Determinants of Federal Natural Disaster Relief

Abstract

This paper provides a comprehensive study of the determinants of federal disaster relief. Political and economic hypotheses about the likelihood of a Presidential Disaster Declaration and the amount of federal aid that is received following a declaration are developed and tested. Three datasets are combined to complete the analysis: the SHELDUS data from the University of South Carolina, the Presidential Disaster Declaration database from the University of Delaware, and the Property Claims Service database of estimated insured losses. Analysis shows that the frequency of approval of major disaster declarations and the amount of federal aid received have increased through time. Many of these trends can be explained by policy changes in disaster management that have occurred. Some of the political and economic hypotheses are supported in the analysis. While disasters in election years are more likely to receive a major disaster declaration, Democratic Presidents are less likely than their Republican counterparts to approve applications. The most intriguing economic finding is that a higher percentage of losses being insured is correlated with higher amounts of federal aid. This may indicate that federal aid is not a substitute (or crowding out) pre-event loss financing in the form of private insurance purchases.

Introduction

With large deficits currently being created by the federal government and concern over the unfunded nature of a large portion of federal disaster funds, a review of federal disaster relief and the role that it plays in both exposure mitigation and financing of natural disasters in the United States has significant public policy appeal. Federal post-disaster relief may be necessary to speed the recovery process, reduce the long-term economic losses associated with the disaster and provide meaningful social benefits to citizens as a whole. However, because of the *ad hoc* nature of current federal disaster relief programs and the lack of budgeting for a significant portion of these expenditures, current practices create an unfunded liability for taxpayers. Federal disaster relief may also have adverse impacts on optimal investments in disaster mitigation and private market pre-event financing for both individuals as well as state or local governments. This paper strives to provide a comprehensive examination of federal natural disaster relief.

This paper is going to examine the determinants of federal disaster relief. Not all natural disasters have received federal disaster relief. There are a significant number of natural disasters that are too small to reach the level of a Governor requesting a Presidential disaster declaration. Once a Governor does submit the request, there are a significant number of Presidential rejections of requests for federal disaster assistance. Once a disaster relief is granted, the amount of federal disaster relief varies relative to the loss amount. This paper will examine the likelihood of federal disaster relief being triggered and the amount of the disaster relief relative to the estimated loss amounts. We test a series of hypotheses related to the political and economic factors that may impact the likelihood that federal relief is granted and the amount of the federal relief.

The next section will provide an overview of federal disaster relief programs. The third section of the paper will review government and academic literature on disaster relief. The fourth section will develop the hypotheses about the likelihood of Presidential disaster declarations and the expenditures once a Presidential declaration has been made. Section five will contain the data and methodology. The paper will conclude with results and directions for future research.

Federal Disaster Relief Programs Overview

Federal disaster recovery programs have been at the forefront of public policy discussions in Washington for the last few years. The Congressional Research Service (CRS) has written a variety of papers on disaster relief for Congress (Bea, 2010; Lindsay & Murray, 2010; Torsell, 2011). These papers provide an overview of the current programs and historical spending patterns. In addition more recent CRS papers (McCarthy and Brown, 2015; Lindsay and McCarthy, 2015; Shields, 2015; Lindsay, Painter, & McCarthy: 2013) revisit the disaster relief process and explore some of the funding issues. Moss (1999) also provides an overview of the historical development of federal disaster relief.

There are a variety of federal programs that provide assistance to state and local governments as well as individuals, families, business and other organizations. The majority of federal aid is made available from FEMA under the authority of the Stafford Act (including the Individual Assistance Program, the Public Assistance Program and the Hazard Mitigation Assistance Program) , but there are other sources of federal funds as well including: Small Business Administration (SBA) Disaster Loans, U.S. Department of Agriculture (USDA) Agriculture and Rural Assistance, the Department of Housing and Urban

Development (HUD) Community Block Grant Program, and the U.S. Department of Transportation Federal-Aid Highway Emergency Relief (ER) Program (McCarthy and Brown, 2015). The current main governing legislation for FEMA under the Department of Homeland Security is the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Stafford Act). The Stafford Act authorizes the President of the United States to issue two types of declarations that precede federal aid: an emergency declaration or a major disaster declaration. Both types of declarations can be made either before or after an event.[1] The President has had the power to make the declaration decisions since the 1950 Federal Disaster Relief Act.[2]

> "Emergency declarations trigger aid that protects property, public health, and safety and lessens or averts the threat of an incident becoming a catastrophic event. A major disaster declaration, issued after catastrophes occur, constitutes broader authority for federal agencies to provide supplemental assistance to help state and local governments, families and individuals, and certain nonprofit organizations recover from the incident" (McCarthy, 2010).

However there are many intervening steps between an actual event occurring and a major disaster declaration. A major disaster declaration typically follows the steps below:

1. A (natural) disaster/event occurs
2. Local government responds to the event
3. If necessary, local government calls state for assistance
4. If the event exceeds state's ability to respond, FEMA is called for assistance
5. Local, state, and federal representatives complete the preliminary damage assessment (PDA) to determine loss
6. Governor submits a request to the President for federal assistance
7. FEMA evaluates the Governor's request and makes a recommendation
8. President either approves or denies request (Lindsay, 2014)

FEMA's evaluation of the Governor's request takes into account a variety of factors including: the nature of the event, an assessment of the state's ability to recover without federal intervention, and the estimate of the per capita damages from the PDA.

If a major disaster declaration is made, funding for the federal relief is taken from the Disaster Relief Fund (DRF), a no-year account that is used to fund response activities and pay for ongoing recovery programs (Lindsay, Painter, & McCarthy: 2013). The DRF is a no-year account which means that any appropriations that are no spent by the end of the year stay in the account to be used for future events. The DRF is funded through two types of appropriations, the annual appropriation and supplemental appropriations for events that exceed the funding of the DRF. Less than 1/3 of the necessary funding for the DRF between 1989 and 2014 was funded through annual appropriations. Of the more than $169 Billion appropriated in that time frame, just under $46 billion was annual appropriations (Lindsay, 2014). This is a major concern about the unfunded nature of federal disaster relief as noted by Cummins, et al (2010). It is important to note that the President decides on the approval of a major disaster

[1] Fire Management Assistance Grants and most agricultural disaster assistance programs do not require Presidential declarations (Lindsay and McCarthy, 2015; Shields, 2015).

[2] Prior to that Act, states had to wait for Congress to decide which could have included a long wait time if Congress was not in session.

declaration, but is not involved in the determination of the amount of aid utilized. That decision is made by FEMA. It is possible that the President and FEMA have different political agendas and may be subject to different political and economic pressures.

