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Determinants of the Probability of Ship Injuries

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Contents

Abstract

This study investigates determinants of the probability that an individual onboard a ship of a given shipping line will be injured (given that the ship is not involved in an accident). A Probit regression statistical model is used to investigate such determinants when ships are in port and on given types of containerships. Probit estimation results suggest that an individual is less likely to be injured in port onboard a ship that is larger in size and underway, but more likely to be injured if involved in a fall. An individual is less likely to be injured onboard a containership with AMO union officers if it is larger in size and during the daytime. An individual is less likely to be injured onboard a containership with MEBA and MMP union officers if it is larger in size, when the weather is clear and when he/she is wearing steel-toed safety boots.

Key Words: ship injuries, probability, port, containerships

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I. Introduction

Studies of the determinants of ship injuries have heretofore focused on ship injuries that arise from ship accidents. A ship accident is an unintended occurrence for a ship, e.g., a collision, a fire or a grounding ship accident. To the knowledge of the author, this study is the first to appear in the literature that investigates determinants of ship injuries for which the injuries do not arise from ship accidents. Also, it is the first study to investigate determinants of ship injuries of a single shipping line.

Data on individual injuries onboard ships (not attributed to ship accidents) of an unnamed shipping line that occurred between June 27, 2004 and May 3, 2008 are used in the investigation. Specifically, the data are used to investigate determinants of the probability that an individual onboard a ship of the unnamed shipping line will incur an injury (not attributed to a ship accident) in port and on given types of containerships.

The investigation finds that an individual is less likely to be injured in port onboard a ship that is larger in size and underway. Further, injuries are less likely on larger-sized containerships.

The study is structured as follows. A review of the literature on determinants of ship-accident injuries is presented in Section 2. A model of determinants of ship injuries not related to ship accidents as well as a description of the data to be used in the estimation of this model are presented in Section 3. Estimates of the model and marginal probabilities appear in Sections 4 and 5, respectively. Finally, conclusions are set forth in Section 6.

II. Literature Review

The number of ship injuries associated with a ship accident has been hypothesized in

the literature to be influenced by the: type of ship, type of ship accident, ship characteristics, ship operation phase, weather/visibility conditions, type of waterway, type of ship propulsion, type of ship hull construction and the cause of ship accident.
That is to say,

number of ship accident injuries = f(type of ship, type of ship accident, ship characteristics, ship operation phase, weather/visibility conditions, type of waterway, type of ship propulsion, type of ship hull construction, cause of ship accident) (1)

The type of ship may be, for example, a tanker, containership, tugboat, cruise ship or a ferry ship. The type of ship accident includes collision, allision, grounding, explosion, fire, equipment-failure, capsize or sinking. A collision accident occurs when a ship strikes or was struck by another ship on the water surface. An allision occurs when a ship strikes a stationary object (other than another ship) on the water surface. A grounding accident occurs when a ship is in contact with the sea bottom or a bottom obstacle. Ship characteristics may include ship age, ship size and ship flag. The ship operation phase may be described by whether the ship was moored, docked, anchored, towed, underway or adrift at the time of the accident.

Weather may be differentiated by whether high winds, precipitation and/or cold temperatures exist at the time of the accident. Visibility may be differentiated by whether the visibility was poor versus good, nighttime versus daytime and by time of day at the time of the accident. The type of waterway includes a harbor, river, lake, coastal, ocean, or a bay waterway. Type of ship propulsion includes diesel, gasoline and turbine. A ship's hull may be constructed with aluminum, steel, fiberglass or wood.

The cause of a ship accident may be a human cause (e.g., operator error, fatigue and intoxication) as opposed to an environmental (e.g., adverse weather and adverse sea condition) or a ship mechanical (e.g., corrosion, steering failure and propulsion failure) cause.

A study by Talley utilized detailed 1981-91 data of individual ship accidents that were investigated by the U.S. Coast Guard to estimate equation (1).[1] The type of ship included container, tanker and bulk ships. Separate estimates of equation (1) were found for the number of fatal and non-fatal ship-accident injuries. The estimation results suggest that the number of fatal crew injuries is greater: 1) for fire/explosion than for collision, material/equipment failure or grounding accidents 2) if the accident cause is human rather than environmental or vessel related; and 3) for tanker than for container or bulk ships. The estimation results for non-fatal injuries suggest that the number of non-fatal crew injuries is greater: 1) for fire/explosion and material/equipment failure than for collision or grounding accidents; and 2) if the accident cause is human rather than environmental or vessel related.

