Penalties for Foodborne Illness: Jury Decisions and Awards in Foodborne Illness Lawsuits

Omchand Mahdu
Graduate Student, Virginia Polytechnic Institute and State University
Email: omchand4@vt.edu

Kathryn A. Boys
Assistant Professor, Department of Agricultural & Applied Economics
North Carolina State University
Email: kaboys@ncsu.edu

Dr. Leon Geyer
Professor, Virginia Polytechnic Institute and State University
Email: geyer@vt.edu

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Abstract

This study examined how various case attributes impact plaintiff success and payouts in jury settled FBI lawsuits. Given the risk to firms in terms of potentially large payouts, future litigation, and lost reputation, the results may provide economic incentives for food firms and others in the supply chain to produce safer and better quality foods. Reviewing the outcomes of 511 FBI jury trials between 1979 and 2014, plaintiffs won approximately 35 percent of the cases, receiving a median award of $32,264. The Heckman two-step estimation procedure was used to examine the effects of various factors on plaintiff success rates and subsequent amounts awarded. Plaintiff chances of victory increased if lawsuits involved a child, foodborne pathogen was identified and pain and suffering was claimed, and decreased if defendants used of one or more expert witnesses or had "deep pockets". Cases involving a child, chronic complications, or defendants with "deep pockets" resulted in higher awards. Corporate and policy implications of these findings are considered.

1. Introduction

It is estimated that 48 million instances of foodborne illnesses (FBI) occur in the U.S. each year that result in 128,000 hospitalizations and 3,000 deaths (CDC, 2012). The economic loss in terms of medical costs, productivity losses, and illness-related mortality arising from FBI is enormous. The estimated cost of illnesses attributable to 15 FBIs in the United States amounted to $15.6 billion annually (USDA-ERS, 2014).[1] Importantly, these estimates do not include transaction and information costs associated with legal fees, court-filing fees, expert testimony, travel costs or any monetization of the emotional distress associated with the illness.

The impact of FBI on firms is also significant. The costs of FBI incidents to an operation include an increase in negative publicity and media attention, lawsuits and legal fees, increased insurance premiums, staff absences, employee retraining costs and a decrease in customers and sales, reputation and staff morale (National Restaurant Association, 2015). Furthermore, unsuccessful defense by food firms and their insurers against FBI lawsuits may lead to jury or settlement awards that not only impact the firm's profitability but may also open the door to other potential lawsuits.

Under US product liability law, consumers harmed by unsafe products, including food contaminated with microbial pathogens, can take legal action to obtain compensation for their injuries. Those affected by FBI can seek remedy for their illness from firm(s) involved directly or indirectly (i.e. food safety audit firms) with the affected food product. Implicated firms may opt to settle out of court or, where a resolution can not be reached, injured parties may pursue settlement through a court trial.

[1] These values are conservative. These values are based on estimates of illnesses caused by one of 31 identified pathogens and thus does not account for the many illnesses caused by unidentified agents. Further, using a basic cost-of-illness model, Scharff (2012) estimated that the aggregate costs of FBI in the United States amount to $51 billion annually. These estimated cost increased to $77.7 billion annually after values for pain, suffering, and functional disabilities were monetized and included.

Despite its economic implications to both individuals and businesses, limited research has been undertaken to examine outcomes in cases involving FBI injury. This has been due, in large part, to the limited information available. Information about out of court settlements is not publicly available. Public court records, however, can be examined to gain insight into the penalties imposed in FBI cases. To date there has been only one study, which has examined this issue. Busby et al. (2001) studied FBI jury verdicts in 32 states from 1988 through 1997 to determine the effects of defendant, plaintiff and lawsuit characteristics on product liability case verdicts and amounts awarded. From among the 175 cases examined, they found that 31.4 percent resulted in some compensation paid by firms with a median award of $25,560 (1998 dollars). The ability of plaintiffs to link their illnesses to a specific pathogen was found to increase plaintiff chances of victory; more severe illnesses that resulted in hospitalization, chronic complications, or death resulted in higher awards. Defendants with "deep pockets", or those that used medical expert testimony decreased the odds of a plaintiff victory (Busby et al. 2001).

This study updates and expands these issues by examining jury trial outcomes from FBI cases throughout the U.S. Recent high-profile cases of FBI, increased regulatory action, and improvements in traceability practices have changed public perception and expectations concerning food firm safety performance. As such, it is anticipated that the amount of financial awards in FBI cases have increased in recent years. Further, due to increased consumer awareness and general understanding of FBI, and changes in food distribution, processing and traceability technologies, it is anticipated that the (relative importance of) factors, which affect these outcomes, will also have changed since Buzby et al. (2001).

This study proceeds by presenting a general overview of FBI, product liability law and its intersection with food safety and economics. Data and methods employed are subsequently discussed with emphasis on the data source, collection and the econometric method used in the analysis. This is followed by a discussion of the results generated. The final section includes a discussion of the overall implications of the findings while identifying possible limitations and opportunity for future research.

2. Review of Literature

At the turn of the 20th century, the majority of consumers ate home-cooked meals prepared from locally produced meat and vegetables. More recently, continued improvements in understanding of food and beverage spoilage, coupled with the development of new processing technologies, led to the proliferation of processed foods (Satin, 2007). These factors, combined changes in away-from-home food consumption behaviors (Satin, 2007), and advances in food logistics, transportation, storage and packaging technologies, have changed the mix of causes, and extent of potential impact of an incident of FBI.

Types of Foodborne Pathogen Identified and Tracked

There are more than 250 pathogens including bacteria, parasites, viruses, fungi and their toxins that are known to cause FBI (CDC, 2013). Currently, 31 pathogens are known to cause FBI many of which are tracked by public health systems. In addition, unspecified agents encompass agents whose health effects or symptoms are most likely to cause acute gastroenteritis but are not tracked. Such agents include those for which there is insufficient data to estimate specific burden; known agents not yet identified as causing foodborne illness; microbes, chemicals, or

other substances known to be in food whose ability to cause illness is unproven; and agents not yet identified (CDC, 2011).

Surveillance of FBIs is an important part of identifying opportunities to improve overall food safety and reduce morbidity and mortality. According to Gould et al. (2013), outbreak surveillance provides valuable insights into the foods, germs, and settings linked to foodborne diseases. In the U.S., there are many surveillance systems that play a role in detecting and preventing foodborne disease and outbreaks (CDC, 2015). In particular, the CDC uses the national surveillance system PulseNet to detect and define outbreaks. PulseNet is a sophisticated outbreak detection system that compares the 'DNA fingerprints' of bacteria from patients to find clusters of disease that might represent unrecognized outbreaks (CDC, 2013).

Among the numerous surveillance systems the CDC provides leadership over, the Foodborne Diseases Active Surveillance Network (FoodNet) is the principal foodborne disease component of the CDC's Emerging Infections Program (CDC, 2015). It estimates the number of foodborne illnesses, monitors trends in incidence of specific foodborne illnesses over time, attributes illnesses to specific foods and settings, and disseminates this information and provides a foundation for food safety policy and prevention efforts. Table 1 presents the estimated annual foodborne illnesses, hospitalizations and deaths due to selected pathogens, United States, 2011.

[Insert Table 1 Here]

While the number of verified FBI cases is substantial, these values significantly underestimate the total incidence of FBI. Many individuals did not seek treatment for FBI, their illness may be misdiagnosed, or their health care professional may not make a specific diagnosis and as such a vast majority of FBIs are never reported to local, state and or federal agencies (Knechtges, 2012). In addition, each state decides which FBI should be under surveillance in

that state (CDC, 2014). As a result, infection due to a particular FBI causal agent will go unreported if it is not tracked or if state medical treatment was not sought. Also, infections with some microbes such as norovirus are not reported unless they are associated with a recognized outbreak (CDC, 2014).

Causes of Foodborne Illness

There are a wide variety of causes because almost any food can become contaminated at any point from where it is grown or raised to where it is consumed (Nakaya, 2012). Food handling errors in food production, distribution, storage and preparation allow contamination of foods, may not remove or may introduce foreign objects/matter such as bones or metals, and may permit environments that allow the survival and/or proliferation of etiologic agents. Specific mechanisms by which foods may become contaminated or permit pathogenic organisms already present in raw foods to survive include cross contamination of prepared foods by contaminated raw food, poor personal hygiene by infected food handlers, inadequate cleaning of equipment, inadequate cooking or reheating, improper holding temperatures, cooling food too slowly after heating, eating food too long after preparation and insufficient fermentation, acidification, salting or sweetening during processing (Bryan etal. 1997). Many FBIs are attributed to sequential errors made by food firms and consumers where food initially contaminated somewhere along production and distribution is in turn improperly handled by consumers (Busby et al. 2001).[2]

Characteristics of Foodborne Illness

[2] For example, fresh produce packagers that failed to prevent pre-package salads from being contaminated by *Salmonella* bacteria, and consumers that subsequently fail to wash the lettuce leaves, causing those who eat the salad to become ill.

Clinical conditions associated with FBI include diarrhea, vomiting, or other gastrointestinal manifestations such as dysentery (Lindsay, 1997). Knechtges (2012) noted that most FBI cause self-limiting or nonfatal conditions. However, non-specific symptoms and neurologic symptoms may also occur (MMWR, 2004). Severe complications such as bloody diarrhea and kidney failure can lead to death or permanent health problems including end-stage kidney disease, neurological complications and insulin-dependent diabetes (Smith, 2012). In other instances, FBI can lead to neural and neuromuscular disorders (Lindsay, 1997) and may transmit through pregnancy leading to stillbirths or babies born with mental retardation (Busby et al. 2001). Symptoms of FBI depend on the source, and can range from mild to serious lasting from a few hours to several days. Characteristics of a specific case of FBI may affect the extent of legal liability for illness and injuries sustained by consumers.