The role of the PDA in determining the likelihood of federal disaster relief cannot be understated. Once the major disaster declaration is made, cost sharing between the state and federal government is set (25% vs. 75% respectively). The Individual Assistance program is designed to aid individuals and families affected by the event. The Public Assistance program is designed to aid state and local governments affected. In assessing the degree of damage covered by the Public Assistance program, FEMA considers:

1. Estimated cost of assistance
2. Localized impacts
3. Insurance coverage
4. Hazard mitigation
5. Recent multiple disasters
6. Other federal assistance programs.

In assessing the factors considered for the Individual Assistance program, FEMA considers:

1. Concentration of damages
2. Trauma
3. Special populations
4. Voluntary agency assistance
5. Insurance coverage
6. Average amount of Individual Assistance by state.

For both the PA and IA programs, the amount of insurance coverage is used to *reduce* the amount of federal disaster aid. Thus the concern that anticipated federal aid would crowd out private insurance purchases. In the PA program, FEMA reduces the amount of aid by the amount of insurance that *should* have been purchased. In the IA program, no such reduction occurs for insurance that *should* have been purchased. This lack of aid reduction strengthens the crowding out potential for individuals.

However, it is important to point out that federal disaster relief provided through the Individual Assistance program is limited. Current limits are set at $28,800 for all aid received through the program, with normal payments in the $2,500 to $5,000 range. In addition, if the property is located in a special flood hazard area, flood insurance is required to qualify for most of the aid available in this program (https://www.fema.gov/recovery-directorate/assistance-individuals-and-households; accessed 2/3/16). In other words, the Individual Assistance program likely does not crowd out flood insurance, as it is required to receive most of the benefits. It may crowd out homeowners insurance, since the benefits of this program are reduced by that type of property insurance coverage.

Significantly more assistance is available to individuals and households in the form of low interest loans through the Small Business Administration (SBA). Although these loans are through the SBA, approximately 80% of loans made are to individuals and households. These loans are limited to $40,000 for personal property and $200,000 for real property. The loans are made available to creditworthy homeowners in the declared disaster area and cover only uninsured or underinsured properties (Torsell, 2011). The loans may be for up to 30 years at a maximum of 4% for homeowners that do not qualify for

a loan elsewhere, or 8% for homeowners that do qualify for loans elsewhere (e.g. a bank). The loans are not available for vacation or second homes (https://www.sba.gov/content/fact-sheet-homeowners-and-renters; accessed 2/3/16). So while this program does provide a significant amount of disaster aid, it is not a grant, but a loan and is limited in qualification and can be a relatively expensive form of post-loss financing. The program appears to be designed as a supplement to private pre-loss financing in the form of private insurance, not as a replacement.

Literature Review

Losses from natural disasters continue to increase (Kunreuther & Michel-Kerjan, 2009; Gall et al, 2011). Cummins et al (2010) provide an estimate of the future unfunded liability of federal disaster relief (between $1.2 and $7.1 Trillion) and state that federal disaster policy has encouraged development in high risk areas that has increased federal exposure to future disasters. Niehaus (2010) in his commentary on the Cummins et al (2010) analysis discusses why researching federal disaster policy is necessary: "…a number of important economic and public policy issues related to the impact of government disaster assistance, including the impact of assistance on (a) the incentives to purchase private insurance, (b) the distribution of wealth, and (c) real estate development in catastrophe prone areas." While both Cummins et al (2010) and Niehaus (2010) express concerns about high-risk development, Hallegatte (2011) provides an argument that increased productivity stems from development in higher risk areas (e.g. New Orleans) and that it may be rational decisions regarding future productivity that are leading to higher disaster losses not necessarily irrational behavior as suggested by Tversky & Shafir (1992) and Trope & Lieberman(2003).

What some find concerning is not only are losses from natural disasters increasing, but federal disaster relief has been increasing as a percentage of the losses due to natural disasters (e.g., Cummins, Suher, & Zanjani, 2010; Michel-Kerjan & Volkman Wise, 2011; Kunreuther & Michel-Kerjan, 2009). In 1995, the U.S. Senate Task Force on Funding Disaster Relief concluded that too many disaster declarations had been made. This was based on the fact that in many cases the local/state governments had the ability to recover on their own and did not need federal intervention. As such, federal disaster relief may reduce the incentives of individuals and organizations to mitigate against potential losses and finance those losses on a pre-loss basis with products such as insurance (Buchanan, 1975; Coate, 1995).

Dari-Mattiacci and Faure (2015) argue that when examining disaster relief a distinction should be made between relief expenditures and recovery expenditures. While the data utilized in our paper does not allow for such a distinction, the authors argue that immediate, *ad hoc* disaster relief is necessary. Dari-Mattiacci and Faure (2015) also provide arguments that it is long-term recovery expenditure that crowds out private insurance purchases and disincentivizes mitigation investment. In contrast , both Shavell (2014) and Boyer and Nyce (2014a, 2014b) provide arguments that in large catastrophes there still exists a government role. Shavell (2014) shows that optimal private sharing of very large risks does not result in complete coverage against them, thus leaving a portion of the risk unfunded. Boyer and Nyce (2014a, 2014b) show that government's lower cost of capital becomes increasing more important as the size of the catastrophe increases, thus complete private market coverage may not be optimal.

There appear to be very few academic studies that examine the determinants of the likelihood or amount of federal disaster relief following natural disasters in a comprehensive manner. Garret & Sobel

(2003), Michel-Kerjan (2010), Healy & Malhotra (2009), and Sylves & Buzas (2007) all find evidence of political motivation for federal disaster relief. For example, Dari-Mattiacci and Faure (2015) support Sylves and Buzas (2007) and others that there are political motivations in disaster relief and cite Michel-Kerjan (2010) as evidence of more ex post funding in election years relative to other years. Moss (2002 & 2010) and Eisensee & Stromberg (2007) find evidence that media coverage is a determinant of federal disaster relief.

Sylves and Buzas (2007) provided the most comprehensive research into Presidential disaster declarations. They evaluate a much longer time period, 1953-2003, than either Garrett and Sobel (2003) or Reeves (2005). They also provide an extensive overview of the political hypotheses regarding Presidential disaster declarations. However, they only analyze the determinants of the declaration using a logistic regression with the declaration or denial of the application as the dependent variable. They do not examine relief amounts or hypotheses outside of the political realm.

Garrett and Sobel (2003) examined disaster declaration data from the 1990's (1991-1999). They find that politically important states are more likely to receive Presidential disaster declarations. They also find that states with congressional representation on FEMA oversight committees receive more federal disaster relief. These two findings lead to their conclusion that nearly half of all disaster relief is motivated politically.

