Gender, norms and survival in maritime disasters
Evidence from MS *Estonia* *

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A B S T R A C T

It's a widespread notion that women and children are saved first in maritime disasters. The systematic evidence of this comes primarily from the sinking of RMS *Titanic*. By analyzing individual level data from MS *Estonia* – one of the largest maritime disaster in the Northern hemisphere since World War II – a different picture emerges. *Estonia* sunk in the Baltic Sea with 137 survivors and 852 casualties. Despite equal gender rates on *Estonia*, 111 men, but only 26 women survived. This striking observation, as well as econometric analyses of survival probabilities, shows that the behavior among passengers and crew was clearly inconsistent with the norm that women should be saved before men. We show that the survival patterns from several maritime disasters, including *Titanic*, can be explained by the behavior of the captain. Women have a survival advantage only when the captain orders that women should be given priority and threatens disobedience with violence. Otherwise women will have lower survival chances.

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Every year disasters cause dramatic loss of life, human suffering and material damage worldwide. Whether as earthquakes, terrorist attacks, nuclear, or maritime disasters, people typically need to act quickly to save themselves and the people around them. How individuals act and organize behavior during disasters have considerable consequences for the total number of casualties and for who will survive and who will die.

It is a widespread notion that women and children will be saved first in maritime disasters. However, despite the consequences disasters have both for the affected individuals and the society, relatively little is known about human behavior in this kind of life-and-death situations. The cumulative field evidence on the role of gender, norms and survival in maritime disasters is extremely limited. It relies on data from three disasters only – the sinking of HMS *Birkenhead,* RMS *Titanic* and RMS *Luisitania*. Statistical analyses of individual level data have only been conducted on *Titanic* and *Luisitania* (see e.g. Hall 1986; Folkesson, 2005: Frey, Torgler and Savage 2010a, 2010b).

That social norms direct individual and group behavior under normal conditions is well documented (Elster, 2005). It is in general difficult for people to disregard social norms. For instance, the risk of social ostracism and disrespect of other community members may lead people to comply with the prescripts of a social norm, even when it is not in their narrow self-interest to do so (Elster, 1989).[1] It is however not well documented to what extent people comply with social norms in extreme situations, such as life-and-death situations that are common in disasters. According to economic theory, rational individuals, whether purely selfish or other regarding, should weigh the benefits of helping others against the risk to their own lives. mportantly, helping others is not necessarily evidence that social norms or other-regarding preferences are motivating behavior. For instance, when the individual costs of non-compliance with certain types of behavior is very costly, such as when a third party can punish non-compliance, then it may be rational for purely selfish individuals to act in line with the preferences of the third party (Fehr and Schmidt, 1999; Fehr and Gächter, 2002; Fehr and Fischbacher, 2004; Camerer and Fehr, 2006). Thus if a third-party punisher, such as for instance the captain on a ship, has preferences for women and children being saved first, then it may rational for all on board to comply with these preferences; at least if the captain give such orders and can credibly signal that disobedience will be punished. If the captain does not give specific orders, or do not threaten to punish disobedience, then it may be rational both for individuals that are selfish and individuals with other regarding preferences to fight for their own survival. Theoretically, the behavior of all on board a ship can therefore be determined by the preferences of the captain alone.

If every man fights for his own survival, then mere physical strength is likely to give men better survival prospects than women. On the other hand, if the stronger help the more vulnerable, then survival chances among men and women may be equal or even reversed.

The 'women and children first' protocol dates back to the sinking of the British ship HMS *Birkenhead* outside South Africa in 1852. Records show that the captain ordered that women

[1] Results from various field and lab experiments indicate that altruistic behavior dominates self-interest in anonymous, non-repeated dictator games (see e.g. Camerer, 2003; Fehr and Fishbacher, 2003).

and children were to be saved before men (Addison and Matthews 1906). The most famous example of this evacuation procedure, however, comes from the sinking of RMS *Titanic* in 1912. Several studies have shown that women had a much higher survival probability than men on *Titanic* (Hall 1986; Folkesson, 2005: Frey, Torgler and Savage 2010a, 2010b). In fact, it seems like the notion that women and children should be saved first became widespread after the sinking of *Titanic*. In a comprehensive analysis of narratives of maritime disasters between 1850 and 1914, Delap (2006) shows that evacuations following the 'women and children first' protocol were rare exceptions. The only maritime disaster, after *Titanic*, that has been carefully analyzed from the perspective of gender and survival is the RMS *Luisitania* which sunk in 1915. Frey, Torgler, and Savage (2010b) find, however, that men and women had about equal survival probabilities in the *Luisitania* disaster. Their main explanation for why men and women had equal survival rates on *Luisitania* is that it sunk very fast, leaving no time for norms to influence behavior. Except for the *Titanic* disaster, there is no obvious scientific evidence of women having an advantage in maritime disasters.