The amount of time that elapses between ingesting a pathogen and the appearance of the first symptoms of an illness (the incubation period) is particularly important to identifying and assigning fault in FBI cases. The incubation period for most FBIs can range from several hours to several weeks depending on the type of pathogen. In FBI lawsuits, the incubation period plays a crucial role in identifying the pathogen responsible for the illness claimed. Busby et al. (2001) found that lawsuits in which a specific foodborne pathogen had been identified had a statistically significant effect on plaintiff's chance of winning. Since illness could have been triggered by a variety of other causes, a plaintiff's ability to make this identification rests on whether they can show that his or her symptoms are consistent with the incubation period of a specific pathogen. Failure to show that their symptoms are consistent with the incubation period of the pathogen implicated may result in a weaker case.

Mass FBI Outbreaks

Changes in human demographics and food preferences, coupled with changes in global food production and distribution systems, microbial adaptation, increase integration and consolidation of agriculture and food production has created many opportunities for contaminated food to be distributed over a wider geographic area thus leading to outbreaks (MMWR, 2004). The CDC defines a foodborne-disease outbreak (FBDO) as an incident in which two or more persons experience a similar illness resulting from the ingestion of a common food. Mead et al. (1999) noted that the majority of FBIs are not detected as part of an outbreak. Illnesses that are not part of an outbreak are called "sporadic" (CDC, 2013).

Outbreaks in FBI can range greatly in size and distribution of cases (Knechtges, 2012), and any of the more than 250 pathogens and toxins known to cause FBI can trigger an outbreak (CDC, 2013). Local outbreaks may typically involve a common meal or food item from a common place in the local community, while larger outbreaks can occur as part of a wider distribution of the same food item(s) across large areas (regions, states). In 2013, more than 220 food poisoning or related clusters across the U.S. were investigated. This resulted in 50 confirmed or suspected vehicles of transmission, and recalls of a variety of foods (CDC, 2014).

FBI lawsuits involving outbreaks are typically easier for plaintiffs to establish the proximate cause because evidence of multiple injuries resulting from a common source would serve to validate the claims made. Examples of such situations may include claims relating to a FBI outbreak attributed to a particular restaurant, cruise ship, or a common food source. In addition, plaintiffs also benefit from key findings relating to a public health authority's investigation of FBI outbreaks. Public health officials are often called upon to provide expert testimony concerning the outcome of their investigations.

Medical Diagnosis and Treatment

One of the difficulties in diagnosing the actual cause of FBI is the fact that numerous pathogens can induce similar symptoms especially diarrhea, abdominal cramps, and nausea. Due to the similarity in symptoms, with the exception of illness recognized as part of an outbreak, it is often challenging to pinpoint the pathogen responsible for a given illness without laboratory tests (MMWR, 2004). Kass and Reimann (2006) noted that even with modern, sophisticated techniques, approximately half of all outbreak investigations failed to implicate a cause. Failure of identification may occur because the agent is truly unknown (Mead et al. 1999) or because of inaccurate laboratory procedure or mishandling of samples (Kass and Reimann, 2006).

Most FBIs are acute in nature and most people recover on their own without medical treatment. As a result, only a fraction of those who experience gastrointestinal tract symptoms from foodborne illness seek medical care (MMWR, 2004). Those who do seek medical care and submit specimens for testing are more likely to be diagnosed with a bacterial infection even though viral, parasitic and chemical infections are also common causes of FBI (MMWR, 2004).

Medical diagnoses of FBI that is mild in nature and last only a few days do not usually require testing. However, more serious bouts of illness may be subject to differential diagnosis and/or clinical microbiology testing. Because many FBIs exhibit similar symptoms, physicians and other trained medical professionals use differential diagnosis to systematically identify the actual cause, or to eliminate potential causes. The extent of diagnostic evaluation depends on the clinical signs, the differential diagnosis considered and clinical judgment (MMWR, 2004). In terms of microbiologic testing, culturing stool samples are used to identify bacteria, while examining stools under a microscope can identify parasites. Routine laboratory testing may not

identify many specific foodborne infections. Thus, specialized, experimental, and expensive tests that are not generally available may be required for some diagnoses.

Treatment of FBI caused by bacteria, viral, and parasitic infections depends on the clinical signs and symptoms, the indicated organism detected in clinical specimens, antimicrobial susceptibility tests and the appropriateness of treating with an antibiotic (MMWR, 2004). Symptoms that are primarily mild or moderate (diarrhea and vomiting) may result in dehydration, and may require replacing lost fluids and electrolytes through oral rehydration (CDC, 2014). Intravenous therapy may be required for more severe dehydration (MMWR, 2004). In infants and young children, special care should be taken to avoid serious adverse effects of antidiarrheal medication. For FBI caused by chemicals and toxins, supportive care is usually advised (MMWR, 2004).

Foodborne Illness and Health Impacts

The majority of people that suffer from FBI usually make a full recovery without any lasting effects from their illness. The long-term effects of FBI however, can be life changing as several pathogens or their toxins are capable of triggering chronic diseases including permanent tissue and organ damage, which may lead to disability and death. For instance, Moss (2009) relates the story of a consumer that initially experienced stomach cramps and diarrhea but eventually suffered from bloody diarrhea, kidney failure and convulsions after consuming a hamburger infected with *E. coli.*

Consumers with weakened or undeveloped immune systems are less capable of fighting off infections such as FBI. Among those that are considered highly susceptible populations are infants and children, the elderly, pregnant women, and immune suppressed individuals.

According to the Morbidity and Mortality Weekly Report (MMWR), the incidence of infection caused by nearly all tracked pathogens was highest among children under 5 years old, and adults 65 years and older (CDC, 2014). Importantly, vulnerable people are at an increased risk of contracting a foodborne illness, experience the illness more severely and for a longer duration. Such individuals are thus more likely to require hospitalization or even die from FBI (FDA, 2013). Additionally, a number of chronic sequelae[3] may result from foodborne infection complications (Lindsay, 1997) including rheumatoid disease, inflammatory bowel syndrome (IBS), haemolytic uraemic syndrome (HUS), Guillain-Barre syndrome (GBS), and autoimmune thyroid disorders. Table 2 presents a summary of severe acute complications and long-term consequences of selected foodborne pathogens.

[Insert Table 2 Here]

Food Safety Standards and Certifications

Concerns related to food safety scandals over the last two decades coupled with changes to the structure of the global food market and consumer demand for safer food have led to the development of many public and private standards on food safety and quality. Public and private food safety standards establish controls and conformance in the production, transport and processing of food (Henson and Humphrey, 2009). Food safety standards may be classified as numerical standards defining required characteristics of food products such as contaminant limits or maximum residue limits, process standards that define how food should be produced including verifiable performance objectives and process standards that define the requirements of the management system such as documentation requirements (Clarke, 2010). In many cases public

[3] Any abnormal condition resulting from FBI

food safety standards lay down the basic parameters of a food safety system, while private food safety standards elaborate on what this system should encompass in order to be effective (Henson and Humphrey, 2009). Regardless of the type of standard or application, a common goal is to reduce the incidence of FBI.

Private food safety standards are developed and owned by non-governmental entities (Liu, 2009) and are often considered more stringent and extensive than public standards. Such standards aim to facilitate supply chain management within an increasingly globalized and competitive international food market (Clarke, 2010). The main purpose of private food safety standards is to clearly assign legal responsibility to food chain operators for ensuring food safety, increasingly global and complex supply chains, and increasing consumer awareness of food and food systems and their impact on health and, in particular, on food safety.

Additionally, individual food firm standards are both developed and adopted by private food companies, predominantly, major food retailers and food service companies (Henson and Humphrey, 2009). For example, Walmart implemented a standard that require all deli meats to be produced with a natural inhibitor that ensures listeria could not grow to more than a log during the product's shelf-life (Lupo, 2013). Food standards set and adopted by individual food firms, tend to be used to distinguish these firms on the market (Clarke, 2010).

Economic Costs of Foodborne Illness

The economic costs of FBIs encompass cost incurred by victims and their families, food firms and third parties. Busby et al. (2001) posited that because most FBIs are mild in nature, thus requiring no medical care, the economic cost incurred by ill consumers and their families are likely to be small. However, more severe illnesses can lead to significant monetary losses due to

medical costs, productivity losses as well as non-monetary losses such as pain and suffering (Busby et al. 2001). Henson and Traill (1993) distinguished between tangible and intangible costs of FBI. Tangible costs entail direct monetary measure such as employment loss, travel, doctors visit, medicine, costs of hospital care, and in the case of outbreaks, the administrative costs of setting up a system for investigating, managing and publicizing outbreak information (Riston and Mai, 1998). On the other hand, intangible costs entail such costs related to the value of loss of leisure and life, which are more difficult to aggregate (Riston and Mai, 1998).

Perhaps of greater importance is the social cost that falls outside the individual consumer affected by FBI. Swinbank (1993) noted that such cost include (1) losses in production over and above the income loss incurred by the suffer, (2) state-funded medical and hospital expenses, over and above those directly borne by the sufferer, and (3) pain and distress suffered by others that sympathize with the sufferer. While identifying these cost sources may seem forthright, determining the costs incurred by each is difficult to ascertain because of costs shifting between parties. Busby et al. (2001) highlighted that costs shifting include insured medical expenses being shifted to private or public insurers; health care providers absorbing uninsured medical expenses as a business loss; time lost from work due to sick leave becomes costs of employers and medical expenses covered under government health plans are picked up by tax payers. As a result of these cost shifting options, consumers and their families bear little out of pocket expenses and hence are less incline to seek compensation from responsible parties.

There is also the cost associated with someone infected with a FBI that becomes a risk to the wider community. For instance, some infected with Hepatitis may inadvertently infect unsuspecting restaurant patrons. FBI also affects market movements and prices. Consumers react to news of FBI by changing their buying patterns and reducing consumption of implicated

product (Palma et al. 2010). As a result, the reduction in sales may lead to market movement shutdown in the short run. Voluntary and involuntary food recalls also contribute to the economic cost of FBI. Although some food firms may possess recall insurance, the costs incurred by insurers are also relevant. Table 3 present the cost estimates of 15 foodborne pathogens.

