data. Very few of these results are not applicable to local government level.

While the impact of natural disasters on national economy can be short term, an effect of disasters on local government economy can be disastrous. If industries and businesses are not able operate and hire local residents, especially in the presence of population migration after a disaster, the likelihood of spending of local residents declining is also likely to be high. Local

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governments are more likely to experience a decline in revenues and thus affecting their economic growth. During the recovery phase, local governments tend to use tax and other forms of revenues to rebuild their economy (Pelling and Uitto, 2011). For example, after Hurricane Andrew, the City of Miami invested in tourist areas to rebuild in order to attract tourists (Baade *et al.*, 2007). On the other hand, major natural disasters create an opportunity for governments to receive aid, reinvest in areas that have been on the decline for a long time, and change policies that attract businesses (Baade *et al.*, 2007). Hence, major disasters lead to possible change in political structure of governments, change in policies, and increase in economic growth.

Main aspect of this paper is to help public managers and administrators to understand the duration of the effect of natural disasters, and the effect of disasters on local government finance. Previous literature shows that natural disasters have a short term and/or long term effects of revenue. Therefore, this paper analyzes the duration of effect of natural disasters, specifically Hurricane Ike, on local government sales tax revenue. This study also analyzes how much increase or decrease in local government sales tax revenue is experienced compared to years before the natural disaster occurred. The findings are essential for practitioners because in order to have a prosperous recovery after natural disasters, public managers have to prepare their local governments for short term changes in local government sales tax revenue.

This paper examines effect of natural disasters on local government finance, specifically on sales tax revenue. The sample contains three cities that have been affected by Hurricane Ike in 2008. The main variable is local government sales tax revenue between years 2000 and 2013. The purpose of this research is to inform scholars and practitioners on economic impact of natural disasters. In order to understand effect and duration of the effect of disasters on local government sales tax revenue, it is important to discuss importance of sales taxes on local government revenue. Hence, this paper is organized in the following way. First, broad overview of the literature on the effect of natural disasters on an economy will be provided. Second, an outline of data collection and time series forecasting analysis will be discussed. Third, the findings of the analysis will be discussed. In the conclusion, implications of the findings on theory and practice will be discussed.

PREVIOUS LITERATURE

At the local government level, Chang (1984) found that hurricanes have an effect on development and growth. For instance, Hurricane Frederic in 1979 caused devastating damages to the southern region of Alabama. Overall damages of the disaster, without adjusting to inflation, were \$2.3 billion dollars. The federal government allocated aid to counties, which helped increase short- term growth. According to Chang (1984), sales tax revenue increased in the coastal region of Alabama, which can be explained by an increase in retail trade and construction sectors. The study also suggested that local governments adopted business friendly policies to attract private businesses. While Chang (1984) does not fully discuss effects of business friendly policies on local government economy, he highlights that economic growth was short-term since there was a tendency for local governments to experience a quick increase in sales taxes and income.

Lindell and Prater (2003) suggested that aid, loans, and investments have a positive effect on an economy. By analyzing effect of disasters on socioeconomic and political impacts of disasters, Lindell and Prater (2003) noted that investments and aid can lead to a multiplier effect, i.e., higher spending created a higher level of income. Picou and Martin (2006) also highlighted that natural disasters affecting government behaviors in the sense that governments would utilize resources in order to increase employment and gain revenue through taxation.

Cuaresma *et al.*, (2008) find that natural disasters have a positive impact on economic growth by highlighting the level of trade and exchange of resources. Natural disasters forced governments to increase economic activities in affected areas by simplifying trade regulations, increasing human capital investment, and new capital stock to improve the region ability to compete internationally. Guimaraes *et al.*, (1992), adopting time-trend analysis and ARIMA modeling, analyzed the effect of disasters on employment and household income and found that disasters have a positive effect in the growth of employment. They also found that, during the recovery stage, the affected areas generally experienced an increase in the number of construction jobs and an increase in the amount of sales in the private sector.