In this paper we provide new evidence to this literature, by analyzing data from the largest maritime disaster in the Northern hemisphere since World War II. After midnight, on September 28th 1994, the cruise ferry MS *Estonia* sank in the Baltic Sea en route from Tallinn, Estonia, to Stockholm, Sweden. We analyze a dataset covering individual level data of all 989 passengers and crew members on board *Estonia* on the night of the disaster. Out of the 989 people on board, 852 died and 137 survived. Although, roughly half of the persons on board *Estonia* were women only 26 survived. That women had a much lower survival probability than men is confirmed by multiple regression analyses. To make our results as comparable as possible to those of Frey, Torgler and Savage (2010a, 2010b), we follow their empirical methodology and specifications closely. It is important to remember that maritime disaster, like that of *Estonia*, does not just encompass the actual sinking but a chain of events, each characterized by specific situational and environmental factors that could moderate or strengthen the influence of social norms and hence affect peoples' survival chances differently. Our data allow us to divide the *Estonia* disaster into two phases—the first and critical impact phase when people tried to escape from the sinking ship and a second phase ranging from the sinking until potential rescue. We investigate survival patterns in each phase separately. The results suggest that women, compared to men, have lower probability of survival both on board the ship and in the life rafts with the difference between the sexes being largest in the first phase.

For research purposes, a key advantage of the *Estonia* disaster is its similarity with the *Titanic* disaster. This allows us to better isolate factors that may determine survival probabilities of men relative to women than has generally been the case in this literature. By relating differences in survival rates to a limited set of contextual differences we can improve our understanding of how individuals and groups act and organize behavior in life-threatening situations. Although, all disasters are unique in their specific characteristics, several important factors were similar in the *Titanic* and the *Estonia* disasters. They were both maritime cruise ferry disasters on, for their times, modern vessels. [thus, unlikely that people expected that the ships would sink] Second, both accidents happened just after midnight. As a result many passengers had gone to bed in their cabins, while some were still socializing or enjoying the

entertainment on the ships.[2] Third, both disasters happened during peace time [varför är det viktigt?]. Fourth, and importantly, both accidents allowed enough time for passengers and crew to have a chance to help each other.[3]

Compared to *Titanic* three somewhat related, but important, differences are apparent. First, the *Estonia* disaster occurred 82 years later, in different waters with people of other nationalities on board. Second, physical strength and to some extent time was the scarce resource limiting survival on the *Estonia*, while on the *Titanic* it was mainly access to life boats that determined survival. Third and importantly, the captain of *Titanic* both gave and enforced the order that women and children should be saved first. No such orders were given on *Estonia*. We will argue that the differences in the relative survival rates between men and women on *Titanic* and *Estonia* is likely to be found among these factors. In particular, our analysis indicates that the behavior of the captains may be the main factor explaining the diametrically different survival patterns in the two disasters.

When comparing the evidence from *Estonia* to the existing evidence from *Birkenhead*, *Titanic* and *Luisitania*, a striking pattern becomes clear: the behavior of the captain and officers can explain the survival patterns in all four accidents. On *Titanic* the captain ordered that women and children were to be given priority to the life boats. Crew members on deck were armed and shot into the air to frighten men who tried to push themselves forward in the queue to the life boats. Several witnesses report that that they saw two men being shot down (Encyclopedia Titanica).[4] On *Estonia*, the captain never gave any orders on who should be evacuated first (JAIC 1997). Importantly, orders to save women and children first were given also on *Birkenhead*. The captain drew his sword and made clear that any man trying to get ahead of women would be punished (Addison and Matthews 1906). Records indicate that the captain of *Luisitania* ordered "women and children first", but did not enforce the order (ref). This shows that in the two disasters were women had a survival advantage (*Birkenhead* and *Titanic*) the captains gave explicit orders that women should be given priority, and also enforced those orders. In the case of *Luisitania*, orders that women should be saved before men were given but not enforced. The outcome was that women had a slightly lower survival rate than men (28 % vs. 34 %). On *Estonia*, were no similar orders were given, women had a marked survival disadvantage. Taken together, comparisons of the four disasters suggest that women are disadvantaged unless the captain enforces orders prioritizing women.

In the light of maritime disasters, the captain can be interpreted as a third party with the opportunity to punish individuals who disobey orders. In particular, the captain may give the order "women and children first"; possibly because of preferences for minimizing survival differences. For such an order to be credible the captain need to stay on board the ship until last man and potentially punish men who break the order. However, a captain with self-regarding preferences can leave the ship and maximize his own survival chance. Men with

[2] Fifty percent of those who survived the disasters report that they had been in their cabins at the start of the disaster (Swedish National Board of Health and Welfare, 1997)

[3] By contrast, the *Luisitania* disaster investigated by Frey, Torgler, and Savage (2010b), occurred during a war and sank rapidly as a result of being hit by a torpedo from a German submarine.