Reeves (2005) also examines 1990's data (1989-1999), looking at disaster declarations by George H.W. Bush and Bill Clinton. Reeves finds that the number of electoral votes and whether the state is politically "competitive" matters in "marginal" disasters, where the magnitude of the disaster is not so large that a Presidential disaster declaration is a given. This fits with political hypotheses where the President has the most flexibility in declaring a disaster, however the ability to utilize discretion in declaring a disaster would be limited to the marginal cases.

Hypotheses

Several hypotheses are developed in this paper and fall into two categories: political hypotheses and economic hypotheses. The political hypotheses related to proximity to elections, political party affiliation, and the importance of the state in national elections will be developed. The economic hypotheses include the percentage of the population effected by the catastrophe, the wealth of the population affected, the ultimate economic losses of the catastrophe, the financial ability of the state to recover, the cause of loss, the portion of losses insured and experience with previous losses and federal disaster relief will also be developed.

Political Hypotheses

Sylves and Buzas (1997) expect Democratic Presidents to approve more Governor requests than Republican Presidents. They attribute this to ideological differences between the two parties. They argue that Democratic Presidents would support a larger role of federal government in disaster policy relative to Republican Presidents who would support larger state roles.

> *P1: Presidential Political Party: Democratic Presidents would grant more Presidential disaster declarations.*

Sylves and Buzas (1997), Reeves (2005), and Garrett and Sobel (2003) postulate that a state with a Governor that is the same political party as the President would have a better chance of having an application for a Presidential disaster declaration approved. Thus, states with a Governor being the same political party as the President is a "friend" state, while states where the Governor is not the same political party is a "foe" or "enemy" state. Democratic Presidents and Democratic Governors would generate the setting for disaster declarations to be most likely. It is not clear how the remaining possible combinations of President/Governor party affiliation affects likelihood of declaration. A Democratic President may be more reluctant to approve an application by a Republican Governor than a Republican President may be willing to grant approval to a Republican Governor. Similarly, a Republican President may be less willing to grant approval to a Democratic Governor, but Republican Governors may be less likely to apply so the pecking order may not be clear.

> P2: Friendly States: When the Governor and President are in the same political party, it is more likely that a Presidential disaster declaration will be declared.

Further, voting patterns by citizens in a particular state may also influence the likelihood of a Presidential disaster declaration. If a state had voted for the seated President in the last election, that President may view that state as a supporting state and be more likely to award a Presidential disaster declaration.

> *P3: Support State: If the state voted for the sitting President in the previous election they are more likely to receive a Presidential disaster declaration.*

Alternatively, Presidents may not reward past support but may be seeking to garner future support by granting more Presidential disaster declarations to states that are "swing" states. Swing states are states that were close in voting in the last election and may help determine the winner in the next election.

> *P4: Swing States: If a state had a close vote in the last Presidential election, they are more likely to receive a Presidential disaster declaration.*

Another political factor that may influence the likelihood of declaration approval is the number of electoral votes held by a state. Winning a Presidential election comes down to electoral votes. The more influential a state is in terms of electoral votes, the more likely they are to be awarded a Presidential declaration.

> *P5: Electoral Votes: States with more electoral votes are more likely to receive a Presidential disaster declaration.*

The final political hypothesis is related to the proximity of a national election. Sylves and Buzas (1997) hypothesize that a sitting President in an effort to get reelected would be more likely to grant declarations in a reelection year. The awarding of the Presidential disaster declaration will generate positive publicity and lead to more votes in the coming election. Lindsay and McCarthy (2015) also examine the political effects of upcoming elections. They look not just at reelections, but at all Presidential elections and find slightly more disaster declarations in elections years. This could be a sitting President trying to aid his party's candidate (even if it is not himself).

P6: (Re)election Years: Years with national Presidential elections will have more Presidential disaster declarations.

The alternative to all of these hypotheses is that Presidential declarations will be awarded in an apolitical manner, based solely on the objective needs of the state(s) involved in the disaster.

Economic Hypotheses

Clearly, the size of the loss incurred during the event will impact the likelihood of a Presidential Disaster Declaration. Losses below a certain amount may never be approved for a disaster declaration. Similarly, losses above a certain amount may always be approved. It is the losses in the middle of the distribution that may be most influenced by the political hypotheses discussed above. The first economic hypothesis is clear.

E1: Size of Loss: Events with larger losses are more likely to get approved for a Presidential disaster declaration and will receive a higher level of federal aid.

FEMA analyzes the affected state's ability to recover from the event without federal government intervention. The financial condition of a state will influence the likelihood and amount of federal aid. Wealthier states and states that have budget surpluses have a better ability to absorb the losses of the event without federal government aid.

E2: Ability to recover: Wealthier states or states with budget surpluses are less likely to get approval for a Presidential disaster declaration and will receive less federal aid.

The type of event may have an impact on the likelihood of federal aid. Some types of events may have a more widespread effect than others. For example, more people may be directly affected by a hurricane than a tornado. This could impact larger portions of the population and for different length time periods. Similarly, the occurrence of some events are predictable and may generate media coverage for a longer period of time. For example, a hurricane can be tracked for days or weeks before making landfall, while an earthquake is relatively unpredictable. The hurricane coverage or winter storm coverage may cover many more news cycles. Similarly, events that cause injuries and fatalities may generate additional media coverage.

E3: Cause of Loss: Causes of loss that affect larger portions of the population, last for longer time periods, or can be predicted are more likely to receive a Presidential disaster declaration and receive more federal aid.

E4: Injuries and Fatalities: Events that cause injuries and fatalities are more likely to be approved for a Presidential disaster declaration and will receive more federal aid.

The role of pre-loss financing in the form of private insurance coverage can have a mitigating effect on federal disaster aid. Significant coverage of the damage by insurance reduces the need for federal aid and thus may make it less likely to receive a disaster declaration. However, the amount of insured losses may not be known at the time of the disaster declaration. Similarly, if a disaster declaration is granted, more insurance coverage should reduce the amount of disaster aid needed.

E5: Insured Losses: Insurance coverage should reduce the amount of federal disaster aid.

Recent experience with disasters and/or federal disaster relief may impact the likelihood or amount of federal disaster relief. A state that has had a recent disaster may see an increased need for federal aid since its ability to recover from an event may have been exhausted in the previous event(s). Thus, recent disasters may make it more likely to get approval for a Presidential disaster declaration. Furthermore, the state with recent experience in the disaster declaration process may have learned how to navigate the process better to ensure a higher likelihood of financial aid. On the other hand, if the state has proven it has the ability to recover without federal intervention, it may be less likely to receive aid in the future. The expectation hypothesis would indicate that a state that has received recent federal aid may come to expect that aid in future events. Therefore, previous federal aid would increase the likelihood of approval for new events. That hypothesis may also imply that if I have been the beneficiary of federal disaster relief, I may be less likely to purchase insurance going forward and "expect" the federal bailout after the fact. On the other hand, if my previous experience with federal disaster aid was not what I expected (process was difficult, aid amounts not sufficient, etc…) that experience may increase the likelihood of purchasing insurance. This can lead to competing hypotheses on previous losses and aid.