[Insert Table 3 Here]

Products Liability and Foodborne Illness

A person injured by a defective product that is unreasonably dangerous or unsafe may have a claim or cause of action under product liability law. The injurer may be liable to the injured person for his or her medical costs and other related expenses, lost income, pain and suffering and may be required to pay damages. In the case of FBI, legal action may be pursued against firms that produce, process, distribute, cook, or sell the food product that allegedly caused the illness.

In FBI product liability litigation the plaintiff(s) carry the burden to prove that the defendant food firm committed wrongful acts that caused harm (Connally, 2009). As such, plaintiff(s) must prove that the product was defective and unreasonably dangerous when it left the food firm's control and that the defect was the proximate cause of the plaintiff's injury (Harl, 1997). Proximate or actual cause refers to a factor without which a result in question could not happen (Legal Information Institute, 2015). Thus, proximate cause seeks to link a specific food product to the FBI or injury claimed.

Central to showing proximate cause is the concept of causation. Plaintiff(s) in FBI lawsuits must show that the food in question caused rather than was simply correlated with their

illness. Causation demonstrates that the adulterated food was the actual cause of the FBI suffered; in comparison, correlation only infers that the food in question shares some kind of relationship with the FBI. In the absence of specific evidence of causation, plaintiff(s) often fail to show that the food in question had directly and proximately caused their illness and as such usually results in the plaintiff(s) meeting the burden of proof that their FBI was attributable to food produced by the defendant firm.

Market Forces

Although product liability can induce firms to improve product safety, firms are often motivated by market forces to enhance product safety because sales can decline if their products harm consumers (Polinsky and Shavell, (2010). By way of example, in the case of juice manufacturer Odwalla, sales of natural juices declined by 90 percent in 1996 due to *E. coli* bacteria contained in some of its products (Polinsky and Shavell, 2010). Following the FDA advise against eating fresh and bagged spinach, U.S. spinach producers experienced a complete lost of sales following an *E. coli* outbreak in 2006 (ERS, 2012). Thus, the threat of loss of sales has led to a market driven effort to provide safe food (ERS, 2012)

While market forces play a crucial role in the current and future performance of food firms at fault for food safety issues, the impact can be even more frequently extended to the same or other firms downstream in the supply chain and/or in related industry (Carrol, 2009). Food contamination at a food firm whose products are used in the manufacture of other products can create a domino effect. As a result, firms may oftentimes incur significant costs relating to product recalls in order to stave off potentially greater loses due to market forces.

Food firms whose products are wrongly implicated in FBI outbreaks may also suffer lost

reputation and financial loses linked to recalls and consumption changes. The domestic strawberry industry was twice affected in 1996 and 1998. Prevor (2007) noted that strawberries wrongly implicated in a *Cyclospora* and Hepatitis A outbreaks were later traced to imported raspberries and strawberries respectively. Both cases resulted in loss of sales and the industry reputation being damaged (Prevor, 2007). Furthermore, tomatoes wrongly implicated in a 2008 *Salmonella* outbreak that was ultimately linked to fresh jalapeno and Serrano peppers was costly to the tomato industry (Schnirring, 2008).

Food Safety Laws and Regulations

In the United States, food safety regulations exist at the federal, state and local levels. At the federal level, food safety is seen as shared responsibility of more than 15 federal agencies (Knechtges, 2012). In particular, agencies under the United States Department of Agriculture (USDA) and the Department of Health and Human Services (HHS) have primary responsibility for the safety of the nation's food supply. Table 4 presents a summary of federal agencies responsible for food safety.

[Insert Table 4 Here]

The authority and responsibilities of these agencies are rooted in multiple federal laws, which were frequently enacted in response to historical food safety concerns. The Pure Food and Drugs Act and the Meat Inspection Act of 1906 are the earliest examples of U.S. national consumer food protection legislation (FDA, 2014). Since the late 1930s, there have been numerous laws addressing a myriad of food safety concerns ranging from pesticide residues to

food and color additives.[4] Mounting concerns over FBI outbreaks in the last two decades, however, led to the enactment of the Food Safety Modernization Act (FSMA) of 2011. FSMA is the most comprehensive food safety legislation in the U.S. to date. The overall goal of FSMA is to achieve higher rates of compliance with preventative and risk-based food safety standards and to better respond to and contain food safety problems as they occur (FDA, 2014). The law enables the FDA to better protect public health through the strengthening of the food safety system by focusing more on preventing food safety problems rather than reacting to them. FSMA mandates the FDA to establish science-based, minimum standards for the safe growing, harvesting, packing and holding of produce on farms to minimize contamination that could cause serious health consequences or death (FDA, 2014).

At the local level, food safety efforts are focused on restaurants and other retail food establishments. There are more than 3000 state, local and tribal agencies that have primary responsibility to regulate the retail food and foodservice industries in the U.S. (FDA, 2015). Although most foodservice regulations are written at state levels with guidance from the FDA Food Code, local health departments facilitate enforcement of such regulations. These regulations often require inspection by city, county, or state inspectors to ensure that local food establishments are in compliance with regulatory requirements as it relates to design, construction, and maintenance of buildings, cleaning and sanitation, utilities and waste management services, equipment and utensils, food handling best practices, and food handler certification (Fraser, 2003).

Insurance and Foodborne Illness

The insurance industry is a key consideration in determining consumers overall propensity to

[4] Examples: The Federal Food, Drug, and Cosmetic Act of 1938; Fair Packaging and Labeling Act of 1966; Federal Meat Inspection Act of 1967; Wholesome Poultry Products Act of 1968; Eggs Product Inspection Act of 1970; Food Quality Protection Act of 1996 etc.

pursue litigation. Although product liability compensates victims of product-related accidents for their losses, this benefit is only partial since insurers frequently compensate victims (Polinsky and Shavell, 2010). Private or public insurance may cover a variety of expenses such as medical, disability, loss of life, and property damage resulting from accidents, including those related to products. In addition, individuals benefit implicitly from public insurance against accidents through the ability to deduct causality losses and medical expenses from taxable income. Polinsky and Shavell (2010) contend that such deductions themselves function as insurance because they reduce the loss that a person suffers from an accident.

While private and public health care insurance are expected to provide coverage for consumers during times of illness, product liability insurance is expected to provide coverage to risk averse firms whose products enter the marketplace. To mitigate the risk associated with product liability, manufacturers, wholesalers, retailers, restaurants, bottlers, packagers and any firm involved in products reaching the public procure product liability insurance. Development of product liability insurance protection began to rise to prominence in the late 1930s due to the development of modern tort theories of products liability and with the passage of time evolved as a means of managing the costs of lawsuit risks (Harvey, 1980). Shapiro (1991) and Busby et al. (2001) noted that firms obtain insurance coverage as part of their risk management strategy.

Transaction and Information Costs

High transaction and information costs create disincentives for plaintiffs to pursue lawsuits and/or decide to settle instead of exhausting considerable resources under a trial. Payments may be distorted since defendants may choose to settle wholly illegitimate claims simply because the costs of litigation exceed the settlement payments (Kozel an Rosenberg, 2004).

Viscusi (1989) argued that high transaction and information costs of tort liability leads to an underproduction of health and safety in the United States. Busby et al. (2001) relate that a similar case can be made for FBI since high transaction and information costs often discourages victims of FBI from seeking restitution through the courts. The likely outcome is that food firms receive limited feedback and are rarely penalized for producing unsafe food. Consequently, without appropriate incentives, food firms are less inclined to adopt better operational practices and they may be generating sub-optimal levels of food safety.

3. Data and Methods

Due to the absence of a comprehensive national recording system, Busby et al. (2001) noted that the actual population of FBI product liability cases in the United States is unknown. In particular, information on FBI product liability cases dropped or settled out of court is not available due, in part, to confidentiality agreements usually agreed to by the parties involved. Skoppek (1989) noted that settlements to avoid astronomical awards, regardless of the fault, are closely guarded by corporate attorneys; this further complicates the difficulty involved in gathering information on out of court settlements.

In the absence of a national system that documents product liability cases, this research made use of the two most complete and widely used sources of this type of data: Westlaw Jury Verdicts and Settlements database (West Group, Inc., Eagan, Minnesota) and the Lexis Nexis Verdicts Library (Reed Elsevier PLC, London) to identify FBI cases legal resolution through the court system. Both databases included descriptive summaries of civil jury verdicts and are the most widely used with complete sources of information of this type. The data set developed by Busby et al. (2001) (1988 -1997) was updated to include FBI cases that reached legal resolution through the court system from 1979-1987 and 1998-2014. Database searches also included years

from the original study to capture any additional cases for which information was released subsequent to the original data collection period.

Searches were conducted of the WestLaw and Lexis Nexis databases in order to identify and collect FBI cases that resulted in jury verdicts. The search criteria employed included general classification terms "food poisoning" and "foodborne illness", and an extensive list of pathogens, which commonly cause foodborne illness. To ensure the completeness of the data collection process, advanced searches were also conducted using combinations of these terms multiple times. The results of each search were recorded and an inventory of the identified cases was developed.

Once the searches were completed and recorded, case summary information, which included the date of final verdict or resolution, case title, a brief description of the case, the source of the case, and the database identification number associated with the case were extracted and entered into an Excel database. Case summaries were subsequently reviewed and duplicates, which were identified through multiple searches, were removed. A review of case descriptions was then undertaken to ensure that each of the identified cases was, in fact, referring to an incident of FBI. That is, the illness (1) produced symptoms consistent with gastrointestinal distress, (2) was linked to food or drink and (3) claimed to have resulted from pathogens or foreign objects embedded in the food or drink (Busby et al. 2001).

Once identified and screened to ensure their relevance to this study, cases were carefully reviewed to extract characteristics needed for this analysis (outcome, age and gender of plaintiff, characteristics of incident etc.) It is important to note that, not all cases identified through the search process reached legal resolution through the courts. As a result, cases that involved arbitration, mediation or settlement, though documented, were excluded from the analysis.

The Heckman two-step estimator was used for statistical estimation. This estimator was consider appropriate given that the truncation of the amount awarded is incidental and is only observed if the plaintiff is successful in a lawsuit. According to Bierens (2007), the Heckman's sample selection model is based on two latent dependent variable models. As such, the Heckman approach involves the estimation of a probit model for selection (choice model), followed by the insertion of a correction factor –the Inverse Mills Ratio (IMR), calculated from the probit model - into the second OLS model of interest (Bushway et al. 2007).