[4] Encyclopedia Titanica: Gunshots on the Titanic (http://www.encyclopedia-titanica.org/gunshots-on-titanic.html), accessed 2011-11-14.

preferences for fair survival chances between men and women may chose to help women even if the captain's threat of punishment is not credible. However, if the expected punishment for breaking orders is high enough, then selfish men would obey order and let women and children be saved first. This means that rather than being a social norm powerful enough to influence men to let women and children be saved first, behavior in line with such a norm would be observed even if only the captain has preferences for a fair distribution of survival rates.

Some lessons about gender, norms and survival are beginning to emerge from the literature on maritime disasters that may shed light also on other types of disasters. Research on gender differences in survival rates of disasters is surprisingly scarce. For instance, the Enarson, Fothergill and Peek's chapter on gender and disasters in the *Handbook of Disaster Research* (2006) does not refer to any research on gender differences in survival. Evidence from quick onset natural disasters such as the cyclone hitting the coastal areas in Bangladesh in 1999 (Ikeda, 1995) and the Indian Ocean tsunami in 2004 in the Aceh province on Indonesia (Frankenberg, Gillespie, Preston, Sikoki and Duncan 2011) as well as in India and Sri Lanka (Oxfam, 2005), however, show that women were less likely than men to survive. Although, there may be other reasons why women are disadvantaged in natural disasters than in maritime disasters such as the *Estonia* disaster, we note that in most disasters, including the Indian Ocean tsunami, there is no obvious leader that can organize behavior; even less punish individuals that selfishly save themselves rather than helping others.

The rest of this paper is organized as follows. The next section discusses norms and the role of the captain. In particular, we apply a third-party punishment model to the context of maritime disasters. Section 3 provides details about the *Estonia* disaster and contrasts it to those of *Birkenhead*, *Titanic* and *Luisitania*. Section 4 describes the data and provides results from the analyses of survival rates on *Estonia*. Section 5 discusses what we learn from the *Estonia* case, by relating the findings to wider literature on norms, gender and survival in other types of disasters. The final section concludes.

2. Social norms: The role of the captain

[This section is substantially incomplete!]

Social norms could be described as a set of shared and accepted values and beliefs which guide how members of a community should behave towards each other (Parsons 1964; Elster, 1989, 2005). It may not always be in the narrow material self-interest to comply with social norms. Violation of norms may, however, still be costly for individuals, due to shame, stigma or feelings of guilt (Elster, 1989). Once a norm has become an integral part of a person's personality external social sanctions tend to be unnecessary for the norm to be effective. Fehr and Fischbacher (2004) note that internalized norms seem to be followed even when violation would be unobserved, or not exposed to sanctions. Many norms, however, may be followed when the benefit of violation is low, but not when the individual benefits of violation

outweighs the social costs of violation. In these, cases institutionalized punishment is necessary to give individuals incentives to comply. For instance, we would certainly expect more people to commit crimes if we removed institutionalized punishments.

In the light of maritime disasters, the idea that women and children should be saved first can be considered to be a social norm.[5] It is not obvious, however, that everyone consider it to be so strong that they would comply with it at the risk of their own life. In this context, the captain may play an important role. We argue that the captain can be viewed as a third party with the opportunity to punish individuals who disobey orders. In particular, the captain may give the order "women and children first"; possibly because of preferences for minimizing survival differences. For such an order to be credible the captain needs to stay on board the ship until last man and potentially punish men who break orders. A captain with selfish preferences can leave the ship and maximize his own survival chance. Men who feel that women should be given priority and help may chose to help women even if the captain does not provide additional incentives. But it should be noted that, in this situation would a selfish man try to save himself.[6] However, if the expected punishment for breaking orders is high enough, then selfish men would obey order and let women be saved first. This means that behavior in line with the norm "women and children first" could be observed even if only the captain has preferences for preferential treatment of women. We argue that the logic of this situation largely resembles that of a dictator game with third party punishment that has been described in a series of articles by for instance Fehr and Schmidt (1999), Fehr and Fischbacher (2004), and Camerer and Fehr (2006). In this game player 1 is given an endowment which he or she can choose share with player 2 who has no endowment. If player 1 has preferences for a fair distribution of resource he may find it optimal to give away part of the endowment to player 2. However, if player 1is purely selfish no sharing will occur. Now assume that a third player is introduced, who can punish player 2 at a cost. It can be shown that if player 3 has preferences for a fair distribution and player 2 believe that he will be punished by player 3, if not sharing the endowment with player 1, then, even if player 2 is purely selfish, he will share the endowment with player 1. Thus, even if only one person in this game has preferences for a fair distribution of resources then all players may act as if they had preferences of fairness.

We plan to develop this discussion further to be able to state the conditions for this outcome and alternative outcomes of a dictator game with third party punishment, in the context of maritime disasters and gender differential survival.

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[5] The strength of norms may of course vary over time and between societies, as well as between subgroups within societies (källa). We are, however, not aware of any study that has investigated how support for the idea that women and children should be saved first in maritime disasters vary between societies or over time. The most comprehensive contribution along these lines is Delap (2006) which discusses the role of this norm in Great Britain from mid 19th century to 1912. Notably, opposition to "women and children first" was raised mainly by women.