The effect of natural disasters on economic growth depends on the types of disasters and the ability of governments to retain businesses (Melecky and Raddatz 2011; Kellenber and Mobarak 2008, Otero and Marti, 1995). Researchers also find that household income plays a role to stimulate local economy during the recovery stage of natural disasters (Hochrainer 2009, Guaimares *et al.*, 1992). For instance, in a disaster affected area where median income of the population is high, the recovery process is relatively faster than the affected areas where income of the population is low. Noy (2010) finds that lack of workforce and resources have a negative effect on economic activity. Governments that are low in resources usually have the ability to increase their sources of revenue during the recovery stage.

Similarly, some studies find that disaster affected areas with strong infrastructure have fewer deaths compared to areas where infrastructure is weaker (Kellenber and Mobarak, 2008). Theoretically, residents in disaster affected areas with higher median income generally are properties owners. Structurally well-built housing leads to fewer deaths. While Noy (2010) finds that disaster affected areas requiring expensive infrastructure maintenance have a slower economic growth due to sudden decrease in revenue, there has been evidence suggesting that some local governments are not able to allocate appropriate resources for redevelopment. For instance, areas where disasters have caused a greater damage to infrastructure require larger funding for rebuild, which requires increase in revenue to pay to rebuilding costs. Therefore, high costing infrastructure requires usage of saved resources and increase in revenue to cover disaster causes damages.

While the literature provides positive and negative impact of disasters on an economy, this paper is investigating the impact of disasters on local government finance. For instance, Picou and Martin (2006) argue that, after Hurricane Ivan in 2004, cities of Gulf Shores and Orange Beach increased sales tax rate in order to increase revenue to rebuild and continue providing services. Similarly, Skidmore and Toya (2007) highlight that, after major earthquakes Alaska and California increased local sales tax rates in order to generate revenue. While increasing sales tax rate is not the only way to increase revenue, studies have also made a case where local governments received aid from the federal and state governments. Public funding

through federal and state grants are also an option, especially when local governments are required to share costs as part of the reconstruction processes. Meaning, when a local government receives a grant, it has to match the amount of the grant provided by the federal or state governments. External funding stimulates local growth by jump start economic activities.

Changing economic behaviors and adapting innovative policies to retain local businesses and attract new businesses is a common strategy adopted by affected governments. Local governments understand that assistance provided by the federal and state governments are not long term, so local governments generally aim to ensure an increase in investment. Crater (2014), for example, highlights that, after Hurricane Ike, the state government provided about \$1 to 10 million in assistance to large businesses and industries; small businesses received between amount between \$10, 000 and 150, 000. Public assistance has also been provided by the federal government to increase businesses activity and helped local governments to rebuild their infrastructure.

While the current literature suggests that there is an increase in short term revenue, it is unclear whether there is a long term impact of disasters on local government revenue (Rascky, 2008). The economic literature highlights that municipalities tend to provide tax incentives and create opportunities for businesses to relocate to affected areas (Crater 2014). However, due to high risks of disaster occurrence, many businesses choose not to relocate to disaster areas in order to avoid future losses. If a disaster prone region is known for its strong economy then the government experiences quick recovery because of strong economic activity in the region (Loayza *et al.* 2009). Stronger economy not only ensures faster recovery but also attracts more businesses, whereby employment related to sales increases as well. Cavallo (2010) highlights that disaster affected areas with strong economy actually benefit during the recovery phase. That is, disasters create a window of opportunity for governments to rebuild and change economic policies in order to recover from disasters. Nonetheless, the impact of disasters differs based on type of occupation and type of industry. Cavallo *et al.* (2010) argue that non- agricultural labor increases after disasters while agricultural labor force decreases after disasters.

Previous literature highlights that economic impact of disasters lasts up to two or three years. Economic impact of natural disasters is captured by sales tax revenue, national GDP, property tax revenue, user charges, debt collection, and etc. More recent findings indicate that the effect of natural disasters, such as hurricanes on national GDP last up to two or three years. Meaning, for a country to finally recover, it requires between two and three years in order to return to the state of growth that it was before the disaster occurred. However, the main weakness of the economics literature is lack of studies on sales tax revenue, particularly on local government level. Sales tax, on average, makes up over 30 percent of revenue in state and local governments. In Texas, sales tax revenue is an essential part of local government fiscal health, which makes 34 percent of the revenue. Depending on type and severity of disasters, sales tax revenue can experience decline, which affects local government fiscal health. Hence, lack of studies on duration and effect of disasters on sales tax revenue in local governments remains a main gap in the literature.