Wooldridge (2013) noted that the usual approach to incidental truncation is to add an explicit selection equation to the population model of interest as outlined below:

$$s = 1[z\gamma + v \geq 0] \quad [1]$$

$$y = x\beta + u, E(u|x) = 0 \quad [2]$$

It is assumed that $\boldsymbol{x}$ and $\boldsymbol{z}$ are always observed and equation [1] and [2] can be expanded to reflect $\boldsymbol{z\gamma} = \gamma_0 + \gamma_1 Z_1 \dots\dots\dots \gamma_k Z_k \gamma_0 + v$ and $\boldsymbol{x\beta} = \beta_0 + \beta_1 X_1 \dots\dots\dots \beta_m X_m + u$ respectively.

Equation [1] is the selection equation where the dependent variable (*s*) is the latent variable measuring the plaintiff's success in a lawsuit. This is illustrated as follows:

Plaintiff Success = {1 if probability of the plaintiff winning ≥ 0
{0 if probability of the plaintiff winning < 0

Equation [2] is the equation of primary interest, where the dependent variable (*y*) is the outcome of interest or the amount awarded. This is illustrated as follows:

Amount Awarded = {xβ+u, if Plaintiff Success = 1
{Unobserved if Plaintiff Success = 0

Selection Equation

The selection equation contains only those factors that are expected to influence whether a plaintiff wins. The estimation of this equation computes the probability of the plaintiff winning and the Inverse Mills Ratio (IMR). In the selection equation below, *WIN* is the probability that a plaintiff will be successful in a FBI lawsuit. The selection equation [4] below comprises of those independent variables that are expected to affect the probability of winning a lawsuit.

$$WIN = \lambda_0 + \lambda_1 YEAR1993 + \lambda_2 CHILD + \lambda_3 HOSPITAL + \lambda_4 DEATH + \lambda_5 REST + \lambda_6 PUBLIC + \lambda_7 PWITDOC + \lambda_8 DWITDOC + \lambda_9 PATHOGEN + \lambda_{10} DEEPPOCK + \lambda_{11} DEFNEG + \lambda_{12} DFTWARN + \lambda_{13} DBREWAR + \lambda_{14} STRICTLIAB + \lambda_{15} REGCRT1 + \lambda_{16} REGCRT2 + \lambda_{17} REGCRT3 + \lambda_{18} REGCRT4 + \lambda_{19} REGCRT5 + \lambda_{20} REGCRT6 + \lambda_{21} REGCRT7 + \lambda_{22} REGCRT8 + \lambda_{23} REGCRT9 + \lambda_{24} REGCRT10 + \lambda_{25} REGCRT11 + \lambda_{26} RESOLYEAR + v \quad [4]$$

In addition, equation [4] contains the following independent variables: the lawsuit was resolved in 1993 or later (*YEAR1993*); one or more plaintiff(s) was a child (*CHILD*); the plaintiff(s) was hospitalized **(***HOSPITAL*); the lawsuit involved a death **(***DEATH*); one or more defendant(s) was a restaurant (*REST*); public health authority involvement in the case (*PUBLIC*); the plaintiff employed one or more doctors as expert witness **(***PWITDOC*); the defendant employed one or more doctors as expert witness (*DWITDOC*); a specific foodborne pathogen, toxin or illness was implicated by the plaintiff (*PATHOGEN*); the defendant(s) had "deep pockets" (*DEEPPOCK*); the defendant was deemed negligent (*DEFNEG*); the defendant failed to warn consumers (*DFTWARN*); the defendant breached implied or expressed warranty of merchantability and fitness (*DBREWAR*); the defendant was sued under strict liability (*STRICTLIAB*) regional differences controlled for using geographic boundaries of the U.S.

Courts of Appeals (*REGCRT1* through *REGCRT11*); and the year of final resolution (*RESOLYEAR*).

Intensity Equation

The intensity equation or equation of primary interest contains only those factors that are likely to influence the amount awarded should the plaintiff win. Equation [5] below is the equation of primary interest that contains the IMR and those factors that are expected to affect the amount awarded. This equation is estimated by ordinary least square (OLS).

$$AMTAWARDED = \beta_0 + \beta_1 CHILD + \beta_2 DEATH + \beta_3 DISTRESS + \beta_4 PAINSUFF + \beta_5 LOSSCONS + \beta_6 CHRONIC + \beta_7 HOSPITAL + \beta_8 IMR + u \quad [5]$$

Equation [5] contains those variables that are directly related to the severity of the injuries sustained by plaintiffs. In this equation, *AMTAWARDED* is the amount awarded to a plaintiff that is successful in a foodborne illness product liability lawsuit. In addition, equation [5] contains the following independent variables: one or more plaintiff(s) was a child (*CHILD*); the lawsuit involved a death **(***DEATH*); the plaintiff claimed emotional distress **(***DISTRESS*); the plaintiff claimed pain and suffering (*PAINSUFF*); the plaintiff claimed loss of consortium due to abandonment by family **(***LOSSCONS*); the plaintiff suffered from chronic complications **(***CHRONIC*); and the Inverse Mills Ratio (*IMR*). One must be cognizant of the fact that while there are factors that exclusively affect selection and outcome respectively, some factors are included in both equation [4] and [5] above.

4. Results and Discussion

Cases adjudicated between 1979 and 2014 are included in the analysis. The final dataset includes 512 cases drawn from across 41 states and DC. Descriptive analysis has found that 35% of cases resulted in positive outcomes for party injured by FBI. Compensation to these individuals ranged from $151 to $6.2M with average and median awards of $76,148 and $32,264 respectively[5]. Busby et al. (2001) found that approximately 31.4 percent of the cases resolved between 1988 and 1997 resulted in monetary award for the consumer. Withstanding a slight increase in plaintiffs' success rate, it can be reasonably concluded that most plaintiffs failed to convince juries that defendants were legally responsible for causing their illnesses. This analysis also found a strong trend of increasing settlement amounts between 1988 and 2014 and differences in the amounts awarded for comparable cases in different geographic regions. Figure 1 shows the trend in FBI lawsuits and amount awarded.

[Insert Figure 1 Here]

The expected award indicates the award amount consumers are likely to receive if they are successful in FBI litigation. Busby et al. (2001) reported an expected award of $41,888 for 55 cases examined between 1988 and 1997. In comparison, for the 178 cases where plaintiffs prevailed between 1979 and 2014, the expected award was $26,525. As such, consumers involved in FBI lawsuits can expect to receive a lower compensation if they decide to go to trial. Importantly, the actual amount receive would be much lower after legal costs and court filing fees are taken into account. Similarly, food firms can expect to pay this amount plus the cost of legal defense, and all other costs associated with a public trial including loss of sales and

[5] Data updated to 2012 dollars using the Bureau of Labor Statistics Consumer Price Index for all urban consumers. Of the 512 court decisions, 511 had published information on awards.

diminish business reputation. Table 5 summarizes compensation for consumer plaintiffs in FBI lawsuits.

[Insert Table 5 Here]

Court Awards by Illness Severity

The 511 cases with award information were categorized into three severity categories: cases involving a premature death, cases where the plaintiff(s) was hospitalized and survived, and all other cases that involved less severe illnesses. Twenty-one lawsuits or approximately 4 percent of the cases involved a death while 107 lawsuits or approximately 21 percent of the cases involved nonfatal injuries that required some form of hospitalization. In comparison, Busby et al. (2001) reported 3 percent of the lawsuits involved a death while 60 percent involved hospitalization for the 175 cases examined between 1988 and 1997. Despite a small percentage increase in premature deaths, hospitalization due to FBI has declined by 39 percent.

Injury severity is a major factor affecting an expected award (Busby et al. 2001). As such, a third of the lawsuits involving premature death result in plaintiff victories with an expected award of $228,945 that was higher than the expected award in FBI cases involving hospitalization ($170,804) and the expected award in all other cases ($68,069). This finding is similar to that of Busby et al. (2001). They found that the expected award in lawsuits involving a death was $183,053, which was significantly higher than cases involving hospitalization ($44,713) and the expected award in all other cases ($32,563).

It must be noted however, that while the severity of the plaintiff's injuries is a major factor affecting an expected award, it is less important in determining whether plaintiffs are successful in FBI lawsuits. That is, a plaintiff's success rate in FBI lawsuits involving a premature death is marginally lower (33.3 percent) than the overall plaintiff success rate (34.8

percent) for all FBI lawsuits. Furthermore, the plaintiff's success rate in FBI lawsuits involving hospitalization is marginally higher (35.5 percent) than the overall plaintiff success rate for all FBI lawsuits. Table 6 presents FBI cases by severity categories.

[Insert Table 6 Here]

Court Awards by Implicated Pathogen

Showing causation is an important consideration in the outcome of FBI lawsuits. The ability of plaintiffs to identify the specific pathogen and food item that made them ill is likely to have an important effect on the outcome of a trial (Busby et al. 2001). Approximately 43 percent of the jury summaries identified a specific pathogen, toxin, foreign object and/or matter as the cause of illness. Of the pathogens identified, *Salmonella* (16.6 percent) was the most frequently cited pathogen and was followed by foreign object and/or matter (5.27 percent) and hepatitis (A, B and C) (4.49 percent). Busby et al. (2001) also found *Salmonella* as the most frequently cited pathogen followed by hepatitis (all types). Table 7 summaries the pathogens frequently implicated in FBI lawsuits.

[Insert Table 7 Here]

The success rate among plaintiffs that alleged illness from a specific pathogen and foreign object and/or matter was approximately 45 and 44 percent respectively. In contrast, plaintiffs that did not implicate a specific pathogen were successful in only 27 percent of the cases. Similarly, the expected award when a specific pathogen and foreign object and/or matter were identified was significantly higher than in cases where the pathogen was unspecified. These findings are consistent with that of Busby et al. (2001). In general, these findings suggest the importance of establishing causation in order for a plaintiff to prevail in FBI jury trials and

subsequently receive compensation for their injuries. Table 8 presents the compensation by pathogen category in FBI lawsuits.