[6] We use the term selfish in this context, although we note that disagreement with the norm of "women and children first" does not necessarily imply the that a person it purely selfish. He or she may for instance care about close relatives and friends.

This model predicts that when a captain orders that women and children should be saved first –and credibly threaten to punish men that do not follow the order – then we would observe equal survival rates or a survival advantage among women. When no such orders are given – or if there is no credible threat of punishment – then we would expect men to have a survival advantage. That women and children were given priority on Birkenhead and Titanic, but not on Estonia and Luisitania, can thus be explained by the logic of a dictator game with third party punishment.

3. The MS *Estonia* disaster

MS *Estonia* departed Tallin, Estonia, on the evening of 27 September 1994 with a scheduled arrival in Stockholm, Sweden, the following morning. It carried 989 people, whereof 821 were passengers who travelled on the ship either as a means of travelling to Sweden or as a business or holiday cruise trip. The ship was investigated and found to be in good condition just before the departure. The weather was bad, with poor visibility in combination with high seas (waves between 4 and 6 meters) and strong winds (up to 25 m/s). Despite the size of the ship, the weather caused a good deal of tossing. At 00.55 a.m. a loud bang was heard by passengers and crew from the front of the ship. During the next 20 minutes several loud bangs were heard with concurrent shakings and vibrations of the ship. The front bow visor had been ripped off by the power of the waves.[7] Enormous amounts of water soon entered the cargo deck which caused the ship to heel over to starboard side. A few minutes later several alarms were heard on the ship and a Mayday message was sent out. The list of the ship rapidly increased and half an hour later at 1.50 a.m. the ship sunk. From the first serious indications that something was wrong it took nearly one hour before *Estonia* sunk.

After understanding that it was an emergency situation, passengers had to quickly move to the life boats. As time elapsed and the list increased it became very difficult to move inside the ship. The corridors were crowded and the stairs difficult to ascend.[8] Physically stronger people clearly had a better chance get out on their own, while less able-bodied people would benefit from assistance from stronger fellows (Källa). Because of the list in combination with the strong winds only 3 out of the 10 lifeboats that were suspended on the port and starboard sides of the ship were successfully launched. Instead, life rafts that are more easily launched in rough weather were used. Once in the water, several life rafts were partially filled with water. Many people did not make it to the life rafts.[9] Some fell into the water, some were saved, others perished. Most people, unfortunately, got stuck inside the boat. It has been estimated that 310 passengers reached the outer decks and 160 managed to get into a life raft or lifeboat (JAIC, 1997 p.xxx). The first boat came to rescue at 2.12 a.m—about 20 minutes after the sinking. The bad weather made the rescue mission very difficult and many people

[7] Investigations
[8] Divers have investigated the wreck and confirmed many dead bodies in the corridors and stairs (JAIC, 1997 p. 129–133)
[9] *Estonia* was built to carry up to 2000 passengers. At the time of the disaster she carried 10 lifeboats with a capacity of taking a total of 629 individuals. In addition there were 63 life rafts with a capacity of carrying 1575 individuals. (SOS p. 30).

had to spend several hours in the life rafts or in the water. While in the lifeboats or rafts, people faced the risk of dying from hypothermia and drowning. The water temperature was between 10 and 12 degrees Celsius at the time of the sinking, but people were poorly dressed, many wearing only underwear. The cold water deteriorated the functioning of tactile organs, such as fingers and arms making it difficult to both get up into the life rafts and hold on to them while in. The strong winds, which continued even after the sinking of the ship, contributed to severe hypothermia also among those who managed to secure a place in the life rafts. The cold water that gushed into the rafts accelerated the process making many of those still alive apathetic and unable to hold on the life rafts. This is supported by stories from survivors tell us that the struggle to survive continued also in the life rafts. This illustrates that even after leaving the ship; people faced the option to help others at their own risk. Several ships and helicopters assisted in the rescue operation during the night and following day. The last survivors were found at around 8 a.m, 7 hours after the sinking. The rescue operation was cancelled at xx a.m.

4. Data and empirical evidence from *Estonia*

4.1 Description of data

We have obtained individual level data on those who survived and those who died in the sinking of *Estonia*. The data originates from the official list as of October 29, 1996, established by the *Investigation Division* at the *Swedish National Bureau of Investigation* (Utredningsroteln vid Rikskriminalpolisen) and was provided to us by the *National Archives and the Regional State Archives of Sweden* (Riksarkivet).[10]

In Table 1 we present…As noted earlier only 137 (13.9 percent) out of the 989 passengers and crew members survived.[11] Of the remaining 852 individuals, 95 dead bodies were recovered while the rest (757) are still classified as missing.[12] Moreover the dataset includes information on nationality, year of birth, and traveler status of those on board the ferry at the night of the disaster.