DATA COLLECTION

Hurricane Ike made landfall in Galveston Island on September 13th, 2008 and accounted for over \$37.5 billion in damages to commercial and residential properties and claimed 132 lives. At that time, Hurricane Ike is the third costliest disaster in the United States history.

Three municipalities located in the Houston-Woodland-Sugar Land metropolitan area in Texas are selected in this study. These cities are selected based on their similar socio-economic characteristics, i.e., population, median income, number of firms, retail sales per capita, and number of employed residents. All three cities have been affected by one of the most costly hurricanes in the history of the United States: Hurricane Ike.

The dependent variable is the total amount of local government sales tax revenues reported quarterly. The quarterly sales tax revenue is normalized as sales tax revenue on per capita basis. Secondary data are collected from the Texas Comptroller's Office between years 2000 and 2013. There are several reasons to use the sales tax revenues as proxy to economic growth. First, sales and gross receipt taxes revenue make up over 34 percent of local government revenue in Texas (Tax Foundation 2013). Second, sales tax is a tax paid to local, state, and county governments for the sales occurred in particular jurisdictions for certain goods and services (Musgrave and Musgrave 1989). The revenue gained through sales tax is used to provide services to residents, as well as adding revenue to city fund to cover other expenses in cases of emergency or during times of short term revenue decline. However, sales tax revenue fluctuates monthly suggesting that local governments' revenue growth is nonlinear. Yet, local government policies, economic recession, employment, and residents' median income can affect sales tax revenues. While sales taxes are waived for items purchased with assistance money such as survival items for personal use and for items purchased to repair commercial and residential properties, sales tax revenues are an important source of local government finance.

In Texas, sales tax revenue is reported monthly for majority of municipalities, however, municipalities with population of one thousand people and lower, tend to report sales taxes at the end of the year. The three selected cities in the sample reported sales tax revenue monthly. Sales tax rate, on the other hand, varies for the selected cities. Sugar Land and Pearland both have 8.25 percent sales tax rate, while League City has 8 percent sales tax rate. It is important to note that sales tax rate for all cities because lower rate could create spillover effect, whereby residents from nearby municipalities could potentially shop in municipalities with lower sales tax rate. The maximum rate for sales tax in Texas is 8.25 percent, therefore League City sales tax rate is 0.25 percent lower than the state mandatory maximum rate. However, 0.25 percent lower rate does not necessarily mean that the residents from nearby municipalities will shop in League City.

While the sales tax revenue for municipalities in Texas is reported monthly and yearly, in our analysis, the monthly data are converted into quarterly data. The data is collected from the Texas Comptroller's Office for years 2000- 2013. We also collected the number of outlets (businesses) where sales occurred from the US Census. Prior research shows that during emergencies and recession, number of businesses decrease and shoppers turn to businesses and shops in neighboring jurisdictions. The characteristics investigated are population, race, type of industry, occupation in sales and production sectors, employment in private and governmental sectors, and median household income. The US Census Bureau report is used to compare and

contrast socioeconomic characteristics for the cities. For occupation, this paper investigates number of employed residents and employment in sales, construction, and production sectors. For industry, this paper investigates number of manufacturers, wholesale businesses, retail trade businesses, and transportation businesses. For employment this paper investigates number of private and governmental workers. For median household income, this paper investigates number of households and median household income.

Table 1. Socio-Economic Characteristics

	League City	Pearland	Sugar Land
Population	91,252	83,983	83,860
Population per square mile	1,629	1,940	2,434
Number of Firms	8,129	6,104	10,990
Median Household Income	\$ 89,149	\$ 88,289	\$ 107,149
Per Capita Income	\$ 36,180	\$ 37,517	\$ 44,223
Retail Sales Per Capita	\$ 10,110	\$ 10,746	\$ 21,716
Employed	46,406	44,156	39,569
Unemployed	2,473	2,374	2,039
Manufacturing	4,684	6,627	3,710
Agricultural	1,145	648	2,068
Wholesale Trade	1,795	1,241	1,476
Retail Trade	4,612	4,207	4,546

Source: U.S. Census 2008

While there is contradicting evidence on the impact of natural disasters on government revenue, this research is interested in finding duration of the effect of disasters, specifically hurricanes, on local government sales tax revenue. The author argues that natural disaster has a positive effect on sales tax revenue. However, the duration of the positive effect is investigated through forecasting analysis. The author assumes that disasters give a window of opportunity to municipalities to reconsider established policies and adopt new policies in order to increase business activity. The author takes into account that cities are prepared for natural disasters and there have mitigation plans in place before the natural disaster occurred.