[Insert Table 8 Here]

Court Awards by Implicated Food

Approximately 82 percent of FBI lawsuits identify some kind of food as the cause of the illness. This is a decline from 92 percent previously reported by Busby et al. (2001). Additionally, approximately one-fifth of the case summaries examined indicated that the cause of illness was attributed to generic sources such as a restaurant meal, fast food, or lunch that can be reasonably assumed to consist of multiple food items thus leaving the exact source unclear. In contrast, approximately 63 percent of the case summaries examined identified a specific food item as the cause of illness. The most frequently cited foods were hamburgers and ground beef, different types of sandwiches and seafood (excluding oysters). In terms of packaged meals such as canned foods and frozen foods, only 7 cases were found thus suggesting that litigation involving such sources are less common or are likely to be settled outside of court. Table 9 provides a summary of the various food items identified in FBI lawsuits.

[Insert Table 9 Here]

In court cases where illness was allegedly caused by a specific food item, plaintiffs won approximately 33 percent of such cases. In contrast, plaintiffs that did not implicate a specific food item won approximately 40 percent of the cases. Busby et al. (2001) concluded that such findings are counterintuitive given the relative importance of establishing causation. Although this finding appears to be out of sync with rational thought, the lack of detailed information available through jury verdict summaries may have inadvertently excluded specific information

on food items involved. Withstanding this finding however, the expected award was higher ($125,438) in cases that identified a specific food item when compared to cases where the food item was not specified ($36,166). Table 10 presents compensation by food category.

[Insert Table 10 Here]

Court Awards by Type of Defendant

The Restatement (Third) of Torts: Apportionment of Liability allows a plaintiff to sue for and recover the entire amount of recoverable damages from any defendant regardless of a particular defendant's percentage share of fault under the concept of "joint and several" liability (Wilson Elser, 2013). As such, plaintiffs may sue multiple defendants involved in the food supply chain even though there might be a strong indication that a specific defendant is more at fault. For example, a plaintiff that alleged they became ill from eating prepackage leafy green salad purchased from a supermarket may sue the supermarket, the distributor, the packaging firm, and the farm where the vegetables were grown. The rationale for such action may be due to the plaintiff belief that the pathogen contamination occurred further back in the food production chain (Rosenbaum, 2000). Clark (2000) noted however, suing multiple defendants maybe a sign that the plaintiff does not have sufficient evidence of causation to isolate and name one defendant.

Of the 512 lawsuits examined, 453 (85 percent) named one defendant, 59 (11.5 percent) named two defendants and 18 (3.5 percent) named three or more defendants for a total of 589 defendants.[6] Restaurants (51.3 percent) made up the largest group of defendants followed by foodstores (13.2 percent) and manufacturers (8.3 percent). Table 11 presents a summary of FBI

[6] Tabulations was done for up to three defendants per case because the majority of the jury verdict summaries had three or fewer defendants. Thus, the total number of defendants is slightly underestimated because a few cases had four or more defendants.

cases by defendant type.

[Insert Table 11 Here]

Court Awards by Gender

The importance of gender in the outcome and subsequent amount awarded in FBI lawsuits was also tabulated. Of the 511 FBI lawsuits with award information, 233 cases had male plaintiffs and 225 cases had female plaintiffs. Additionally, 35 cases comprised of male and/or female plaintiff(s). While the success rate for male and female plaintiffs were similar, there was a large gap in the expected award with female plaintiffs expected to receive approximately $39,000 more than male plaintiffs. Furthermore, the expected award for cases comprising of male and/or female plaintiff(s) was $512,785. One reason for the significant difference may be due to the fact that awards received in these cases are the total to be shared among all plaintiffs. Table 12 presents a summary of awards by gender.

[Insert Table 12 Here]

Other Findings Provided by Jury Verdict Summaries

Of the 511 cases with award information, public health authorities were involved in 36 (7 percent) and of these cases, plaintiffs were successful in 17 (47.2 percent). Both plaintiffs and defendants employed expert witnesses such as physicians to support their respective claims. Plaintiffs called one or more expert witnesses in approximately 20.2 percent of the FBI cases while defendants used expert witnesses in 23.3 percent of the cases. This finding is inconsistent with that of Busby et al. (2001) that reported that plaintiffs called one or more physicians as expert witnesses in 67 percent of FBI cases while 45 percent of defendants called on expert witnesses to testify. Since the burden of proof in civil cases rests with the plaintiff, this finding is counterintuitive.

In FBI lawsuits, three main causes of action are available to plaintiffs: strict product liability, negligence, and breach of express or implied warranty. Of the 511 cases with award information, plaintiffs claimed that the defendant was negligent in 292 (57.1 percent) of the cases and were successful in 106 (36.3 percent). Plaintiffs claimed breach of express or implied warranty in 65 (12.7 percent) of the cases and were successful in 24 (36.9 percent) of these cases. Claims of strict liability occurred in 36 (7 percent) of the cases with the plaintiff being successful in 14 (38.9 percent).

Econometrics Analysis

Equation [1] and [2] specified above were estimated using the Heckman two-step procedure. After examining the results however, equation [1] and [2] were reformulated to reflect two additional variable specifications that were subsequently re-estimated. The discussion that follows provides a justification for each additional specification. Table 13 Heckman Two-Step Results Comparison, presents the results of the three separate Heckman two-step procedures.

[Insert Table 13 Here]

Under the original model specified (Heckman Scenario 1 in Table 13), it was observed that CHILD played an important role regarding whether a plaintiff or survivor won a lawsuit. As such, the marginal effect of CHILD as it relates to the probability of the amount awarded being observed was approximately 22 percent and was statistically significant at the 1 percent level. In terms of the expected amount awarded conditional on being observed, the marginal effect of CHILD evaluated at the mean was approximately $410,657. It must be noted that the marginal effects of CHILD consist of the direct effect of being included in the equation of primary interest and the indirect effect of also being included in the selection equation. The marginal effects are

presented in Table 14 Marginal Effects at Mean for Amount Awarded Conditional on being Observed and Table 15 Marginal Effects for the Probability of the Dependent Variable being Observed.

In terms of selection, DWITDOC and DEEPPOCK both had a negative effect on the probability of the plaintiff winning with marginal effects of approximately 19 and 13 percent respectively that were statistically significant at the 1 percent level. Conversely, PATHOGEN and REGCOURT4 had a positive effect on whether a plaintiff was successful reflecting a marginal effect of approximately 20 and 36 percent respectively and were statistically significant at the 1 percent level.

As it relates to the amount awarded, all independent variables with the exception of DISTRESS had a positive effect. However, the results indicated CHILD and CHRONIC were the only variables to be statistically significant at the 1 percent level. Although the Wald Test testing the hypothesis that the coefficients in the model are zero was rejected at the 1 percent level, the inverse Mills ratio (IMR) computed suggested that there is reasonable evidence of a sample selection problem in estimating the amount awarded equation. With a t-statistic of 1.65 and p-value of 0.10, we reject the null hypothesis (H_0: $\rho = 0$) at a 10 percent level of significance.

Subsequently, equations [1] and [2] were reformulated and re-estimated in an attempt to improve the model specification. Under Heckman Scenario 2, the award equation was expanded to include YEAR1993, REST and DEEPPOCK. It was reasoned that greater public awareness captured by YEAR1993 would lead to juries being more familiar with the seriousness and financial impact of health complications related to FBI while juries were more inclined to punish restaurants monetarily for endangering the lives and health of patrons. In addition, juries were

more likely to view deep pocket defendants as caring more about the bottom line and less about public health and safety thus setting out to penalize them for their lack of compassion.

The inclusion of YEAR1993 and DEEPPOCK in the award equation resulted in a positive effect while REST resulted in a negative effect on the amount awarded. However, only DEEPPOCK with a marginal effect of approximately $268,857 was statistically significant at the 5 percent level. The results also highlighted that marginal effects of CHILD and CHRONIC were approximately $367,679 and $1,058,655 and statistically significant at the 5 and 1 percent level respectively. The Wald Test indicated that the true value of the parameters were different from zero. However, the IMR with a t-statistic of 0.5 and corresponding p-value of 0.62 provided little evidence of a sample selection problem.

Building on Heckman Scenario 2, the award equation was expanded to include DEFNEG, DBREWAR, STRICTLIAB, and DFTWARN. It was assumed the plaintiffs that highlighted the specific cause of action under which judicial relief was being sought were more likely to convince a jury to award higher damages. The selection equation was also expanded to include DISTRESS, PAINSUFF, LOSSCONS and CHRONIC in Heckman Scenario 3. According to Wooldridge (2013), while it may be appropriate to exclude certain independent variables from the selection equation, including all independent variables in the selection equation is not very costly. However, incorrectly excluding independent variables can lead to inconsistency in the estimates (Wooldridge, 2013). As such, these independent variables were added to the selection equation with the expectation that juries were more likely to be sympathetic after hearing testimony of plaintiffs' agony and despair thus influencing the verdict in favor of plaintiffs.

The inclusion of DEFNEG, DBREWAR, STRICTLIAB, and DFTWARN in the award equation each had a positive effect but was not statistically significant. Controlling for

PAINSUFF, LOSSCONS, and CHRONIC in the selection equation each had a positive impact while DISTRESS had a negative effect on the probability of the plaintiff winning. However, only PAINSUFF with a marginal effect of approximately 56 percent was statistically significant at the 1 percent level. The Wald Test concluded that the coefficients in the model were different from zero while the IMR with a t-statistic of 0.33 and corresponding p-value of 0.74 provided little evidence of a sample selection problem.

Of the models specified, the Heckman Scenario 3 is the preferred specification. Apart from no sample selection problem indicated, this specification encompasses all independent variables in the selection equation that is likely to result in more consistent estimates. Specifically, the inclusion of PAINSUFF, LOSSCONS, and CHRONIC in the selection equation highlights the importance of these factors in influencing plaintiff victory and thus provided greater insights into FBI litigation outcomes. Based on this model, one can predict that lawsuits involving CHILD, PATHOGEN, and PAINSUFF would increase the probability of the plaintiff winning while the presence of DWITDOC, DEEPPOCK and RESOLYEAR were likely to reduce such probability. Similarly, the presence of CHILD, CHRONIC, and DEEPPOCK are likely to increase the amount awarded to plaintiffs.