Importantly for our study the data also contains information about the gender of the passengers and the crew members. Table 1 shows that there were almost equal shares of males and females (51 and 49 percent respectively) on board *Estonia*.[13] We note that survival probability for men were almost four times as large as the survival probability for women.

[10] This is the data referred to by the Joint Accident Investigation Commission of Estonia, Finland and Sweden (JAIC, 1997).
[11] Ships rescued 34 survivors and search and rescue divers from helicopters rescued 104 survivors, one of whom died in a hospital (JAIC, 1997).
[12] Most of the missing persons are believed to be inside the ship (JAIC, 1997). No bodies have been recovered from inside the ship.
[13] Among the passengers there were those who travelled on the ship either as a mean of travelling to Sweden or a as business or holiday cruise trip. *Estonia* was frequently used for conferences.

Table 1: Survival patterns on *Estonia*

	Survivors	Deceased	Total
Sex			
Women	26 (5.4)	459 (94.6)	485
Men	111 (22)	393 (78)	504
Nationality			
Swedish	49 (8.9)	501 (91.1)	550
Estonian	64 (18.6)	280 (81.4)	344
Latvian	6 (21.4)	22 (78.6)	28
Finnish	6 (37.5)	10 (62.5)	16
Russian	2 (14.3)	12 (85.7)	14
Others	10 (27)	27 (73)	37
Traveler status			
Passengers	98 (12.3)	698 (87.7)	796
Crew	39 (20.2)	154 (78.8)	193
Age	34.2	46.4	44.7
Age groups			
<16	2 (12.5)	14 (87.5)	16
16-50	121 (19.9)	486 (80.1)	607
>50	14 (3.8)	352 (96.2)	366

Note: Percentages in parentheses.

We have used information on year-of-birth to calculate the individual's age as of 1994. The mean age in the overall sample is 44.7. For women, the mean age is 45.7. It is only slightly lower, 43.8, for the men.[14] The survivors are about 12 years younger than the deceased. We obtain a similar result for both men and women. To get a better understanding of the relationship between age and survival we divide the sample into three age categories: persons younger than 16 (<16); persons 16–50; and persons older than 50 (>50). These are the same age categories used in Frey, Torgler and Savage (2010a). There were only 16 children on board *Estonia*.[15] We note that children have a lower survival probability than individuals 16–50, but higher than those older than 50. Regarding the adults, we see that there is a strong negative relationship between age and survival; the survival rate of individuals 16–50 years is five times higher than the survival rate of individuals older than 50. Table A.2, in Appendix A, shows that the pattern is similar for both males and females. These results are expected given that young adults have an advantage over older adults and children in terms of physical strength and mobility.

[14] For descriptive statistics for men and women separately, see Table A.1 in Appendix A.
[15] The age of people younger than 16 ranges from 0 to 15 with a mean and standard deviation equal to 8.9 and 4.6, respectively.

We know whether the individual traveled on Estonia as a passenger or as part of the crew. The total number of crew members is 193, most of them Estonians.[16] Table 1 reveals that the crew members had a substantially higher survival probability than the passengers (20 vs. 12 percent). One explanation for the result is that the crew members had better knowledge about emergency exits and the placement of life boats and life rafts than the passengers.[17] It is also reasonable to believe that the crew members received information about the severity of the catastrophe before the passengers and thus had more time to take the necessary courses of action. . From a regulatory perspective, this is however, a quite striking result. According to maritime conventions the crew is responsible for making sure that emergency procedures are carried out correctly. It can also be seen as their duty to stay on the ship and expedite the evacuation. Thus, if the crew follows procedures we would expect them to have a lower survival chance than the passengers.

There were in total 16 nationalities represented on board *Estonia* at the time of the disaster. The largest group consists of Swedes (550) followed by Estonians (344).[18] Table 1 shows that survival chances differ depending on nationality but because of a small number of observations for nationalities other than Swedish and Estonian it is difficult to draw any general conclusions. Interestingly, however, we note that Estonians were about twice as likely to survive as Swedes. In fact the survival rate among Swedes is 4 percentage points lower than the overall survival rate. One possible explanation for this is that *Estonia* was an Estonian ship with mainly Estonian crew. Estonians passengers could therefore have had an informational advantage due to shared language.[19]

Although the above discussion suggests that the differences between men and women on board *Estonia* were small it is still important to control for differences in individual characteristics when estimating gender differentials in survival. We, therefore, now turn to the empirical model.

4.2 Multivariate analysis

We follow Frey, Torgler and Savage (2010a) and use probit models to estimate survival probabilities among those on board *Estonia*.[20] Our dependent variable is a binary variable taking the value one if the individual survived and zero if the individual is reported missing or deceased. Our main explanatory variable of interest is sex. We define a dummy variable

[16] The crew constitutes two groups: the listed crew and persons who worked on *Estonia* at the night of the sinking but were not on the regular crew list. The latter group includes musicians, dancers, and croupiers. Since we do not have information on the seniority of those in neither of the two groups we treat them similarly in the analysis.