> *E6A: Previous Losses and Aid: Recent (disaster losses/federal disaster aid) may increase the likelihood of a Presidential disaster declaration and increase the level of federal aid.*
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> *E6B: Previous Losses and Aid: Recent (disaster losses/federal disaster aid) may decrease the percentage of losses covered by private insurance purchases and decrease the level of federal aid.*

Controlling for Policy Changes

Policy changes may influence the frequency of major disaster declarations. Federal disaster policy is constantly evolving. However, there are a few policy changes that have been more significant than others and may have fundamentally changed major disaster declarations. These include the Disaster Relief Act Amendments of 1974 (later named after Robert Stafford), the creation of FEMA in March of 1979, the Disaster Mitigation Act of 2000 that established a pre-disaster mitigation program and capped home repair costs at $5,000 per household, and the Post-Katrina Emergency Reform Act of 2006 that repealed the $5,000 limit per household (Lindsay and McCarthy, 2015). These treatments need to be controlled for during analysis and may help explain some of the time trends that are noticeable in the data.

FEMA has a general guideline for recommending a major disaster declaration, since 1986, it was $1 per capita in preliminary damage assessments. FEMA did not adjust this number for inflation until 1999. According to the Department of Homeland Security's Inspector General report in 2012, inflation adjustment of that guideline between 1986 and 1999 would have resulted in 36% fewer disasters in 2009 and 2010 qualifying for the recommendation of a major disaster declaration (OIG-12-79, pg. 7). Having this guideline unadjusted may have influenced the number of disaster declarations between 1986 and 1999, a period of time that saw significant increase in the likelihood of disaster declarations.

Controlling for Transparency of Declaration Process

Although the major disaster declaration process is designed to be somewhat transparent, Lindsay and McCarthy (2015) point out that it becomes more opaque as it moves through the layers of FEMA and

the Department of Homeland Security on the way to the White House (pg. 20). To make the process more transparent, FEMA published the factors they consider when evaluating a Governor's request for a major disaster declaration in the Federal Register on September 1, 1999. The publication of these factors may have made it easier for the various states considering applications for major disaster declarations to "check all the boxes" on their applications. In addition, it may have made it more difficult for FEMA to recommend declining a request if a majority of the factors were met.

Another change that may make disaster declarations seem more frequent is the professionalization of emergency management. Now that many colleges and universities are offering degrees in emergency management the individuals working in emergency management at the state level are more likely to be aware of the declaration process and become advocates of asking for the Governor to request a disaster declaration. This is not explicitly measured or tested in this paper, but may be a possible explanation for increasing frequency of approval.

Data/ Methodology

Data is being used from multiple data sets. Natural disaster losses are being taken from the SHELDUS database at the University of South Carolina. Federal disaster relief expenditures are being taken from the Presidential Disaster Declarations website at the University of Delaware. Insured loss estimates are from Property Claims Services (PCS). The time period studied is 1960 through 2009.

Gall et al. (2011) use the SHELDUS data for the same time period studied in this paper. SHELDUS contains direct property and crop losses from natural hazards in the United States. This database is a consolidation of information from the National Climatic Data Center, the US Geological Survey, and other sources. The losses reported are at the county level and when a range of losses are provided, SHELDUS only reports the lowest amount. All dollar values are reported in 2009 dollars for the 736,000 records at the county level. The SHELDUS data includes the cause of loss, number of injuries, the number of fatalities, the amount of property damage and the amount of crop damage from each event at the county level. To match the data from the Presidential Disaster Declarations website and PCS the SHELDUS data is aggregated to the state level. The aggregation is done by begin and end dates for the specific events reported in the database.[3] The vast majority of events reported in the SHELDUS database (over 94,000 events after aggregating to the state level) are too small to be considered for federal disaster relief. Those events account for more than 30% of total losses due to natural disaster events. Table 1 contains the summary statistics for the SHELDUS data utilized in this paper. As you can see the median property damage amounts are substantially smaller than the mean damage amounts, indicating that the distribution has a long tail pulling the mean up. The median (reported in millions) shows that half of the more than 94,000 events resulted in property damage less than $30,000.

Sylves and Buzas (2007) utilize the data from the Presidential Disaster Declarations (PDD) website at the University of Delaware. They used 1953-2003. To match our other data sources we will be utilizing the data from 1960-2009. That database contains both disaster declarations and denials. There were 1655 Presidential Disaster Declarations and 680 denials during our time period. For the denials, the database reports the request number, the state, the turn down date, a disaster description and the President. In

[3] As discussed below, date ranges in the various databased often vary for a single event. As a result, data is consolidated in a variety of ways.

addition, for each declaration the database reports the declaration number, the counties involved in the event, the date of approval, the type of disaster, total federal aid (in 2009 dollars), the President, and the Governor. Any missing data on President, Presidential political party, Governor, or Governor political party were filled in via Google searches. Table 1 also contains the summary statistics for the federal aid variable taken from the PDD data. Similar to the SHELDUS data the median federal aid amount is substantially lower than the mean value. The mean is more than eight times larger than the median, with the mean amount of federal aid per Presidential disaster declaration being approximately $84 million.

Insured loss estimates for natural disaster events was provided by Property Claims Services (PCS). The estimates are generated by PCS for events that are of significant magnitude. From 1960 until 1982 losses had to be greater than $1M for PCS to consider an event a catastrophe. From 1983 to 1996, the event had to cause more than $5M in damage. Since 1997, the losses have to be greater than $25M. This database has approximately 5,600 events at the state level. Table 1 also contains the summary statistics of the PCS estimated insured losses per event reported. The PCS data is still skewed, just not as much as the PDD federal aid variable or the SHELDUS property loss variable. The mean PCS estimated insured loss is just over $55 million.

One of the concerns raised in the previous literature is about the increasing likelihood of federal disaster relief and the increasing amounts of federal funds. To examine this time trend, the data was aggregated to the decade level. Table 2 contains the SHELDUS data aggregated to the decade level. As you can see from columns 1 and 2, there has been a noticeable increase in both the frequency and severity of natural hazards in the United States through time. Not only that, but looking only at larger events, (columns 3 & 4 focus on losses great than $10M, and columns 5&6 focus on losses greater than $100M) we see that we are having more larger events. While the total number of events per decade has doubled (Column 1), the total number of events greater than $100M has increased by nearly 400% (column 5), even after adjusting for inflation to 2009 dollars.