In a study by Talley, Jin and Kite-Powell[2], nine separate estimates of equation (1) were found for the number of non-fatal crew injuries, fatal crew injuries, and missing crew in freight ship, tanker and tugboat ship accidents. The estimates were based upon detailed 1991-2001 data of individual ship accidents that were investigated by the U.S. Coast Guard. The estimates suggest that: 1) higher fatal injuries in ship accidents are expected when older freight ships, tankers with fires aboard and capsized tugboats are involved; 2) higher non-fatal injuries in ship accidents are expected when ships are moored or docked and when high winds, poor visibility and cold temperatures exist at the time of ship accidents; and 3) a greater number of missing crew in ship accidents are expected when older freight ships and tugboats with fires aboard are involved.

Separate estimates of equation (1) for fatal and non-fatal crew and passenger injuries in ferry vessel accidents (based upon detailed 1981-91 data of individual ferry vessel accidents

1 Talley(1999), pp.1365-1372.
2 Talley, Jin and Kite-Powell(2005), pp.263-278.

that were investigated by the U.S. Coast Guard) are found in a study by Talley.[3] The estimates indicate that the number of fatal injuries is 3.35% higher for fire/explosion than for material/equipment failure, collision or grounding ship accidents and the number of non-fatal injuries are 4.46% and 3.60% higher for fire/explosions and collisions than for material/equipment failure or grounding accidents.

A study by Talley, Jin and Kite-Powell of ferry-accident injuries (based upon detailed 1991-2001 data of individual ship accidents that were investigated by the U.S. Coast Guard) found that fatalities are expected to be greater when a ferry accident is caused by a human factor as opposed to vessel and environmental factors.[4] A similar re- sult was found for cruise ship accidents by Talley, Jin and Kite-Powell.[5] That is to say, fatalities of cruise-ship accidents (based upon detailed 1991-2001 data of individual ship accidents that were investigated by the U.S. Coast Guard) are expected to be greater when a cruise ship accident is caused by a human factor as opposed to vessel and environmental factors.

The empirical results of the ship-accident injury literature provide strong evidence of a positive relationship between human causes of ship accidents and related injuries, thereby providing support for the shift in ship safety regulation in recent years toward regulating human actions aboard ships as opposed to just regulating ship conditions.

Further, the evidence predicts that reducing human causes of ship accidents will be efficacious in reducing both non-fatal and fatal ship injuries.

III. Model and Data

This paper investigates determinants of injuries aboard ships (not involved in accidents) of a single shipping line. That is to say, what factors explain why an individual on board one of the line’s ships was injured. This question is addressed by in-

3 Talley(2002), pp.331-338.
4 Talley, Jin and Kite-Powell(2008a), pp.175-188.
5 Talley, Jin and Kite-Powell(2008b), pp.86-94.

vestigating determinants of the probability that an individual onboard one of the line's ships will be injured.

Data used in the investigation were taken from ship injury reports of the unnamed shipping line. The unnamed shipping line operates a fleet of 51 ships, consisting of a commercial fleet and a government fleet that include containerships, tankers, car/truck and multi-purposes ships. The line provides ocean freight transportation service.

Each ship injury report of the unnamed shipping line provides information on a single individual that was injured onboard one of the line's ships as well as ship information (e.g., size, age and operation phase) and weather and visibility at the time at which the individual was injured. Fifty-two ship-injury reports are available that describe injuries to 52 individuals onboard the line's ships between June 27, 2004 and May 3, 2008.

However, because of missing information, complete information was only availabl for 38 of the 52 injured individuals. Thus, a sample of 38 ship injury reports was used in the investigation.