5. Conclusions, Policy and Industry Implications

In its 2013 annual report, the CDC indicated that foodborne infections continue to be an important public health problem in the United States (CDC, 2014). The findings of this study provide interesting insights regarding the factors that influence whether a plaintiff wins and any subsequent amount awarded. As such, this research may help support and influence policy decisions at the federal, state, and local government levels while providing the basis for policy changes in the food, insurance, and health industries.

Based on the findings, it is important for plaintiffs to identify the foodborne pathogen that caused their illness in order to convince a jury that the defendant food firm is responsible. The result also indicates that a jury is more likely to be amenable to child plaintiffs. Plaintiffs claiming pain and suffering and loss of consortium are also likely to increase their odds of winning. On the other hand, "deep pocket" defendants can employ expert testimony that discredits a plaintiff's claims. Expert testimony that shows that the onset of the plaintiff's illness was inconsistent with the incubation period of the implicated pathogen is important to refuting causation. Additionally, a defendant can show that there are multiple sources of the implicated pathogen or that the plaintiff had a pre-existing condition that placed them at higher risk of contacting a FBI. The findings also indicate that juries gave larger awards in cases involving a child, chronic complications, and "deep pocket" defendants.

Given the finding, this research can be used to provide economic incentives for food firms and others in the supply chain to improve their operations and produce safer and better quality foods. Changes in food firm behavior can minimize the risk associated with FBI thereby reducing the costs shared by other sectors (employers, private health insurers, and government) of the economy (Busby et al. 2001). The findings may also encourage food firms to implement internal and external food safety training, quality circles, and the establishment of a formal safety committee in their efforts to limit exposure to FBI product liability litigation.

Additionally, changes in food labeling, packaging, and warnings may help food firms reduce the occurrence of FBI and any subsequent litigation that may follow. Firms need to ensure that food product labels are clear, concise, accurate and easy to understand. Ryan (2003) noted that product packaging should be repeated in different languages, convey the consequence of failure to heed warnings and disclose proper methods of safe disposal.

Given the high costs to food firms in terms of awards, future litigation, and lost reputation, the findings can also help influence the decision of whether to pursue litigation or settle out of court. At the onset, significant legal and administrative costs are incurred to defend FBI product liability claims. In the event of an unsuccessful defense however, compensatory and punitive damages awarded against food firms may have an even greater impact on a firm's short-term performance and long-term survival.

As part of its food safety efforts, food firm's policy should call for one of the major food safety certifications. Food firms can also include in their policies the requirement that others (partners, suppliers, wholesalers etc.) in the supply chain obtain food safety certification and be subject to third party audits and periodic recertification.

In response to the findings of this study, federal, state and local government agencies can also update and/or upgrade policies that support overall food safety efforts. At each level of government, consumer education programs that focus on good hygiene practices, cooking foods adequately, avoiding cross contamination, storing foods at safe temperatures, and avoiding foods and water from unsafe sources are paramount to FBI prevention. Inspection programs at each government level can also be enhanced to increase the likelihood to early detection of foodborne pathogens. Specific responses by the federal government may include mandatory surveillance, coordination and information sharing across states and various agencies, mandatory inspection of certain foods, and increase funding to support inspection of high-risk foods identified.

Policies changes can also increase federal oversight of certain high-risk foods. For example, federal agencies could inspect meat and meat products regardless of whether or not it is involved in inter-state commerce. In todays complex supply chain it may be difficult to prevent

meat from crossing state lines. In response to high-risk areas identified, the federal government should commit more funds to facilitate inspection programs.

State specific responses could involve increased surveillance of major FBIs highlighted while also engaging in surveillance of FBIs that are of lesser concern. Currently, individual states decide on which FBI should be under surveillance. As such, only the more popular pathogens are being tracked and reported. However, tracking and reporting of other pathogens may be beneficial to the overall fight against FBI. At the local government level, responses may entail more frequent inspection of local restaurants, food stores, abattoirs, and other food establishments to ensure that they are up to health code standards.

A vast majority of FBIs are never reported. This is due in part to misdiagnosis or lack of a specific diagnosis by health care professionals. As such, the health industry can use the findings of this research to improve diagnosis of specific FBIs. For instance, health care providers can relate the foods and corresponding pathogens identified in this research to diagnose and treat future FBIs.

For insurance providers, the findings of this research provide interesting insights regarding the risk associated with food firms. As such, FPLI providers may become better informed regarding various risk factors concerning different food products across firms. With this information in hand, insurers may be better able to assess risk, adequately price premiums, package insurance products and recommend coverage levels that are consistent and appropriate to specific food firms.

Although this research concentrated on FBI product liability cases that reached legal resolution through the court system, future research could extend the analysis by including FBI cases that were settled out of court. Examining the factors that influence out of court settlements

would provide further insights regarding the costs associated with food safety and product liability. The multifaceted nature of this topic also encourages further research in related areas. One appealing research area would be to examine the effects of product liability litigation on firms' performance and overall change in behavior.

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Table 1. Estimated Annual Foodborne Illnesses, Hospitalizations and Deaths Due to Selected Pathogens, United States, 2011

Pathogen	Illnesses	Hospitalizations	Deaths	Comment
	Number			
Norovirus	5,461,731	14,663	149	Bacteria
Salmonella, nontyphoidal	1,027,561	19,336	378	Bacteria
Clostridium perfringens	965,958	432	26	Bacteria
Campylobacter spp.	845,024	8,463	76	Bacteria
Staphylococcus aureus	241,148	1064	6	Bacteria
Toxoplasma gondii	86686	4,428	327	Parasitic
31 known pathogens	9.4 million (6.6 -12.7 million)	55,961 (39,534 - 75,741)	1,351 (712 - 2,268)	(90% credible interval)
Unspecified agents	38.4 million (19.8 - 61.2 million)	71,878 (9,924 - 157,340)	1,686 (369 - 3,338)	(90% credible interval)

Source: Centers for Disease Control and Prevention (CDC), (2011).

Table 2. Severe acute complications and long-term consequences of selected etiologic agents

Etiologic Agent	Severe Acute complications	Long-term Consequences
Campylobacter	Sepsis, meningitis, carditis, endocarditis, hepatitis, cholecystitis, pancreatitis	Chronic diarrhea, Guillain-Barré syndrome, irritable bowel syndrome, dyspepsia, inflammatory bowel disease, reactive arthritis, renal diseases
Escherichia coli - O157:H7	Hemolytic uremic syndrome, renal failure, coma, seizures	Kidney dysfunction, hypertension, cardiovascular disease, stroke, endothelial injury, pancreatitis diabetes, splenic abscesses, gallstones, seizures, hemiplegia, cortical blindness, psychomotor retardation, irritable bowel syndrome, dyspepsia, reactive arthritis
Listeria	Preterm birth, encephalitis, meningitis, seizures, bacteremia, sepsis, endocarditis, pulmonary infection, septic arthritis	Cerebral palsy, epilepsy, vision and hearing loss, cognitive and attention deficits, chronic lung disease
Salmonella	Bacteremia, sepsis, meningitis, septic arthritis, spondylitis, cholangitis, pneumonia, septic metastases, arterial infection, aortitis, aortic aneurysm, endocarditis, osteomyelitis and bone sequelae, splenic abscesses, pancreatitis, hemolytic uremic syndrome, renal failure, coma, seizures	Chronic diarrhea, irritable bowel syndrome, dyspepsia, inflammatory bowel disease, reactive arthritis
Shigella	Intestinal perforation, toxic megacolon, bacteremia, sepsis, hemolytic uremic syndrome, renal failure, coma, seizures	Kidney dysfunction, hypertension, cardiovascular disease, endothelial injury, pancreatitis, diabetes, splenic abscesses, gallstones, coma, seizures, hemiplegia, cortical blindness, psychomotor retardation, irritable bowel syndrome, dyspepsia, inflammatory bowel disease, reactive arthritis
Norovirus (NoV)	None	Irritable bowel syndrome
Yersinia enterocolitica	Intestinal perforation; intussusception; toxic megacolon; mesenteric vein thrombosis; osteomyelitis; sinusitis; pneumonia; empyema; bacteremia; sepsis; endocarditis; meningitis; abscesses in kidney, lung, liver, or spleen	Chronic diarrhea, Graves' disease (autoimmune thyroid disease); reactive arthritis

Source: Batz et al. (2013).

Table 3. Cost Estimates of 15 Foodborne Illnesses

Etiologic Agent	Estimated Costs
Campylobacter (all species)	$1,928,787,166.23
Clostridium perfringens	$342,668,497.88
Cryptosporidium parvum	$51,813,651.77
Cyclospora cayetanensis	$2,301,422.92
Escherichia coli O157	$271,418,689.72
Non-O157 Shiga toxin-producing Escherichia coli	$27,364,560.51
Listeria monocytogenes	$2,834,444,202.28
Norovirus	$2,255,827,318.28
Salmonella (nontyphoidal)	$3,666,600,031.17
Shigella (all species)	$137,965,962.14
Toxoplasma gondii	$3,303,984,477.77
Vibrio parahaemolyticus	$40,682,311.84
Vibrio vulnificus	$319,850,292.60
Vibrio (all other non-cholera species)	$142,086,208.87
Yersinia enterocolitica	$278,111,168.08

Source: Economic Research Service (ERS), (2014).