METHODOLOGY

The analysis adopted in this paper is Time Series Forecasting, whereby cities are graphed by quarterly sales tax revenue for years 2000 to 2013. Then the author forecasts revenue controlling for disaster and seasonal effects and report the amount of revenue gained or lost in years after natural disasters. Finally, a graph of predicted and actual amount of revenue is provided. The purpose of time series forecasting is to find whether natural disaster have a positive or negative effect on the amount of sales tax revenue gained after the disaster occurred. Moreover, the author is also interested in finding duration of the effect of the disaster on revenue. The independent

variable in the analysis is time. Whether it is there is an increase or decrease in revenue, the main purpose of the study is to find how long it takes for sales tax revenue to return to normalcy. Furthermore, this paper takes into account effect of the national economy on local government economy, and mitigation and emergency preparedness of local governments that might have had an effect on sales tax revenue.

This study the author adopts time- series analysis, mainly time series forecasting. In order to test for increase or decrease in sales tax revenue, the author uses actual sales tax revenue and compare it to the predicted values. Moreover, reliability and validity measurements are also taken into account in this study. Reliably measurement is necessary to determine consistency in measurement and repeatability. Validity measurement is necessary to find whether measurement of the test measures what is supposed to measure.

The study is conducted on three cities for certain time frame (2000- 2013), by analyzing sales taxes revenue with regards to time. Running measurement test for validity is unnecessary because the study measures one particular variable (sales tax revenue) overtime. Reliability measurement, on the other hand, is conducted by analyzing Cronbach's Alpha (0.93). Results of the Cronbach's Alpha statistic suggest that measurement is in fact reliable. The methodology adopted for the study is quite simple, whereby the author predicts sales tax revenue and compare to the actual revenue in order to find shock effect of the natural disasters on revenue. The natural disaster (Hurricane Ike) is not introduced as a control variable, but rather used to point out as a reason for increase or decrease on sales tax revenue pattern.

In this study we specifically measure sales tax revenue. The goal is to see how sales tax revenue moves through time. By projecting sales tax revenue for the selected cities, the author is able to compare the actual sales to predicted sales. Moreover, by introducing natural disaster as an event that occurred in 2008, not as a variable, the author is able to show short term change in sales tax revenue that occurred after the event.

The author uses time as an independent variable, in total as 56 periods between 2000 and 2013 (14 years and 56 quarters). Once cycle is four periods, indicating four quarters in a year. In order to manipulate the data, we first smooth the actual sales tax revenue data to control and iron for irregularities. Simple moving average technique is used to smooth the actual data. After setting the moving average per four periods, then the author centers moving average per four periods. This helps control for errors that occur in sales tax revenue. By smoothing we take out seasonal and irregular component from the dependent variable (sales tax revenue). Conceptually, smoothing is needed to separate actual sales tax revenue from average sales tax revenue to control for seasonality.

After smoothing sales tax revenue for the selected cities, we extract seasonality that occurs in the actual data to find difference between original sales tax revenue and irregularities that occur during the forecasting analysis. Classical multiplicative model of time series ($Y_t = S_t * I_t * T_t$) argues that season component is multiplied by irregular component and multiplied by trend component. By doing this, we are able to find percentage of seasonal and irregular components that is above or below the actual sales tax revenue. On average, seasonal and irregular components ($Y_t / \text{Centered Moving Average}$) for sales tax revenue for the selected cities is 3 to 4 percent above and below the smoothed sales tax revenue. We removed

irregularities in the data by dividing the actual sales tax revenue data by the seasonal component (Y_t / S_t).