The probability that an individual onboard a ship of the unnamed shipping line will be injured, Pr(Injury), is hypothesized as follows:

Pr(injury) = g(ship characteristics, type of ship, ship operation phase, ship location, weather/visibility conditions, type of individual incident, injured individual characteristics, individual operation phase, year of injury) (2)

Ship characteristics include ship size (SSIZE) and ship age (SAGE). Type of ship includes two types of commercial containerships, containership #1 and containership #2 (CONT1, CONT2) versus tanker, car/truck and multi-purpose ships. Containership #1 and containership #2 are distinguished by their union officers. The union officers of containership #1 are members of the American Maritime Officers (AMO) union[6] and the union officers of containership #2 are members of the International Association of Masters, Mates and Pilots (MMP) union and the Marine Engineers Beneficial Association (MEBA) union.[7]

Ship operation phase is described by whether the ship was underway (UNDERWAY) or docked, moored, or anchored at the time of the injury. Ship location at the time of an individual's injury is described by whether the ship was in port (PORT) versus not in port. Weather is differentiated by whether the weather is clear (CLEAR) versus not clear and visibility is differentiated by whether it is daytime (DAYTIME) versus nighttime. The type of individual incident for which the individual was injured is described by an individual falling (FALL) while onboard a ship versus not falling. The injured individual is characterized by his/her age (INDAGE). The operation phase of the individual at the time of the injury is described by whether he/she was on ship duty (ONDUTY) versus not on ship duty and wearing steel-toed safety boots (TOEBOOT) versus not wearing such boots at the time of his/her injury. The variable INJYEAR describes the year in which the individual's ship injury occurred. This variable is included as a proxy variable for determinants during the year of injury occurrence (for which data are missing) of the probability that an individual onboard a ship of the unnamed shipping line will be injured.

The above variables and their specific measurements and descriptive statistics (mean and standard deviation) based upon data taken from the unnamed shipping line's ship injury reports appear in Table 1. If a ship injury occurred on containership #1 and containership #2, the binary variables CONT1 and CONT2 are assigned a one and zero otherwise, respectively. If the ship injury occurred in port, the binary variable PORT is assigned a one and zero otherwise. If the injury occurred when the weather is clear and the ship is underway, then binary varia bles CLEAR and UNDERWAY are assigned a one and zero otherwise, respectively. If the injured individual was on duty at the time of

6 The American Maritime Officers (AMO) union is the largest union of merchant marine officers in the United States. AMO officers work onboard U.S.-flagged merchant and military sealift vessels.

7 The Marine Engineers Beneficial Association (MEBA) was founded in 1875. It is a maritime labor union that provides marine engine and deck officers for U.S. flag ships. The International Association of Masters, Mates and Pilots union (MMP) was founded in 1887. The MMP represents deck officers and captains who are licensed by the U.S. Coast Guard (Talley, 2007). The MMP is the marine affiliate of the International Longshoremen's Association (ILA).

the injury, wearing steel-toed safety boots and falling is the type of individual incident, then the binary variables ONDUTY, TOEBOOT and FALL are assigned a one and zero otherwise, respectively.

<Table 1> Variable definitions and descriptive statistics

Variable	Measurement	Mean	Standard Deviation
SSIZE	Ship size in gross tons	41,106	20,142
SAGE	Ship age in years	19.947	9.687
CONT1	1 if container ship #1 , 0 otherwise	.237	.431
CONT2	1 if containership #2, 0 otherwise	.447	.504
UNDERWAY	1 if ship is underway when an individual was injured, 0 otherwise	.368	.489
PORT	1 if ship is in port when an individual was injured, 0 otherwise	.711	.460
CLEAR	1 if weather is clear when an individual was injured, 0 otherwise	.684	.471
DAYTIME	Time of day when an individual was injured in naval time hours	11.990	5.032
FALL	1 if injured individual was involved in a fall, 0 otherwise	.368	.489
INDAGE	Injured individual's age in years	48.763	11.598
ONDUTY	1 if injured indi vidual was on duty, 0 otherwise	.553	.504
TOEBOOT	1 if the injured individual was wearing steel -toed safety boots, 0 otherwise	.421	.500
INJYEAR	The year in which an individual was injured.	2006.7	1.141

The remaining variables in Table 1 have continuous units of measurement. The size of the ship on which the injury occurred (SSIZE) is measured in ship gross tons; the time of day when the injury occurred (DAYTIME) is measured in naval time hours; the age of the ship on which the injury occurred (SAGE) is measured in years; the age of the individual that was injured (INDAGE) is measured in years; and the year in which the injury occurred (INJYEAR) is measured in years.