Table 3 shows the trends of the Presidential Disaster Declarations through the decades. The number of disaster declarations per decade has increased (column 1) faster than the overall rate of event increases in Table 2, but slower than the rate of increase for $10M or $100M events. The mean federal aid per declaration has also increased (column 4), especially in the 1990's and the 2000's. However, when you compare the mean federal aid to the mean annual federal expenditures for each decade, the percentage of federal expenditures on aid has actually diminished through time (column 6). The most noticeable change is in the likelihood of a Governor's request for a disaster declaration being approved. The rejection rate for applications has dropped substantially through time (column 3).[4]

Table 4 contains the breakdown of the number of natural disaster events, disaster declarations and insured loss estimates by state. When merged with the political data and state-level economic data, this will help to test many of the hypotheses. Table 5 shows some of the distribution of disaster losses relative to the disasters that are either approved or denied a major disaster declaration. This table shows that most hazard losses do not reach a level where approval of a Presidential Disaster Declaration is probable. Seventy five percent of disaster declarations are for disasters where property losses are

[4] Though not reported, the PCS Estimated Insured Losses show a similar pattern to the SHELDUS and Disaster Declarations data. The number of events reported by the PCS increases through time and the mean estimated insured loses per event also increase.

$2.3 million or higher. Compare that to the distribution of the SHELDUS losses where the 75th percentile of losses is only $192,000. In fact, it is nearly the 95th percentile of losses ($3.4 million) before you get to most of the Presidential Disaster Declarations. The denials are more varied with denials stretching from $0 up to losses in the billions.

Merging the three datasets is challenging. Since the SHELDUS data is reported at the county level, it needs to be aggregated to the state level. To do this, we first consolidate events with the same begin date, end date and peril across counties, summing the variables related to the impact such as injuries, fatalities, property damage, crop damage, and counties impacted. However, there may be inconsistencies in reporting. Some counties may be reporting slightly different begin and/or end dates of events, or may be reporting different causes of loss. Therefore, in our initial data, we may be overstating the number of events that are occurring. This would also imply that we are understating the severity of those same events. We may be reporting two smaller events as separate events, where they may be part of one larger event. We would expect that record keeping has become better through time, so that if we are overrstating the number events, we would expect that the degree of overstatement would be higher in earlier years and lower in later years with better record keeping. All the results reported here use this baseline merger method for the SHELDUS data that was then matched to the PCS and PDD data. [5]

The PCS data was hand matched to the Presidential Disaster Declarations database. Of the 1,655 disaster declarations 1,215 matched the PCS data. The remaining did not match any PCS event. Of the 680 disaster denials, 408 did NOT match any PCS data. Thus our sample underreports the likelihood of a disaster denial. The joint PCS/PDD data was then hand matched to the aggregated SHELDUS data. The result is approximately 1,500 of the original 5,600 PCS events that did not match SHELDUS events.

County area in square miles was taken from Google searches (mainly Wikipedia). Population for each county was taken from the U.S. Census with linear extrapolation between the 10 year reporting windows.[6]

Preliminary Results

To test the hypotheses presented earlier, we develop a two-stage Heckman model to analyze the likelihood of a disaster declaration being approved and once approved the level of federal aid received. The results appear in Tables 6 and 7. Table 6 presents the full sample results. These are the disaster

[5] We then follow a similar procedure for events with the same begin date and peril as well as events with the same end date and peril in a given state. This results in just over 90K events, an additional consolidation of over 4,000 events. Upon further inspection, there are still a significant number of events with the same peril and begin dates that are within a day or two. Thus, we follow a similar collapsing process to merge observations with the same peril and with start dates within a day and within two days. This reduces the number of events to 86,500 an additional consolidation of 3,500 observations. While this should reduce the chance that the same event is reported more than once in single state, it is now possible we are understating the number of events. Both of these new SHELDUS dataset consolidations are currently being matched to the PCS and PDD data, a time consuming process that will be completed before the ARIA meeting.

[6] Additional data still being collected: voting patterns for Presidential elections (1960-2008), state level wealth data, and state budget information is necessary to test some of the hypotheses. All this data collection and hypothesis testing will be finished before the ARIA meeting.

declarations and denials that we could match to both the PCS data and the SHELDUS data. The full sample is 1,365 observations with 232 disaster denials included. Table 7 contains the results of a subsample of the data where the SHELDUS losses were between $1M and $100M. This represents the middle of the distribution, where it is not obvious that the event was too small for federal aid, nor was it so large that federal aid was nearly a given. That sample has 1,050 observations with 160 disaster denials. The results in Tables 6 and 7 are fairly consistent.

In the hypotheses section, the first two political hypotheses indicated that Democratic Presidents would be more likely to grant a disaster declaration and both Republican and Democratic Presidents would be more likely to grant disaster declarations to states with Governors in their own party. The results of this test are in Tables 6A and 7A. The excluded variable is the pairing of a Republican President and a Republican Governor. Both the Democratic President/Democratic Governor and Democratic President/Other Governor are negative, indicating that Democratic Presidents are less likely to award disaster declarations, contrary to hypothesis P1. It is interesting to note that Democratic President/Other Governor is the least likely combination of President/Governor to result in a disaster declaration. There is no statistical difference between a Republican President/Republican Governor pairing and the republican President/other Governor pairing. So the friendly state hypothesis (P2) may hold for Democratic Presidents, but it does not appear to influence Republican Presidents. The election year political hypothesis (P6) is supported as the likelihood of getting a disaster declaration in an election year is higher (marginally statistically significant).[7]

The economic hypotheses are also tested. The first economic hypothesis (E1) is supported. The amount of property damage incurred has a positive and significant effect on the likelihood of a disaster declaration. The third economic hypothesis regarding cause of loss (E3) also has some significant results. The excluded cause of loss is flood. The flood cause of loss is the most likely to get a disaster declaration since all of the other causes of loss have a negative coefficient. The causes of loss that are less likely (statistically significant) to get a declaration are hail, snow, and tornados. Surprisingly, the number of injuries and fatalities associated with an event do not seem to have an impact on the likelihood of approval as neither parameter estimate is statistically significant.

The time trend of disaster declarations can be explained by some of the policy changes discussed earlier. The passage of the Stafford Act (1974) and the creation of FEMA (1979) did not have any impact on the likelihood of approval. However, the Disaster Management Act of 2000 had a negative and significant impact while it lasted (2000-2006). The two events that had the largest positive impact on the time trend were the failure to adjust the losses per capita measure for inflation (1986-1999) and the publication of the factors used to decide on disaster declaration recommendations (1999). This result may indicate that it is not that the federal government is more likely to provide federal aid but that there are policy reasons why approval is more likely today that it was in the past.