[17] 142 of the regular crew members had undergone an IMO-approved safety training course and were proficient with survival craft (JAIC, 1997)

[18] The other nationalities on board *Estonia*
were: Latvian (28), Finnish (16), Russian (14), Norwegian (9), German (8), Danish (6), Lithuanian (4), British (2), Dutch (2), Moroccan (2), Belarusian (1), Canadian (1), French (1), Nigerian (1).

[19] *Estonia* was owned jointly by the government owned Estonian Shipping Company and the Swedish privately owned shipping company Nordström & Thulin.

[20] Estimates are obtained using Maximum Likelihood. We have also estimated all specifications with a linear probability model. The results are very similar to the probit results in terms of economic and statistical significance.

taking the value one for females and zero for males. The estimated models include controls for individual characteristics in the form of dummy variables for different age groups, nationalities and a crew status.

The passenger list does not provide information on what type of tickets the passengers held. Consequently, we cannot account for differences in survival chances stemming from the fact that some people were staying in the more expensive cabins located on the higher decks, often with ocean view, while others stayed in the cheapest cabins below the water level.[21] However, according to the commission surprisingly many of those living in cabins under the water level survived the disaster.[22]

The data also prevent us to test for differences in survival probabilities between persons traveling alone or in the company of others. It is however not obvious whether the effect of traveling with family or friends on survival probability is positive or negative. On the one hand a social entity can provide information and physical help which in turn may increase the survival rate among its members. On the other hand, group membership could act as a constraint on survival if the member is slowed down by the search for and help directed to weaker members.

4.3 Main results

Table 2 presents the estimates from probit regressions together with their corresponding standard errors (in parenthesis). It also shows the corresponding marginal effects (in bold) for each variable.[23] Columns 1–6 show regression results for the entire sample and for particular sub-groups (passengers, crew members, Swedes, Estonians and prime age) when we only include the female dummy. The coefficient estimates are negative and statistically significant on all conventional levels, in all instances. The corresponding marginal effects indicate that females, compared to males, had between 10 and 24 percentage points' lower chance of survival. This should be compared to the unconditional survival rate among men of 22 percent.

Columns 7–12 report the regression results when we augment the specification with controls for crew, age groups, and different nationalities. The reference person is a 16–50 years old male Estonian crew member. The coefficient for the female dummy is negative and

[21] Previous studies investigating survival on *Titanic* have used information on ticket price and traveler class to test for the importance of social class on survival (Hall, 1986; Frey, Torgler and Savage, 2010a, 2010b). The results show that people who traveled in first-class had a significantly higher probability to survive than individuals traveling in the lower classes. There are however many reason to believe that social class was a much less important determinant of survival at *Estonia* than it was in the beginning of the 21th century. For example, at Titanic the third-class constituted predominantly of poor emigrants (see Hall, 1986, p. 687) who had paid around $ 40 ($500 today) for a ticket whereas those in first class were upper class Brits and Americans who had paid about $150 ($3,000) for their tickets. This compares to *Estonia* were the difference in price between a first-class and a third-class ticket was at *Estonia* compared to Titanic is substantially smaller indicating that.

[22] One explanation put forward by the commission is that these people reacted on the sounds from the breaking of the bow visor earlier than passengers further up. Another explanation is that the cabins in the lower decks hosted groups of mostly young, able-bodied, passengers (Swedish National Board of Health and Welfare, 1997)

[23] Since our specifications include only discrete regressors we calculate the impact of a change in a regressor on the dependent variable using the finite difference method (see e.g. Cameron and Trivedi, 2005, p. 123).

statistically significant in all specifications. Our finding that women were much less likely to survive than men is a robust pattern in our data. We note, however, that controlling for age and nationality lowers the marginal effects except for when we restrict the sample to crew members. Interestingly, the negative relationship between being female and survival seems to be more pronounced among the crew members than among the passengers.

In contrast to what we expected, given the discussion of the patterns provided in Table 1, the coefficient estimate on *Crew*, in column 7, is statistically insignificant indicating that crew members are no more likely to survive than passengers. The coefficient is however imprecisely estimated. The coefficient for *Age<16* is statistically insignificant in all specifications, probably because of the small number of observations.[24] The coefficients on *Age>50* in Column 7 and 8, however, confirm that there is a negative relationship between age and survival among adults; being older than 50 rather than 16–50 reduces the probability of survival by around 15 percentage points.

[24] We have performed a similar analysis in which we exclude the children. The results are close to those presented in Table 2.