The means of the binary variables in Table 1 can be interpreted as the proportion of individuals that incurred ship injuries in the data that are attributed to the binary variables' descriptions. Among containerships, containership #2 was involved in the largest percentage of injured individuals, i.e., 44.7 percent as compared to 23.7 percent for containership #1; 71.1 percent of the individuals that were injured were injured in port; 68.4 and 36.8 percent were injured when the weather was clear and the ship was underway, respectively; and 55.3, 42.1 and 36.8 percent of the individuals were injured while on duty, wearing steel-toed safety boots and falling was the individual type of incident, respectively. The average size of a ship on which injuries occurred is 41,106 gross tons; the average time of day at which ship injuries occurred was 11.99 hours (i.e., at noon); and the average age of the ship and the injured individual are 19.9 and 48.8 years, respectively.

Correlation coefficients for the above variables are found in the Appendix. Note that the absolute values of the correlation coefficients exceed 0.5 for the variable groups – SSIZE/CONT1, SSIZE/CONT2, CONT1/CONT2 and UNDERWAY/PORT. The correlation coefficients for the variable groups ONDUTY/TOEBOOT and CONT2/UNDERWAY are 0.446 and 0.300, respectively. The absolute values of the remaining correlation coefficients are less than 0.300.

IV. Model Estimates

The variables in Table 1 are utilized in the estimation of equation 2, i.e., in the estimation of the parameters of equation 2. Specifically, estimates of equation 2 are found and presented in Tables 2, 3 and 4 for which the dependent variables are the binary variables PORT, CONT1 and CONT2, respectively. The Probit regression statistical model is used to obtain the estimates, since Probit regression estimation restricts the predictions of the dependent binary variables to lie in the interval between zero and one. A discussion of the Probit regression statistical model is found in Greene.[8]

In the second columns of Tables 2, 3 and 4, the estimated parameters of equation 2 for the heretofore discussed explanatory variables are found. In the third columns of the tables, the estimated parameters of equation 2 for subsets of explanatory variables are found, i.e., those explanatory variables that are statistically significant or nearly so. In the fourth columns of Tables 2, 3 and 4, the marginal probabilities that correspond to the estimated parameters found in the third columns of the tables are presented. The estimation results of this study are based upon the parameter estimates and the marginal probabilities found in the third and fourth columns of Tables 2, 3 and 4.[9] Probit estimates of equation 2 for which the dependent variable is PORT are found in Table 2.

The estimate of equation 2 in the third column of Table 2 reveals that three of the hypothesized explanatory variables – SSIZE, UNDERWAY and FALL – are statistically significant at the ten, one and ten percent level, respectively. Further, the explanatory variable INJYEAR is nearly significant at the ten percent level (i.e., at the fifteen percent level). The negative signs for the estimated coefficients of SSIZE and UNDERWAY suggest that for the unnamed shipping line the probability of an individual being injured in port onboard one of its ships decreases as the ship increases in size and is less if the ship is underway. The positive coefficient sign for FALL suggests that an individual is more likely to be injured in port onboard a ship if the individual is involved in a fall.

8 Greene(1997).

9 The Probit parameter estimates of equation 2 as found in the second columns of Tables 2, 3 and 4 are expected to be biased and inconsistent. This follows since by using a dependent variable in one equation as an independent variable in another equation, the problem of correlation between an independent variable and the error term of the Probit statistical model arises – thereby resulting in biased and inconsistent parameter estimates.
However, since the estimation results of this study are based upon the parameter estimates in the third and fourth columns of Tables 2, 3 and 4 for which a dependent variable in one equation is not used as an independent variable in another equation, this problem does not arise.

<Table 2> PORT equation estimates

Variable	Estimate #1	Estimate #2	Estimate #3 (Marginal Probabilities)
SSIZE	$-.346x10^{-2}$ (8.074)	$-.485x10^{-4}$*** ($.285x10^{-4}$)	$-.393x10^{-5}$
SAGE	-4.087 (11,745)	---	---
CONT1	-28.518 (375,661)	---	---
CONT2	36,430 (160,719)	---	---
UNDERWAY	-96.252 (295,029)	-3.893* (1.448)	-.749
CLEAR	57.173 (301,768)	---	---
DAYTIME	-2.772 (10,413)	---	---
FALL	44.836 (146,697)	2.039*** (1.107)	.149
INDAGE	1.083 (11,473)	---	---
ONDUTY	-37.883 (297,263)	----	---
TOEBOOT	55.518 (188,179)	---	---
INJYEAR	16.893 (93,017)	.699 (.467)	.057
Constant	-33,687 (18,653,250)	-1.399 (937)	---
Percent of Dependent Variable Values Predicted Correctly	100	84.2	

\# Standard errors are in parenthesis.
* Significant at the one percent level.
** Significant at the five percent level.
*** Significant at the ten percent level.