The last step of the classical multiplicative model requires trend component (T_t). In order to find the trend component, we run a simple linear regression where the dependent variable is denoted as Y_t / S_t . The coefficients of the regression then are used to calculate the trend component. For this, the intercept in the regression analysis (Y) is multiplied by the coefficient time variable (X) and multiplied by time (coded from 1 to 56, one unit per quarter). The final step is to find the forecasted/ predicted value for each year by multiplying the seasonal component by the trend component ($S_t * T_t$). The results of the difference between the actual and predicted values are stated in table 2.

Table 2. Difference between actual and predicted sales tax revenue

Year	League City		Pearland		Sugar Land	
2001	\$ 176,610	14%	\$ -16,316	-1%	\$ -387,441	-6%
2002	\$ -124,237	-11%	\$ -222,745	-13%	\$ -502,950	-10%
2003	\$ 44,456	2%	\$ -29,527	-2%	\$ 1,030,941	14%
2004	\$ 168,697	12%	\$ -80,883	-3%	\$ -823,781	-12%
2005	\$ 24,452	0%	\$ 305,231	10%	\$ 909,956	10%
2006	\$ 469,466	27%	\$ 154,412	4%	\$ 305,959	2%
2007	\$ 217,206	10%	\$ 167,446	4%	\$ -371,863	-6%
2008	\$ 588,710	23%	\$ 604,639	12%	\$ 74,258	-1%
2009	\$ -265,504	-13%	\$ -789,222	-18%	\$ -702,610	-9%
2010	\$ -814,484	-28%	\$ -99,253	-2%	\$ -777,917	-9%
2011	\$ 73,281	2%	\$ -262,336	-6%	\$ 493,719	5%
2012	\$ 246,482	3%	\$ 517,388	9%	\$ 674,401	4%
2013	\$ -228,172	-7%	\$ -234,210	-4%	\$ 193,078	1%