Table 2: Estimates of gender differentials in survival on *Estonia*

	All	Passengers	Crew	Swedish	Estonian	Prime Age	All	Passengers	Crew	Swedish	Estonian	Prime Age
Female	-0.839***	-0.866***	-0.916***	-0.702***	-0.805***	-0.889***	-0.887***	-0.865***	-0.954***	-0.847***	-0.879***	-0.907***
	(0.113)	(0.135)	(0.219)	(0.163)	(0.174)	(0.129)	(0.122)	(0.147)	(0.222)	(0.180)	(0.183)	(0.133)
	-0.166	**-0.155**	**-0.239**	**-0.101**	**-0.202**	**-0.230**	**-0.150**	**-0.130**	**-0.247**	**-0.093**	**-0.216**	**-0.234**
Crew							0.184			-0.001	0.263	0.215
							(0.143)			(0.392)	(0.173)	(0.148)
							0.031			**-0.000**	**0.065**	**0.055**
Age <16							-0.500	-0.497			0.070	
							(0.435)	(0.434)			(0.687)	
							-0.085	**-0.074**			**0.0171**	
Age >50							-0.913***	-0.934***	-0.660	-1.038***	-0.413	
							(0.156)	(0.162)	(0.591)	(0.184)	(0.345)	
							-0.155	**-0.140**	**-0.171**	**-0.114**	**-0.106**	
Swedish							-0.013	0.008	-0.193			0.077
							(0.134)	(0.145)	(0.395)			(0.144)
							-0.002	**0.001**	**-0.045**			**0.012**
Others							0.263	0.275				0.338
							(0.258)	(0.259)				(0.281)
							0.045	**0.041**				**0.087**
Constant	-0.771***	-0.857***	-0.409***	-1.048***	-0.591***	-0.502***	-0.567***	-0.580***	-0.348**	-0.537***	-0.665***	-0.604***
	(0.062)	(0.070)	(0.140)	(0.097)	(0.099)	(0.074)	(0.103)	(0.106)	(0.150)	(0.133)	(0.126)	(0.107)
Observations	989	796	193	550	344	607	989	796	193	547	344	607
Pseudo R^2	0.077	0.080	0.095	0.060	0.0700	0.085	0.154	0.161	0.105	0.175	0.084	0.090

4.4. Reaching the outer decks and surviving until rescue arrives

A maritime disaster does not just encompass the actual sinking but rather a chain of events, each characterized by specific situational and environmental factors that could have different impacts on the affected persons' survival chances. For instance, physical strength, mobility and competitiveness may be important individual characteristics on board the ship during the critical impact phase when abandoning the ship is the main priority. A second phase starts after the sinking, when individuals try to get a place in the life rafts and survive until being rescued. In phase 2 attributes such as calmness, resistance to cold, clothing and ability to swim may be important determinants of survival. Some of the attributes are more prevalent in one sex than in the other: for example, men are often physically stronger and more competitive than women (Niederle and Vesterlund, 2007; Gneezy, Niederle and Rustichini, 2003)[25], while women are believed to fare better than men in conditions marked by extreme cold (Rivers, 1982).[26] To get a more complete understanding of gender differences in survival, we therefore divide the course of events during the *Estonia* disaster into two phases investigate each phase separately. .

Phase 1 is the period between 01:15, when the bow visor separated and the ship took on a heavy starboard list and 01:50, when the ship disappeared from the radar screens. According to witnesses' reports, the situation inside the ship was tumultuous. People were panicking, loose objects were flying around, and the narrow corridors were blocked with debris making it practically impossible to move safely.[27]

Phase 2 is the period between the sinking and the rescue. The rescue operation was time-consuming and lasted for many hours. Some people were rescued earlier than others. The last survivor was rescued at around 08.00 and the rescue operation was canceled at 12.20.[28]. During this stage people spent time either in life rafts or in the water. Many life rafts were damaged or partly filled with water. The conditions were marked by severe cold. According to the autopsy reports the main cause of death was drowning, following from hypothermia (SOS p. 74).[29] Because of the extended time it is likely that other regarding preferences are

[25] Evidence from different field experiments indicate that men are more competitive than women (see e.g. Niederle and Vesterlund, 2007, for references) and that men tend to outperform women in most types of competitive environments (see e.g. Gneezy, Niederle and Rustichini, 2003).

[26] Women are, on average, smaller and have a thicker, more insulating, subcutaneous fat layer than men, which delay their heat loss (Rivers, 1982). Because of higher basal metabolic, inactive adult males also suffer greater core temperature reduction than inactive adult females when exposed to an environmental cold stress, like immersion in cold water (McArdle, Magel, Gergley, Spina and Toner, 1984; Harrison, Tanner, Pilbeam and Baker, 1988).

[27] Reports from witnesses have also been interpreted as if panicking was largely abscent (Cornwell, Harmon, Mason, Merz and Lampe, 2001). This indicates how difficult it is to rely solely on witnesses reports when assessing behavior that has a strong normative dimension. See also Delap (2010) for how reports from maritime disasters may serve political interests.

[28] Helicopters continued the search for dead bodies until 18.10 (Swedish National Board of Health and Welfare, 1997).