Probit estimates of equation 2 for which the dependent variable is CONT1 are found in Table 3. The estimate of equation 2 in the third column of Table 3 reveals that three of the hypothesized explanatory variables – SSIZE, UNDERWAY and ONDUTY – are statistically significant at the ten percent level. Further, the explanatory variables DAY-TIME and INJYEAR are nearly significant at the ten percent level (i.e., at the fifteen percent level). The positive signs for the estimated coefficients of UNDERWAY and ONDUTY suggest that for the unnamed shipping line the probability of an individual being injured onboard containership #1 is greater when the ship is underway and the individual is on duty. Alternatively, the negative coefficient signs of SSIZE and DAY-TIME suggest that the probability of an individual being injured onboard containership #1 decreases as the ship increases in size and the probability of injury is less during the daytime.

Probit estimates of equation 2 for which the dependent variable is CONT2 are found in Table 4. The estimate of equation 2 in the third column of Table 4 reveals that four hypothesized explanatory variables in the third column – SSIZE, SAGE, CLEAR and TOEBOOT – are statistically significant at the one, ten, ten and five percent level, respectively. In addition, the explanatory variable FALL is nearly significant at the ten percent level (i.e., at the fifteen percent level). The negative (positive) sign for the estimated coefficient of SSIZE (SAGE) suggests that for the unnamed shipping line the probability of an individual being injured onboard containership #2 decreases with ship size (increases with ship age). The negative coefficient signs of CLEAR and TOEBOOT suggest that an individual is less likely to be injured onboard containership #2 when the weather is clear and the individual is wearing steel-toed safety boots. The negative coefficient sign for FALL suggests that an individual is less likely to be injured onboard containership #2 if the individual is involved in a fall as opposed to other types of individual incidents.

<Table 3> CONT1 equation estimates

Variable	Estimate #1	Estimate #2	Estimate # 3 (Marginal Probabilities)
SSIZE	$-.197 \times 10^{-2}$ (36.3)	$-.158 \times 10^{-3}$*** ($.824 \times 10^{-6}$)	$-.534 \times 10^{-6}$
SAGE	-1.811 (24,575)	---	---
UNDERWAY	3.149 (2,046,325)	4.601*** (2.769)	.427
PORT	-55.9 (2,866,672)	---	---
CLEAR	29.3 (517,635)	---	---
DAYTIME	-1.614 (49,646)	-.201 (.135)	$-.682 \times 10^{-3}$
FALL	49.54 (716,803)	---	---
INDAGE	-1.764 (56,278)	---	---
ONDUTY	17.06 (604,180)	2.632*** (1.505)	$.280 \times 10^{-1}$
TOEBOOT	10.86 (1,104,958)	---	---
INJYEAR	3.733 (452,782)	.593 (.415)	$.201 \times 10^{-2}$
Constant	-7,306 (90,447,869)	-1,188 (832.8)	---
Percent of Dependent Variable Values Predicted Correctly	100	81.6	

\# Standard errors are in parenthesis.
* Significant at the one percent level.
** Significant at the five percent level.
*** Significant at the ten percent level.

<Table 4> CONT2 equation estimates

Variable	Estimate #1	Estimate #2	Estimate # 3 (Marginal Probabilities)
SSIZE	$-.108\times10^{-3*}$ ($.420\times10^{-4}$)	$-729\times10^{-4*}$ ($.228\times10^{-4}$)	$.271\times10^{-4}$
SAGE	$.280\times10^{-1}$ ($.502\times10^{-1}$)	.058*** (.035)	.021
UNDERWAY	1.548 (1.081)	---	---
PORT	1.671 (1.117)	---	---
CLEAR	-2.203 (1.407)	-1.341*** (.767)	-.494
DAYTIME	-.113 (.089)	---	---
FALL	-1.816** (.877)	-.794 (.554)	-.276
INDAGE	.088*** (.049)	---	---
ONDUTY	-.611 (.855)	---	---
TOEBOOT	-1.677 (1.062)	-1.967** (.782)	-.609
INJYEAR	-.444 (.412)	---	---
Constant	883.9 (825.7)	-2,488*** (1.335)	---
Percent of Dependent Variable Values Predicted Correctly	86.8	78.0	

\# Standard errors are in parenthesis.
* Significant at the one percent level.
** Significant at the five percent level.
*** Significant at the ten percent level.