Tables 6B and 7B provides the second stage Heckman results where the dependent variable is the natural log of federal aid provided for each disaster declaration. In this table, E1 is again supported as it appears the size of the property losses has a positive impact on the amount of federal aid provided. There is also an indication that fatalities do have an impact on the amount of aid provided (positive and

[7] The remaining political hypotheses require additional data to test. That data, as previously mentioned in being collected and we will have those results prior to ARIA.

significant). Aid also varies by the cause of loss. Freezing generates slightly more aid than floods, but both hail and tornados receive significantly less federal aid. This could be an indication that these causes of loss affect smaller areas. The most surprising result is the positive and significant parameter estimate on the insurance ratio. The more of the loss that is insured, the higher the federal aid received. This is in direct contrast to the crowding out hypothesis that federal aid is serving as a replacement to pre-loss event financing.

Conclusion

Initial results show that in addition to the size of the property damage and the cause of loss, there are several other political and economic factors influencing both the declaration of a Presidential Disaster Declaration as well as the amount of federal aid received. For example, the presence of the disaster in an election year leads to increased likelihood of a declaration being approved. Additionally, the political affiliation of the President and Governors (and their relationship to each other) also impacts the decision.

The data to measure the Presidential Disaster Declarations, the insured losses and the damage is complex and merged from a variety of sources. While the initial results support many of the political and economic hypotheses, further results will be generated when the data mergers are more refined and remaining political and economic factors are added. This will be done prior to ARIA.

References

Asseldonk M., Huirne R., Meuwissen M. 2002. Belief in Disaster Relief and the Demand for a Public – Private Insurance Program. *Review of Agricultural Economics* 24(1): 196-207.

Bea K. 2008. Federal Stafford Act Disaster Assistance: Presidential Declarations, Eligible Activities, and Funding. *CRS Report for Congress* 1-43.

Bea K. 2005. Organization and Mission of the Emergency Preparedness and Response Directorate: Issues and Options for the 109th Congress. *CRS Report for Congress* 1-64.

Bea K. 2008. Federal Stafford Act Disaster Assistance: Presidential Declarations, Eligible Activities, and Funding. *CRS Report for Congress* 1-43.

Bea K. 2010. Federal Stafford Act Disaster Assistance: Presidential Declarations, Eligible Activities, and Funding. *Congressional Research Service* 1-28.

Bea K. 2010. Federal Stafford Act Disaster Assistance: Presidential Declarations, Eligible Activities, and Funding. *Congressional Research Service* 1-28.

Borden K., Cutter S., Emrich C., Gall M. 2011. The Unsustainable Trend of Natural Hazard Losses in the United States. *Sustainability* 3: 2157-2181.

Botzen W.J., Van Den bergh J. 2012. Monetary Valuation of Insurance Against Flood Risk Under Climate Change. *International Economic Review* 53(3) 1005-1025.

Brunette M., Cabantous L., Couture S., Stenger A. 2013. The Impact of Governmental Assistance on Insurance Demand Under Ambiguity; a Theoretical Model and an Experimental Test. *Springer Science + Business Media New York ?* 153-174.

Bruce L., Murray J. 2010. Disaster Relief Funding and Emergency Supplemental Appropriations. *Congressional Research Service* 1-28.

Buzas Z., Sylves R. 2007. Presidential Disaster Declaration Decisions, 1953-2003: What Influences Odds of Approval? *Preparedness of State and Local Governments* 3-15.

Coate S. 2001. Altruism, the Samaritan's Dilemma, and Government Transfer Policy. *The American Economic Review* 85(1):46-57.

Coble K., Landry C., and Petrolia D. 2013. Risk Preferences, Risk Perceptions, and Flood Insurance. *Land Economics* 89(2): 227-245.

Cummins D., Suher M., Zanjani G. 2010. Federal Financial Exposure to Natural Catastrophe Risk. *National Bureau of Economic Research.* Measuring and Managing Federal Financial Risk ? 61-92.

Cummins J., Suher M., Zanjani G. 2010. Federal Financial Exposure to Natural Catastrophe Risk. *National Bureau of Economic Research* 93-96.

Dari-Mattiacci G., Faure M. 2015. The Economics of Disaster Relief. *Law & Policy* 37(3): 108-208

Department of Homeland Security Office of Inspector General. Opportunities to Improve FEMA's Assistance. Preliminary Damage Assessment Process. 2012.

Eisensee T., Stromberg D. 2007. News Droughts, News Floods, and U.S. Disaster Relief. *The Quarterly Jounral of Economics* 122(2): 693-728.

Garrett T., Sobel R. 2003. The Political Economy of FEMA Disaster Payments. *Economy Inquiry* 41(3): 496 – 509.

Gallagher J. 2014. Learning About an Infrequent Event: Evidence from Flood Insurance Take-Up in the United States. *American Economic Journal: Applied Economics* 6(3): 206-233.

Hillert A., Jacobs H., Muller S. 2014. Media Makes Momentum. *The Review of Financial Studies* 27(10): 1-35.

Kaplow L.1991. Incentives and Government Relief for Risk. *Journal of Risk and Uncertainty* 4: 167-175.

Kelly M., Kleffner A. 2003. Optimal Loss Mitigation and Contract Design. *Journal of Risk and Insurance* 70(1): 53-72.

Kousky C., Michel-Kerjan E., Raschky P. 2014. Does Federal Assistance Crowd Out Private Demand for Insurance? *The Wharton Risk Management and Decision Process Center* 1-41.

Kunreuther H., Miller L. 1985. Insurance Versus Disaster Relief: An Analysis of Interactive Modelling for Disaster Policy Planning. *Public Administration Review*. Special Issue: Emergency Management: A Challenge for Public Administration 45: 147-154.

Kunreuther H., Michael-Kerjan E. 2015. Demand for Fixed-price Multi-year Contracts: Experimental Evidence From Insurance Decisions. *Journal of Risk and Uncertainty* 51: 171-194.

Landis M. 1998. Disaster Relief and the American Welfare State. *Northwestern University Law Review* 92(3):967-1034.

Landis M. 1999. Fate, Responsibility, and "Natural" Disaster Relief: Narrating the American Welfare State. *Law and Society Review* 33(2): 257-319.

Lewis T., Nickerson D. 1989. Self-Insurance Against Natural Disasters. *Journal of Environmental Economics and Management* 16: 209-223.

Lindsay B. 2010. The SBA Disaster Loan Program: Overview and Possible Issues for Congress. *Congressional Research Service* 1-30.