Source: Texas Comptroller's Office 2000- 2013

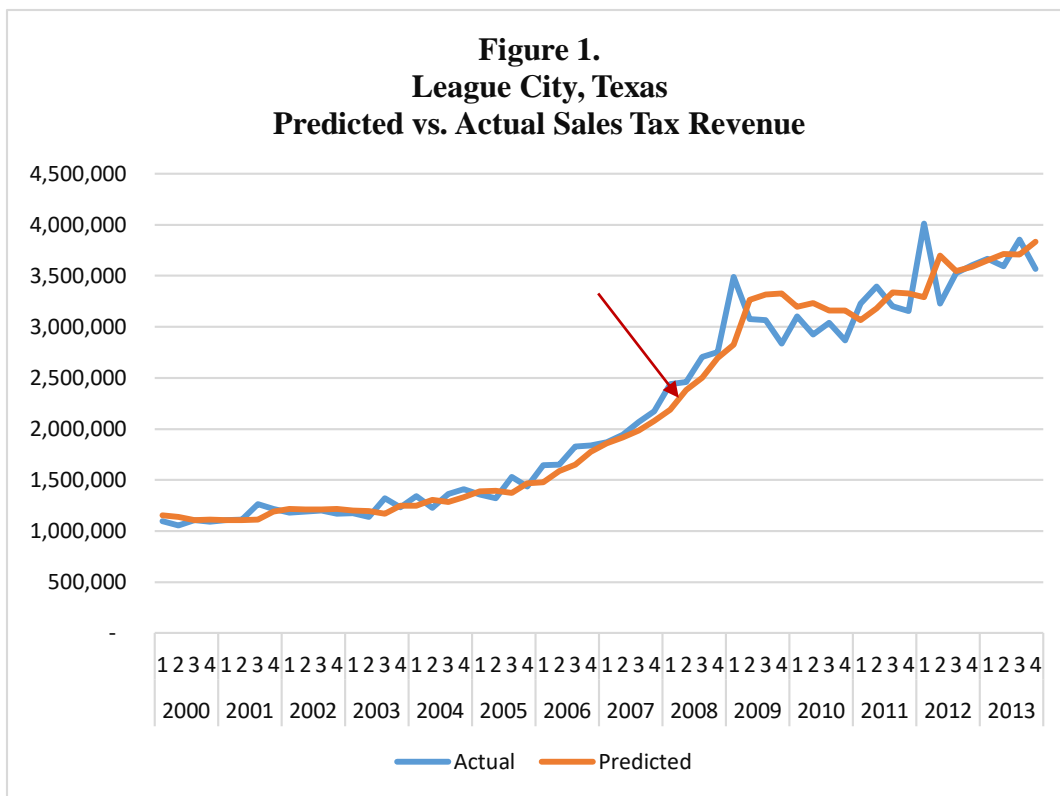
RESULTS AND DISCUSSION

Analysis of graphs indicate that there is in fact change in sales tax revenue. The analysis indicates the difference between actual and predicted amount of sales tax revenue. It is important to keep in mind that the disaster occurred in the third quarter of 2008. The results of our Time Series Forecasting indicate that there is a surge in sales tax revenue after Hurricane Ike for the Cities of League City and Pearland. However, the City of Sugar Land shows a steady growth in sales tax revenue.

Sales tax revenue of League City from 2000 to 2008 experienced a long term steady increase. However, it is noticed that there is surge in sales tax revenue for two quarters after Hurricane Ike, but then the sales tax revenue experiences a sudden decrease which lasts for almost two years (2009 to 2010). Based on the results, it is noted that Hurricane Ike has a positive short term impact on sales tax revenue on League City. The long term effect, however,

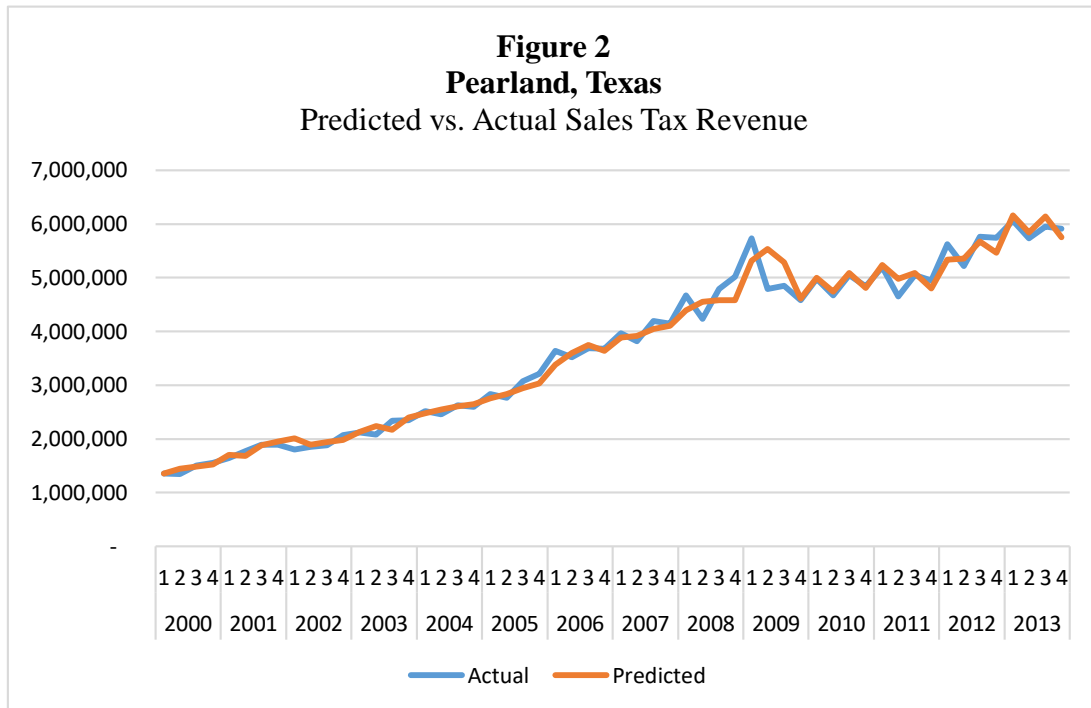
is negative, whereby steady long term growth of sales tax revenue is interrupted by the natural disaster.