V. Marginal Probabilities

Although the signs of the estimated Probit coefficients suggest either an increase or decrease in the probability of an onboard ship injury, the coefficients themselves do not measure the correct marginal probability effects for nonzero observations of the dependent variable. However, estimates of correct marginal probability effects can be derived using the estimated coefficients. This derivation is found in Greene (1997) and was used to compute the marginal probabilities found in Tables 2, 3, and 4. Among the categorical (or dummy) variables in the fourth column of Table 2, underway has the largest marginal probability effect on an injury occurring, i.e., when a ship of the unnamed shipping is underway in port, the probability of an onboard injury decreases by.749. A fall by an individual increases this probability by .149.

In Table 3, underway (among categorical variables) also has the largest marginal probability effect on an injury occurring on containership #1. However, in this case the effect is positive, i.e., when a containership #1 is underway, the probability than an onboard individual will incur an injury increases by. 427.

Among the categorical variables in Table 4, the wearing of steel-toed safety boots has the largest marginal probability effect on an injury occurring on containership #2 – i.e., the probability of an individual incurring an injury on containership #2 of the unnamed shipping line decreases by. 609 when an individual is wearing steel-toed safety boots. If the weather is clear, this probability decreases by. 494.

VI. Conclusion

The purpose of this study has been to investigate determinants of the probability that an individual onboard a ship of a given shipping line will be injured (given that the ship is not involved in an accident). To the knowledge of the author, this is the first study of its kind to appear in the literature. The unnamed shipping line provides container, tanker, car/truck and multi-purpose shipping services. Data on individual injuries onboard ships of the unnamed shipping line that occurred between June 27, 2004 and May 3, 2008 are used in the investigation. The data include information on individuals that were injured and the ships on which injuries occurred as well as the weather and visibility at the time of injuries. These data and a Probit regression statistical model were used to investigate determinants of the probability that an individual onboard a ship of the unnamed shipping line will incur an injury in port and on given types of containerships.

The Probit estimation results suggest that an individual is less likely to be injured in port onboard a ship that is larger in size and underway, but more likely to be injured if involved in a fall. The probability of a ship injury incurring in port decrea-ses by .749 if the ship is underway. The Probit estimation results also suggest that an individual is more likely to be injured onboard a containership with AMO union officers when the ship is underway and the individual is on duty, but less likely on a larger-sized ship and during the daytime. The probability of an injury onboard this type of containership increases by. 427 if the ship is underway. An individual is less likely to be injured onboard a containership with MEBA and MMP union officers if it is larger in size, when the weather is clear and when the individual is wearing steel-toed safety boots, but more likely for an older ship. The probability of an injury onboard this type of containership decreases by .609 if onboard individuals are wearing steel-toed safety boots.*

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<Appendix> Correlation Coefficients

	SSIZE	SSAGE	CONT1	CONT2	UNDERWAY	PORT	CLEAR	DAYTIME	FALL	INDAGE	ONDUTY	TOEBOOT	INJYEAR
SSIZE	1												
SAGE	-0.202	1											
CONT1	-0.595	-0.023	1										
CONT2	0.507	-0.039	-0.501	1									
UNDERWAY	0.142	-0.024	0.089	0.300	1								
PORT	-0.228	-0.040	-0.054	-0.243	-0.715	1							
CLEAR	-0.059	-0.051	0.112	-0.072	-0.185	0.191	1						
DAYTIME	0.075	-0.146	-0.155	-0.099	0.045	-0.007	0.015	1					
FALL	0.023	-0.036	0.088	-0.139	-0.131	0.247	-0.068	0.063	1				
INDAGE	-0.076	-0.094	-0.010	0.190	0.097	-0.074	0.011	0.170	0.268	1			
ONDUTY	0.047	-0.132	0.128	-0.148	-0.191	0.009	-0.270	0.118	0.139	-0.111	1		
TOEBOOT	0.120	0.139	-0.099	-0.231	-0.320	0.192	-0.338	0.158	0.116	-0.346	0.446	1	
INJYEAR	-0.070	-0.297	0.156	-0.030	0.117	0.027	0.111	0.015	0.268	0.266	-0.205	-0.346	1

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