Lindsay B. 2010. The SBA Disaster Loan Program: Overview and Possible Issues for Congress. *Congressional Research* 1-30.

Lindsay B. 2014. Federal Emergency Management: A Brief Introduction. *Congressional Research Service* 1-27.

Lindsay B. 2014. FEMA's Disaster Relief Fund: Overview and Selected Issues. *Congressional Research Service* 1-25.

Lindsay B., McCarthy F. 2015. Stafford Act Declarations 1953-2014: Trends, Analyses, and Implications for Congress. *Congressional Research Service* 1-32.

Lindsay B., Murray J. 2010. Disaster Relief Funding and Emergency Supplemental Appropriations. *Congressional Research Service* 1-28.

Lindsay B., Painter W., McCarthy F. 2013. An Examination of Federal Disaster Relief Under the Budget Control Act. *Congressional Research Service* 1-19.

Liu E. 2008. Flood Insurance Requirements for Stafford Act Assistance. *CRS Report for Congress* 1-6.

McCarthy F. 2009. FEMA Disaster Housing: From Sheltering to Permanent Housing. *Congressional Research Service* 1-27.

McCarthy F., Keegan N. 2009. FEMA's Pre-Disaster Mitigation Program: Overview and Issues. *Congressional Research Service* 1-22.

McCarthy F. 2010. FEMA Disaster Cost-Shares: Evolution and Analysis. *Congressional Research Service* 1-24.

McCarthy F. 2010. FEMA's Disaster Declaration Process: A Primer. *Congressional Research Service* 1-22.

McCarthy F., Brown J. 2015. Congressional Primer on Responding to Major Disasters and Emergencies. *Congressional Research Service* 1-12.

McCarthy F., Keegan N. 2009. FEMA's Pre-Disaster Mitigation Program: Overview and Issues. *Congressional Research Service* 1-22.

Michael-Kerjan E., Kousky C. 2010. Come Rain or Shine: Evidence on Flood Insurance Purchases in Florida. *The Journal of Risk and Insurance* 77(2): 369-397.

Michel-Kerjan E., Wise J. 2011. The Risk of Ever-Growing Disaster Relief Expectations. 1-35.

Raschky P., Schwarze R., Schwindt M., Zahn F. 2013. Uncertainty of Governmental Relief and the Crowding out of Flood Insurance. *Environmental Resource Economics* 54: 179-200.

Raschky P., Weck-Hannemann H. 2007. Charity Hazard- A Real Hazard to Natural Disaster Insurance?. *Environmental Hazards* 7(4): 321-329.

Richardson D. 2015. Major Disaster Assistance from the Disaster Relief Fund: State Profiles. *Congressional Research Service* 1-6.

Shavell S. 2014. A General Rationale for a Governmental Role in the Relief of Large Risks. *Journal of Risk and Uncertainty* 49: 213-234.

Shields D. 2015. Agricultural Disaster Assistance. *Congressional Research Service* 1-9.

Torsell C. 2011. Federal Disaster Recovery Programs: Brief Summaries. *Congressional Research Service* 1-14.

U.S. Congress, Senate Task Force on Funding Disaster Relief, *Bipartisan Task Force on Funding Disaster Relief*, 104th Cong., 1st sess., March 15, 1995, No. 104-4 (Washington: GPO, 1995),

Table 1: Summary Statistics

	SHELDUS DATA (N=94741)				Presidential Disaster Declarations (N=1653)	Property Claims Services (N=5625)
	Injuries	Fatalities	Mean Property Damage	Mean Crop Damage	Mean Federal Disaster Aid	Mean Estimated Insured Losses
Mean	2.27	0.2977	5.08	1.16	83.90	55.40
Median	0	0	0.03	0.00	9.51	10.00
Min	0	0	0	0	0	0.0025
Max	17,500	683	34,100	8,160	28,100	25,400

* all dollar figures in millions of 2009 dollars

Table 2 Natural Disaster Events Through Time						
	Sheldus (all losses)		Sheldus (losses > $10M)		Sheldus (losses > $100M)	
	N	Mean Property Damage	N	Mean Property Damage	N	Mean Property Damage
1960's	13,622	$2.44	181	$159	38	$633
1970's	16,225	$3.07	442	$102	86	$438
1980's	18,052	$3.73	510	$122	80	$657
1990's	19,862	$6.11	640	$177	122	$793
2000's	26,980	$7.78	800	$251	151	$1,210

* all Property Damage in 2009 dollars in millions

Table 3 Presidential Disaster Declarations Through Time

	Declarations	Disaster Denials	Rejection Rate	Mean Federal Aid	Mean Federal Expenditures	Aid-to-Total Expenditures Ratio
1960's	176	91	34.08%	19.8	196,850	0.0101%
1970's	310	225	42.06%	27.6	490,140	0.0056%
1980's	214	139	39.38%	25.5	1,281,750	0.0020%
1990's	427	117	21.51%	71.1	2,303,730	0.0031%
2000's	521	68	11.54%	174.0	3,902,900	0.0045%

Table 4 State Level Data							
	SHELDUS DATA		Presidential Disaster Declarations			Property Claims Service	
State	Events	Mean Property Damage	Declarations	Mean Federal Aid	Denials	Events	Mean Insured Losses
AK	582	5.41	30	26.80	10	6	99.17
AL	2425	4.37	51	63.60	29	172	413.00
AR	2263	2.34	47	19.50	19	186	170.00
AZ	1342	1.18	20	25.00	11	28	229.00
CA	2086	31.70	68	265.00	29	87	2740.00
CO	2333	2.08	13	19.90	2	98	558.00
CT	728	1.28	11	14.50	7	97	154.00
DE	510	0.53	12	6.40	4	56	69.30
FL	4067	12.60	61	249.00	28	133	3900.00
GA	2843	1.17	31	40.70	24	162	367.00
HI	455	7.93	21	29.50	5	6	2920.00
IA	3182	4.56	37	55.80	13	142	176.00
ID	1317	0.62	18	7.55	5	7	64.30
IL	2161	2.91	47	33.50	19	264	232.00
IN	2020	3.41	36	20.20	12	195	257.00
KS	3148	1.57	38	40.20	16	215	239.00
KY	2058	2.06	50	26.60	0	138	317.00
LA	2385	30.70	50	672.00	18	180	1940.00
MA	1335	1.44	19	32.30	8	90	210.00
MD	1531	0.99	17	23.70	9	90	233.00
ME	973	2.00	34	9.38	9	41	126.00
MI	2005	4.47	22	31.40	16	116	221.00
MN	1811	2.99	41	32.30	12	93	678.00
MO	2371	2.49	48	31.90	18	224	269.00
MS	2501	15.60	45	269.00	23	181	950.00
MT	1192	0.33	17	8.12	6	10	149.00
NC	2937	4.16	32	76.00	19	134	510.00
ND	1325	5.63	36	36.80	12	31	262.00
NE	3074	1.31	40	16.50	9	115	220.00
NH	844	0.44	22	8.94	4	46	85.55
NJ	772	4.07	23	28.80	10	143	167.00
NM	1284	1.91	19	8.40	10	44	158.00
NV	609	1.87	13	8.28	10	19	251.00
NY	3337	3.73	54	242.00	34	176	1360.00
OH	2670	3.20	42	24.10	23	190	310.00
OK	2766	2.30	62	20.20	0	274	248.00
OR	833	2.26	23	20.00	0	29	214.00
PA	2831	2.81	36	55.70	12	178	250.00
RI	387	1.09	5	6.58	5	61	88.31
SC	2179	3.57	13	64.80	12	106	384.00
SD	1674	0.76	30	17.20	6	40	95.67