To further understand the effect of the disaster on League City sales tax revenue, actual and predicted amount of sales tax revenue is calculated for the city. The percentage difference between actual and predicted amount of revenue before the disaster is 10.4 percent and after the disaster there is an increase of 19 percent in sales tax revenue. An immediately surge after the disaster is noticed, however long- term two-year revenue loss in ranges between 6 to 17 percent. Furthermore, it is important to note that after the Great Recession of 2008, the national economy experienced shortfall, which could have affected the decline in sales tax revenue for League City between 2008 and 2010.



The City of Pearland also experienced surge in sales tax revenue after Hurricane Ike. While the city sales tax revenue has been steadily growing between years 2000 and 2008, after the disaster occurred in September 2008, sales tax revenue soared for three quarters. The city experienced growth in sales tax revenue that it has not experienced before the disaster. While the short term surge in sales tax revenue lasts three quarters, the long term impact of the disaster lasts for two years. However, sales tax revenue does not decline as much as we noticed in League City. To clarify, sales tax revenue declines 15 percent in the fourth quarter after the disaster and continues to decline at a slow rate between 0.5 to 7 percent. The results indicate that the disaster has a major positive short term impact and minor negative long term impact on the

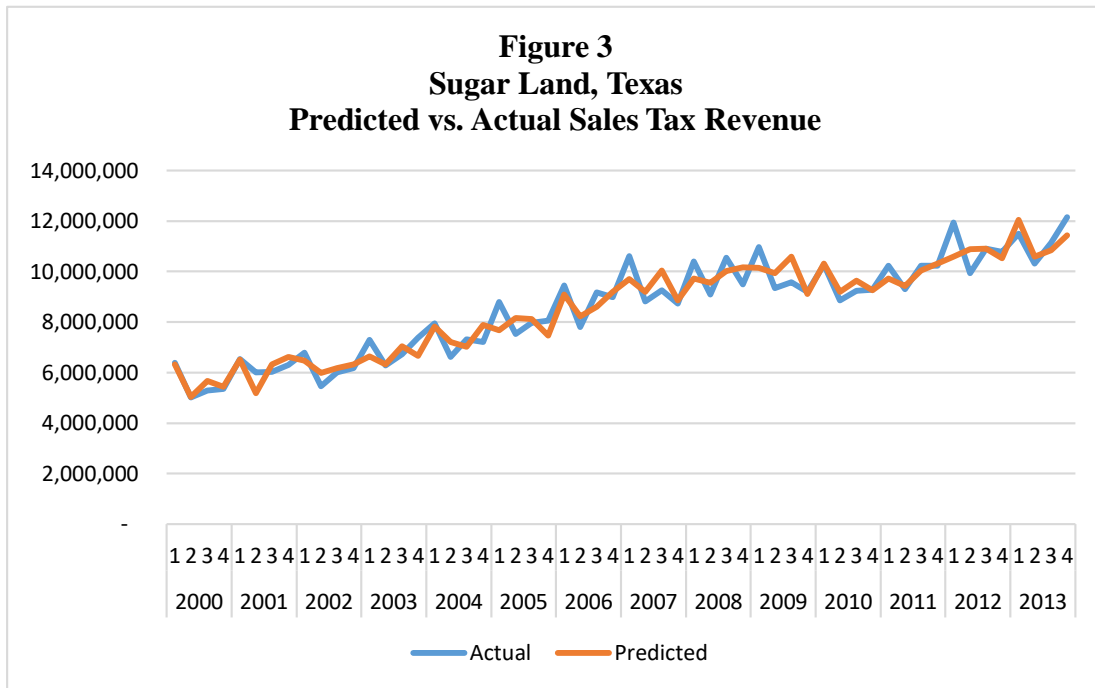
city. Again, it is important to keep in mind that the economic recession could have affected the sales tax revenue.



The City of Sugar Land, also experiences long term steady growth between 2000 and 2008. However, after the disaster, the city sales tax revenue does not surge as it does in cities of League City and Pearland. Instead, sales revenue continues to grow for the first two quarters after the disaster then it decreases. Decrease in sales tax revenue continues for two years, then it increases in the fourth quarter of 2011. Moreover, before the disaster, the city sales tax revenue experienced seasonal decrease of 1.47 to 7 percent in revenue. However, after the disaster, sales tax revenue decreases by almost 11 percent. Furthermore, the city sales tax revenue experiences highest of 1 percent growth in two years after the disaster. The evidence shows that Sugar Land sales tax revenue after the disaster does not increase. On the contrary, sales tax revenue experiences a long term decline.