Table 4. Federal Agencies Responsible for Food Safety

Department	Agency	Area of Responsibility
U.S. Department of Agriculture	Food Safety and Inspection Service	All domestic and imported meat, poultry, and processed egg products
	Animal and Plant Health Inspection Service	Protecting the health and value of U.S. agricultural resources (e.g., animals and plants)
	Grain Inspection, Packers and Stockyards Administration	Establishing quality standards, inspection procedures and marketing of grain and other related products
	Agricultural Marketing Service	Establishing quality and condition standards for dairy, fruit, vegetable, livestock, meat, poultry, and egg products
	Agricultural Research Service	Conducting food safety research
	Economic Research Service	Providing analyses of the economic issues affecting the safety of the U.S. food supply
	National Agricultural Statistics Service	Providing statistical data, including agricultural chemical usage data, related to the safety of the food supply
	Cooperative State Research, Education and Extension Service	Supporting food safety research, education, and extension programs in the land-grant university system and other partner organizations
Department of Health and Human Services	Food and Drug Administration	All domestic and imported food products except meat, poultry, or processed egg products
	Centers for Disease Control and Prevention	Protecting the nation's public health, including foodborne illness surveillance
Department of Commerce	National Marine Fisheries Service	Voluntary, fee-for-service examinations of seafood for safety and quality
Environmental Protection Agency		Regulating the use of pesticides and maximum allowable residue levels on food commodities and animal feed
Department of Treasury	Alcohol and Tobacco Tax and Trade Bureau	Enforcing laws covering the production, use, and distribution of alcoholic beverages

(Knechtges, 2012)

Table 5. Compensation for Consumer Plaintiffs in Foodborne Illness Lawsuits Decided by Jury Verdicts, (1979- 2014)[a]

Outcome	Sample Size	Percent won by Plaintiffs	Range of Compensation	Mean Award	Median Award	Expected Award[b]	Total Amount Compensated
	Number	Percent	----------2012 Dollars----------				
Plaintiff[c]	178	100	151-6,159,099	76,148	32,264	76,148	49,154,354
Defendant[d]	333	0	0	0	0	0	0
Total	511	34.8	151-6,159,099	76,148	32,264	26,525	49,154,354

[1] Data updated to 2012 dollars using the Bureau of Labor Statistics Consumer Price Index for all urban consumers. Of the 512 court decisions, 511 had published information on awards.

[b] The expected award is the average award multiplied by the percent of foodborne illness jury trials won by plaintiffs.

[c] Plaintiff verdict or award combined.

[d] Defendant verdict or award combined. Occasionally, unsuccessful plaintiffs covered defendants' court costs but these were not enumerated here.

Table 6. Compensation in Foodborne Illness Court Cases by Severity Category, (1979-2014)[a]

Illness Severity	Court Cases with Award Information	Percent Won by Plaintiff	Mean Award	Median Award	Expected Award[b]
	Number	Percent	----------2012 Dollars----------		
Premature Death	21	33.3	686,836	278,118	228,945
Hospitalized and Survived	107	35.5	480,947	54,244	170,804
Other Cases	383	34.7	196,019	26,358	68,069
Total	511	34.8	76,148	32,264	26,525

[a] Only 511 of the 512 court decisions had award information so the award totals do not represent statistics for all court awards.

[b] The expected award is the mean plaintiff award multiplied by the percent of foodborne illness jury trials won by plaintiffs. Only one case is excluded here since information on awards was not available.

Table 7. Foodborne Pathogens, Toxins, or Illnesses Involved in Foodborne Illness lawsuits Decided by Jury Verdicts, (1979-2014)[a]

Pathogen	Lawsuits	
	Number	Percent
Salmonella	85	16.60
Foreign Object/Matter	27	5.27
Hepatitis (A, B & C)	23	4.49
E.coli	20	3.91
Vibrio	12	2.34
Shigella	11	2.15
Campylobacter	11	2.15
Ciguatera	9	1.76
Staphylococcus	9	1.76
Norovirus	4	0.78
Mold	2	0.39
Botulism	1	0.20
Cyclospora	1	0.20
Adverse reaction to protective immunization after exposure to foodborne hepatitis	1	0.20
Trichinosis	1	0.20
Yersinia	1	0.20
Streptococcus	1	0.20
Typhoid	1	0.20
Cholera	1	0.20
Not Specified	291	56.84
Total	**512**	**100**

[a] Foreign Object/Matter includes blood, decaying bone, gasoline, lighter fluid, maggots, sulfites, rat poison, urine, saliva and other unspecified foreign object.

Table 8. Compensation in Foodborne Illness Court Cases by Pathogen Category, (1979 - 2014)[a]

Pathogen Category	Court Cases with Award Information	Decision for Plaintiffs	Mean Award	Median Award	Expected Award[b]
	Number	Percent	----------2012 Dollars----------		
Alleged Illness from a Specific Pathogen	194	44.8	432,660	83,331	100,014
Foreign Object/Matter[c]	27	44.4	307,738	14,806	136,772
Unspecified Pathogen	291	27.1	98,989	18,080	26,873
Total	511	34.8	76,148	32,264	26,525

[a] Of the 512 court decisions, 511 had award information. Therefore, the award totals do not represent statistics for all court awards.

[b] The expected award is the mean plaintiff award multiplied by the percent won by plaintiffs. Only one case is excluded here since information on awards was not available.

[c] Foreign Object/Matter includes blood, decaying bone, gasoline, lighter fluid, maggots, sulfites, rat poison, urine, saliva and other unspecified foreign object.

Table 9. Food Items Involved in Foodborne Illness Lawsuits Decided by Jury Verdicts, (1979 - 2014)

Food Items	Lawsuits	
	Number	Percent
Hamburger and Ground Beef	39	7.6
Sandwiches (e.g. chicken, fish, ham)	39	7.6
Seafood (fish, scallops, shrimp)	39	7.6
Chicken	27	5.3
Salads (e.g., fruit, potato, chicken)	21	4.1
Mexican Food (e.g., burritos, tacos, quesadillas)	19	3.7
Other Beverage (e.g., soda, orange juice, sports drink)	17	3.3
Oysters	16	3.1
Beef (e.g., steak, sirloin, jerky)	14	2.7
Other Meat (e.g., duck, lamb, goat)	9	1.8
Milk (including raw milk)	8	1.5
Pork	8	1.5
Eggs	7	1.4
Packaged Meals (e.g., canned food)	7	1.4
Baked Goods (e.g., cookies, cake, doughnut)	6	1.2
Chinese Food	6	1.2
Sausages	6	1.2
Turkey	3	0.6
Water	3	0.6
Ice Cream	2	0.4
Single Vehicle (e.g., ketchup, syrup, salad dressing)	24	4.7
Multiple Vehicles (e.g., restaurant food, fast food, lunch)[a]	99	19.3
Not Specified	93	18.2
Total	512	100.0

[a] For cases where multiple foods were identified, these were included under Multiple Vehicles. For example, a spare ribs and pork chops or eggs and steak.

Table 10. Compensation in Foodborne Illness Court Cases by Food Category, (1979-2014)[a]

Food Category	Court Cases with Award Information	Decision for Plaintiffs	Mean Award	Median Award	Expected Award[b]
	Number	Percent	----------2012 Dollars----------		
Alleged Illness From a Specific Food	344	32.6	385,275	41,453	125,438
Did not Specified Food	167	39.5	91,511	27,070	36,166
Total	511	34.8	76,148	32,264	26,525

[a] Only 511 of the 512 court decisions had award information so the award totals do not represent statistics for all court awards.

[b] The expected award is the mean plaintiff award multiplied by the percent won by plaintiffs. Only one case is excluded here since information on awards was not available.

Table 11. Defendants in Foodborne Illness Court Cases by Firm Type, (1979-2014)[a]

Defendant	First Defendants		Second Defendants		Third Defendants		All Defendants	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Restaurants[b]	298	58.2	3	5.1	1	5.6	302	51.3
Foodstores	66	12.9	10	16.9	2	11.1	78	13.2
Manufacturers	34	6.6	8	13.6	7	38.9	49	8.3
Parent	39	7.6	6	10.2	3	16.7	48	8.1
Individuals	16	3.1	9	15.3	1	5.6	26	4.4
Distributors	6	1.2	14	23.7	4	22.2	24	4.1
Farms	9	1.8	0	0.0	0	0.0	9	1.5
Cruise	4	0.8	0	0.0	0	0.0	4	0.7
Other[c]	40	7.8	9	15.3	0	0.0	49	8.3
Total	512	100.0	59	100.0	18	100.0	589	100.0

[a] Of the 512 court cases, 59 had multiple defendants for an overall total of 589 defendants. Tabulations were performed on up to three defendants per case. The number of defendants is under-estimated for cases with more than three defendants because of insufficient information.

[b] Includes hotel restaurants

[c] Includes food service operators (6), insurance companies (5), casinos (4), delicatessens (4), churches (3), catering company (3), school (3), youth foundations (2), clubs (2), vending machine company (2), government entity (2), amusement park (1), department store (1), fair vendor (1), psychiatric institution (1), prison (1), railway (1), shelter (1), hospital (1), management company (1), oil and gas barge (1), and market (1).

Table 12. Compensation in Foodborne Illness Court Cases by Gender, (1979-2014)[a]

Gender	Court Cases with Award Information	Decision for Plaintiffs	Mean Award	Median Award	Expected Award[b]
	Number	Percent	----------2012 Dollars----------		
Male	233	34.3	134,193	33,037	46,075
Female	225	33.8	252,697	28,409	85,355
Multiple Male and Female	35	37.1	1,380,574	53,507	512,785
Private	4	75.0	18,444	3,013	13,833
Not Specified	14	42.9	201,850	40,826	86,507
Total	511	34.8	76,148	32,264	26,525

[a] Only 511 of the 512 court decisions had award information so the award totals do not represent statistics for all court awards.

[b] The expected award is the mean plaintiff award multiplied by the percent won by plaintiffs. Only one case is excluded here since information on awards was not available.