TN	2587	1.00	43	16.10	11	153	316.00
TX	5491	6.95	77	122.00	47	428	844.00
UT	1144	0.90	7	18.60	10	8	123.00
VA	2159	3.20	38	31.80	12	128	306.00
VT	1230	0.75	28	7.90	3	40	72.57
WA	900	20.60	41	31.30	14	32	420.00
WI	1820	3.29	32	18.80	18	109	206.00
WV	1286	1.93	39	32.70	2	67	111.00
WY	978	0.59	7	3.11	4	26	118.00

Table 5: Comparison of Property Damage Amounts

	SHELDUS Property Damage	Presidential Denials (Property Damage)	Presidential Disaster Declarations (Property Damage)
Minimum	$0	$0	$0
25th Percentile	$4,839.50	$341,000	$2,300,000
50th Percentile	$30,000	$2,900,000	$17,600,000
75th Percentile	$192,000	$16,300,000	$85,100,000
Maximum	$5.25 E10	$1.17 E9	$5.25 E10

Table 6A: First Stage Heckman Results
Dependent Variable = Disaster Declaration Approved
Full Sample

VARIABLES	Parameter Estimate	Std. Err.
Injuries	0.0014	[0.001]
Fatalities	0.0097	[0.009]
ln (Property Damage)	0.1051***	[0.017]
Area	0.0000	[0.000]
# of event days	0.0019	[0.007]
Fire	-0.0788	[0.665]
Freezing	-0.1280	[0.247]
Hail	-0.4726***	[0.120]
Hurricane	-0.0050	[0.266]
Snow	-1.6523**	[0.643]
Tornados	-1.1933***	[0.332]
Wind	-0.2885	[0.454]
Election Year (d)	0.1863*	[0.108]
Democrat/Democrat	-0.1936	[0.144]
Republican/Other	0.0739	[0.123]
Democrat/Other	-0.2940**	[0.145]
Stafford (d)	-0.1852	[0.176]
FEMA (d)	0.0252	[0.156]
DMA (d)	-1.0383***	[0.307]
No Inflation (d)	0.6152***	[0.138]
Published Factors (d)	1.5838***	[0.292]
Constant	-0.8325***	[0.303]
Observations	1,365	

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 6B: Second Stage Heckman Results
Dependent Variable = ln (Federal Aid)
Full Sample

VARIABLES	Parameter Estimate	Std. Err.
Injuries	0.0000	[0.000]
Fatalities	0.0091***	[0.002]
ln (Property Damage)	0.3687***	[0.034]
Fire	-0.2929	[0.599]
Freezing	0.4557*	[0.274]
Hail	-0.8295***	[0.168]
Hurricane	0.3313	[0.300]
Snow	-1.4059	[1.051]
Tornados	-1.7123***	[0.543]
Wind	-0.5081	[0.591]
Stafford (d)	-0.2794	[0.232]
FEMA (d)	-0.2230	[0.201]
DMA (d)	-0.0346	[0.188]
No Inflation (d)	0.6564***	[0.164]
Published Factors (d)	0.8927***	[0.230]
ln (Insurance Ratio)	3.2758***	[0.362]
ln (Crop Damage)	0.0320***	[0.006]
Population	0.0000***	[0.000]
lambda	1.7042***	[0.492]
Constant	6.3458***	[0.884]
Observations	1,365	

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 7A First Stage Heckman Results
Dependent Variable = Disaster Declaration Approved
Truncated Sample ($1M < Losses < $100M)

VARIABLES	Parameter Estimate	Std. Err.
Injuries	0.0015*	[0.001]
Fatalities	0.0039	[0.009]
ln (Property Damage)	0.1770***	[0.037]
Area	0.0000	[0.000]
# of event days	-0.0009	[0.008]
Fire	-2.2131	[1.452]
Freezing	0.1737	[0.418]
Hail	-0.4953***	[0.140]
Hurricane	-0.0808	[0.313]
Snow	-1.6162**	[0.653]
Tornados	-1.0541***	[0.357]
Wind	0.2419	[0.610]
Election Year (d)	0.3482***	[0.132]
Democrat/Democrat	-0.2710	[0.169]
Republican/Other	0.0525	[0.147]
Democrat/Other	-0.3561**	[0.171]
Stafford (d)	-0.1456	[0.202]
FEMA (d)	0.0165	[0.180]
DMA (d)	-1.1913***	[0.407]
No Inflation (d)	0.4815***	[0.163]
Published Factors (d)	1.6518***	[0.386]
Constant	-2.0287***	[0.627]
Observations	1,050	

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 7B Second Stage Heckman Results
Dependent Variable = ln (Federal Aid)
Truncated Sample

VARIABLES	Parameter Estimate	Std. Err.
Injuries	-0.0002	[0.000]
Fatalities	0.0140***	[0.005]
ln (Property Damage)	0.4475***	[0.064]
Fire	-1.0482	[1.983]
Freezing	0.4444	[0.413]
Hail	-0.9211***	[0.221]
Hurricane	0.3612	[0.410]
Snow	-1.7366	[1.263]
Tornados	-1.6273**	[0.670]
Wind	-0.0066	[0.742]
Stafford (d)	-0.1031	[0.305]
FEMA (d)	-0.2666	[0.268]
DMA (d)	-0.0578	[0.250]
No Inflation (d)	0.7239***	[0.206]
Published Factors (d)	1.0380***	[0.299]
ln (Insurance Ratio)	1.8748**	[0.835]
ln (Crop Damage)	0.0174**	[0.008]
Population	0.0000***	[0.000]
lambda	2.0107***	[0.675]
Constant	6.1003***	[1.685]
Observations	1,050	

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1