Previous researchers have argued that natural disasters have a short term or long term impact on an economy. Based on time series analysis we conclude that natural disaster in fact have both, short term and long term impact on local government sales tax revenue. The results show that short term impact lasts two to three quarters. However only two cities in the sample shown this to be true. Similarly, we notice that long term impact lasts almost two years. The pattern for all three cities suggests that sales tax revenue after the disaster either increases or continues to grow at same phase for two or three quarters then declines for almost two years. Thus, based on this analysis we learn that, on average, long term impact of disasters on local government sales tax revenue lasts two years. We conclude that disasters do not provide positive

long term impact on local government revenue. However, it is equally important to note that financial recovery and return to normalcy lasts two years.



While this research does not go in depth of discussing how cities recover after the disaster, we are able to provide evidence of the impact of disasters on sales tax revenue. It is important to keep in mind that cities could have adopted different policies and strategies to attract businesses. For example, as part of economic development strategy municipalities provide tax incentives to increase revenue. Nonetheless, the process of attracting industries and businesses could take up to few years.

CONCLUSION

The main purpose of this study is to find the effect of disasters on local government revenue. Economics literature argues that effect of disasters on an economy is can be positive and negative. While the economists usually study national GDP of countries to determine the effect of disasters, this study investigates effect of disasters on sales tax revenue on local government level. While disasters have negative effect on national economy, local governments also experience hardships after disasters. Yet, few studies have investigated the effect of disasters on local government revenue. This study investigates the effect of natural disasters, specifically Hurricane Ike, on local government economy of cities located in Houston- Woodland- Sugar Land metropolitan region. Local government economy is operationalized as sales tax revenue and time series forecasting analysis is adopted to study the phenomenon.

The cities that are investigated are League City, Pearland, and Sugar Land. The author chose these cities because they have similar demographic, socio-economic, and sales tax rate characteristics. All three cities were affected by the third most costly natural disaster in the history of the United States. Time series forecasting method is adopted to analyze the effect of the hurricane on local government sales tax revenue. The results indicate that for two cities, League City and Pearland, there is an average increase of sales tax revenue for almost three quarters followed by long term decrease of revenue that lasts two years. On the other hand, Sugar Land sales tax revenue indicates minor decline in revenue immediately after the disaster. Yet, findings indicate similar results whereby it took almost two years to return to normalcy. Hence, the results indicate that Hurricane Ike had a positive and minimal immediate effect on sales tax revenue followed by long term two years of decline revenue.

The findings of time series forecasting highlight that disasters' effect on sales tax revenue differs among cities. The three cities examined in this study have different changes in sales tax revenue immediately after the disaster occurred. However, the long term impact of Hurricane Ike on sales tax revenue that lasted almost two years suggests that disasters in fact have a negative effect on local government revenue. Theoretically, the results of findings argue that disasters have a negative effect on local government sales tax revenue that lasts almost two years. Researchers in the fields of public finance, emergency management, and economics should further study the effect of disasters on local government economy. The main finding of the study is the duration of the effect of the disaster on sales tax revenue. Practitioners should therefore prepare their local governments for possible decline in sales tax revenue that last almost two years. Meaning, proper mitigation, economic preparation, and economic recovery policies should be adopted so local governments recover faster.

There are weaknesses to this study. Only three cities that are located in the same metropolitan area within the same state are analyzed. Furthermore, only one type of disaster is analyzed in the study. While all three cities are located in the same metropolitan region, the sales tax rate differs among the cities. League City and Sugar Land both have 8.25 percent sales tax rate, while Pearland has 8.00 percent sales tax rate. Lower sales tax rate could cause spillover of shoppers from neighboring cities. Similarly, the Great Recession of 2008 could have had an effect on sales tax revenue in the selected cities. However, this study only analyzed three cities with similar socio-economic characteristics, but the results cannot be applicable to all cities in the United States. Future research of the author will include over 50 cities analyzed based on five major types of disasters in the state of Texas to make the study more generalizable. Yet, the author recommends that scholars look into the effect of natural disasters on local government revenue in other regions of the United States.

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