Table 13. Heckman Results

Dependent Variables	Independent Variables	Expected Signs	Heckman Scenario 1	Heckman Scenario 2	Heckman Scenario 3
Equation of Primary Interest: Amount Awarded	CHILD	+	528,334.3*** (169,905.4)	406,237.0** (173,696.2)	393,265.8** (174,101)
	DEATH	+	491,652.9* (295,310.3)	504,810.9 (289,984.3)*	444,612.7 (289,090.4)
	DISTRESS	+	-268,547.7* (157,283.5)	-243,901.0 (154,848.9)	-248,979.5 (157,999.0)
	PAINSUFF	+	85,592.4 (123,718.8)	57,063.2 (124,767.6)	88,164.5 (198,332.6)
	LOSSCONS	+	279,069.3 (193,490.8)	279,930.3 (191,077.9)	266,551.5 (209,131.8)
	CHRONIC	+	1,051,550*** (188,560.7)	1,058,655*** (186,114.2)	1,108,751*** (196,067.3)
	HOSPITAL	+	196,718.0 (129,667.5)	212,656.1* (127,956.9)	193,274.8 (131,806.2)
	YEAR1993	+		142,792.1 (125,014.2)	86,185.7 (154,797.3)
	REST	+		-46,432 (116,480)	-50,961.2 (116,341.7)
	DEEPPOCK	+/-		243,767.7** (121,488.5)	255,528.9** (120,229.6)
	DEFNEG	+			44,307.8 (145,585.2)
	DBREWAR	+			250,959.5 (186,501.5)
	STRICTLIAB	+			9,526.1 (239,216.2)
	DFTWARN	+			112,003.8 (222,646.3)
	INTERCEPT		-262,011.3 (204,677)	-266,084.1 (214,416)	-270,135.4 (233,374.7)
	YEAR1993	+	-0.26 (0.20)	-0.26 (0.20)	0.01 (0.22)
	CHILD	+	0.58*** (0.19)	0.58*** (0.19)	0.61*** (0.21)
	HOSPITAL	+	-0.02 (0.15)	-0.02 (0.15)	0.03 (0.16)
	DEATH	+	0.03 (0.32)	0.03 (0.32)	0.04 (0.35)
	REST	+	0.12 (0.13)	0.01 (0.13)	0.01 (0.14)
	PUBLIC	+	0.26 (0.24)	0.26 (0.24)	0.31 (0.25)
	PWITDOC	+	0.06 (0.17)	0.06 (0.17)	0.01 (0.18)
	DWITDOC	-	-0.56*** (0.19)	-0.56*** (0.19)	-0.54*** (0.19)
	PATHOGEN	+	0.56*** (0.13)	0.56*** (0.13)	0.47*** (0.14)
	DEEPPOCKET	+/-	-0.36*** (0.13)	-0.36*** (0.13)	-0.37*** (0.14)
			0.12	0.12	0.11

Selection Equation: Plaintiff Success	DEFNEG	+	(0.14)	(0.15)	(0.16)
	DBREWAR	+	-0.10 (0.22)	-0.10 (0.22)	-0.07 (0.23)
	STRICTLIAB	+	-0.01 (0.28)	-0.01 (0.28)	-0.06 (0.29)
	DFTWARN	+	-0.28 (0.23)	-0.28 (0.23)	-0.37 (0.26)
	REGCOURT1	+/-	-0.12 (0.32)	-0.12 (0.32)	-0.25 (0.35)
	REGCOURT2	+/-	-0.24 (0.30)	-0.24 (0.30)	-0.32 (0.32)
	REGCOURT3	+/-	0.39* (0.24)	0.39* (0.24)	0.32 (0.25)
	REGCOURT4	+/-	0.93*** (0.32)	0.93*** (0.32)	0.74** (0.34)
	REGCOURT5	+/-	-0.33 (0.23)	-0.33 (0.23)	-0.40* (0.25)
	REGCOURT6	+/-	-0.15 (0.26)	-0.15 (0.26)	-0.07 (0.28)
	REGCOURT7	+/-	0.53* (0.27)	0.53* (0.27)	0.62** (0.29)
	REGCOURT8	+/-	0.50* (0.27)	0.50* (0.27)	0.39 (0.29)
	REGCOURT9	+/-	0.05 (0.20)	0.05 (0.20)	0.12 (0.22)
	REGCOURT10	+/-	-0.11 (0.39)	-0.11 (0.39)	-0.05 (0.40)
	REGCOURT11	+/-	0 (omitted)	0 (omitted)	0 (omitted)
	RESOLYEAR	+	-0.01 (0.01)	-0.01 (0.01)	-0.04*** (0.01)
	DISTRESS	+			-0.04 (0.21)
	PAINSUFF	+			1.56*** (0.22)
	LOSSCONS	+			0.76** (0.31)
	CHRONIC	+			0.50* (0.28)
	INTERCEPT		11.97 (27.18)	11.97 (27.18)	86.89 (30.59)
	IMR (lambda)		295,823.2* (178,782.4)	96,929.68 (193,806)	68,441.39 (205,671.6)

Numbers in parentheses are standard errors.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table 14. Marginal Effects at Mean for Amount Awarded Conditional on being Observed

Variables	Heckman Scenario 1	Heckman Scenario 2	Heckman Scenario 3
CHILD^	410,656.5	367,678.6	364,625.5
DEATH^	485,484.5	502,789.7	442,561.6
DISTRESS^	-268,547.7	-243,901.0	-246,937.8
PAINSUFF^	85,592.4	57,063.2	23,464.4
LOSSCONS^	279,069.3	279,930.3	232,253.3
CHRONIC^	1,051,550.0	1,058,655.0	1,085,059
HOSPITAL^	201,691.6	214,285.8	192,006.4
YEAR1993^	54,463.3	160,637.6	85,458.9
REST^	-2,550.5	-47267.7	-51,386.0
DEEPPOCKET^	76,571.0	268,857.0	273,520.9
DEFNEG^	-26,605.8	-8,717.7	38,859.6
DBREWAR^	21,977.5	7,201.2	254,386.9
STRICTLIAB^	2,457.9	805.3	12,696.23
DFTWARN^	63,547.9	20,822.2	130,890.2
PUBLIC^	-54,140.4	-17,739.7	-14,858.2
PWITDOC^	-11,807.2	-3,868.7	-580.0
DWITDOC^	124,206.9	40,697.4	27549.8
PATHOGEN^	-117,945.2	-38,646.0	-23,271.1
REGCOURT1^	25,929.6	8,496.1	12,980.4
REGCOURT2^	52,547.5	17,217.7	16,215.6
REGCOURT3^	-81,506.8	-26,706.6	-15,613.8
REGCOURT4^	-175,173.9	-57,397.6	-33,481.1
REGCOURT5^	71,306.6	23,364.4	20,746.1
REGCOURT6^	32,263.4	10,571.4	3594.0
REGCOURT7^	-106,809.1	-34,997.2	-28,554.1
REGCOURT8^	-101,639.4	-33,303.2	-18,971.2
REGCOURT9^	-10,541.3	-3,453.9	-6,024.4
REGCOURT10^	23,422.5	7,674.6	2,522.9
RESOLYEAR^	1,320.0	432.5	2,185.6

^ dy/dx is for discrete change of dummy variable from 0 to 1
Note: No Standard errors are available from Stata

Table 15. Marginal Effects for the Probability of the Dependent Variable being Observed

Variables	Heckman Scenario 1	Heckman Scenario 2	Heckman Scenario 3
CHILD^	0.22***	0.22***	0.23***
	(0.08)	(0.08)	(0.08)
DEATH^	0.01	0.01	0.01
	(0.12)	(0.12)	(0.13)
DISTRESS^	0.00	0.00	-0.01
	(0.00)	(0.00)	(0.07)
PAINSUFF^	0.00	0.00	0.56 ***
	(0.00)	(0.00)	(0.06)
LOSSCONS^	0.00	0.00	0.29**
	(0.00)	(0.00)	(0.12)
CHRONIC^	0.00	0.00	0.19*
	(0.00)	(0.00)	(0.11)
HOSPITAL^	-0.01	-0.01	0.01
	(0.06)	(0.06)	(0.06)
YEAR1993^	-0.09	-0.09	0.01
	(0.08)	(0.08)	(0.08)
REST^	0.00	0.004	0.00
	(0.00)	(0.05)	(0.05)
DEEPPOCKET^	-0.13***	-0.13***	-0.13***
	(0.05)	(0.05)	(0.05)
DEFNEG^	0.04	0.04	0.04
	(0.05)	(0.05)	(0.06)
DBREWAR^	-0.04	-0.04	-0.02
	(0.08)	(0.08)	(0.08)
STRICTLIAB^	0.00	-0.004	-0.02
	(0.10)	(0.10)	(0.10)
DFTWARN^	-0.10	-0.10	-0.12
	(0.07)	(0.08)	(0.08)
PUBLIC^	0.10	0.10	0.12
	(0.90)	(0.09)	(0.10)
PWITDOC^	0.02	0.02	0.00
	(0.06)	(0.06)	(0.06)
DWITDOC^	-0.19***	-0.19***	-0.18***
	(0.05)	(0.05)	(0.06)
PATHOGEN^	0.20***	0.20***	0.17***
	(0.05)	(0.05)	(0.05)
REGCOURT1^	-0.04	-0.04	-0.09
	(0.11)	(0.11)	(0.11)
REGCOURT2^	-0.08	-0.08	-0.10
	(0.10)	(0.10)	(0.10)
REGCOURT3^	0.15	0.15	0.12
	(0.09)	(0.10)	(0.10)
REGCOURT4^	0.36***	0.36***	0.29**
	(0.12)	(0.12)	(0.13)
REGCOURT5^	-0.11	-0.11	-0.13*
	(0.07)	(0.07)	(0.07)
REGCOURT6^	-0.05	-0.05	-0.03
	(0.09)	(0.09)	(0.10)
REGCOURT7^	0.20*	0.20*	0.24**
	(0.11)	(0.11)	(0.11)
REGCOURT8^	0.19*	0.19*	0.15
	(0.11)	(0.11)	(0.12)
	0.02	0.02	0.04

REGCOURT9^	(0.07)	(0.07)	(0.08)
	-0.04	-0.05	-0.02
REGCOURT10^	(0.13)	(0.13)	(0.14)
	0.00	0.00	-0.02***
RESOLYEAR^	(0.00)	(0.00)	(0.01)

^dy/dx is for discrete change of dummy variable from 0 to 1
Numbers in parentheses are standard errors.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Figure 1. Trends in FBI Lawsuits and Amount Awarded