[29] Since hypothermia lowers the pulse and decreases the breath sound significantly there is a possibility that the search and rescue divers falsely concluded that some individuals were dead and hence gave them a lower priority in the rescue.

more likely to be prevalent in the life rafts than they were on board the ship. Reports from witnesses indicate that some persons helped others to get up from the water into the life rafts, despite an obvious risk to their own lives. Similarly, two men have reported that they tried to keep a naked man warmer by holding him between their bodies. Thus, although difficult – and with the risk of death – it was possible to help others survive during the time in water and life rafts. Whether women were significantly helped in this phase is, however, impossible to tell from the limited reports from witnesses. It is generally acknowledged that group ties are critical predictors of altruism with the needs of individuals within the personal circle, such as family members and friends strictly dominating the wellbeing of other social entities. Unfortunately, we do not have information on social relationships among the passengers and crew members. However, anecdotal sources indicate that very few of social entities stayed intact throughout the disaster.

The descriptive statistics in Table 1 tells us that only 137 persons were fortunate to survive both phases. It is more difficult to get exact information on survival rates in each of the two phases.[30] We do not have individual level information on when, where and why people died. Instead, we make use of the distinction between confirmed dead and reported missing and assume that the 95 confirmed dead[31], in addition to the 137 survivors, managed to abandon the ship before it sank. Regarding the 757 missing persons we assume they failed to escape the sinking ship, and hence that they died during the first stage. Admittedly simplified, we still think this is a reasonable strategy given that no bodies have been recovered from inside the ship.[32] Table 3 presents detailed results from the econometric analysis of the probability to manage to abandon *Estonia* (phase 1). Following our previous strategy we let the dependent variable be a binary variable taking the value one if the person is classified as survivor or deceased, and zero if reported as missing.[33] From column 1 we see that the women, compared to the men, had a 19 percentage points lower probability to escape the sinking ship. The same pattern is found among all subgroups, with marginal effects ranging from -12 to – 30 percentage points lower probability to escape the ship. The result is robust to inclusion of controls for crew, age, and nationality. The lower probability of escape for women compared to men is evident in all sub-samples. The coefficient *Crew* in column 6 is positive and, in contrast to the main analysis, statistically significant. The corresponding marginal effect shows that, being a crew member rather than passenger increases the probability of being able to escape by 11 percentage points. This confirms the hypothesis that the crew members have

[30] Another limitation is that we do not have information on peoples' specific location at the beginning of each stage. Thus, we are forced to assume that all persons on board had equal starting points at the beginning of each stage. We are well aware that this assumption is somewhat simplified. Some people had a lot worse starting point than others, especially in the first stage. Both official reports and survivors estimate that a large fraction of the passengers and crew members were in their cabins when the ferry listed, and remained so because they were trapped by objects blocking the doors.

[31] Some of those persons may have drowned in the currents that followed when the ship sank, while others may have died at a much later stage in the life raft. We also note that there is a possibility that some could have floated up to the surface from the ship via broken windows or from the wide open stern.

[32] Our numbers contrasts the estimates from the inquiry commission saying that up to 310 passengers reached the outer decks, that is survived the first stage, and that 160 of those managed to climb into the life-rafts or lifeboats essential for survival (JAIC 1997).

[33] Table A.2 and A.2.1 in Appendix A presents descriptive statistics for the two groups.

advantages over the passengers in terms of knowledge about escape routes, at least on board the ship. The results in column 7 reveal that there is a clear relationship between age and the probability to get out of the ship. In contrast to the main analysis however, both the *Age<16* and the *Age>50* coefficients are negative and statistically significant. For instance, children have 20 about percentage points lower probability of escaping than persons aged 16–50. This analysis clearly shows that women were much less likely to escape the sinking ship. We can only speculate that this was the result of women lacking both physical strength and competiveness in the congested corridors and stairs. It shows clearly, however, that men do not seem to have given priority to women, by for instance helping those with less strength to ascend the stairs.

Let us now turn to whether there are differences in survival probabilities between males and females among those who managed to leave the ship. Accordingly, we use information on the confirmed dead and the final survivors. In total, 232 individuals made it to the second stage. Out of those 67 (28.9 percent) were women and 165 (71.1 percent) were men. This disparity is the result of the lower success rate for women, compared to men, in the first phase. Likewise, Table A.3 shows that the first phase resulted in relatively more crew members and individuals aged 16–50 in the second phase. No such differences are apparent regarding the distribution of nationalities. More importantly, however, is that men and women are similar in terms of individual characteristics. For instance, the mean age is about the same for men and women and so are the corresponding age distributions. The unconditional survival probabilities in Table A.3 suggest that men are more likely to survive in this phase compared to women. However in order to investigate this more thoroughly we estimate similar models as in previous analyses. The dependent variable is now a binary variable taking the value one if the person is classified as survivor, and zero if reported as recovered dead. We present results from a similar set specifications as in the previous analysis, see Table 4. The specifications in the first six columns show that women have between 25 and 28 percentage points lower survival probability than men. The mean survival probability of men in this phase was 67 percent. Because of a smaller sample size the precision of the key estimates are somewhat lower than in the previous analysis, but still significant at least at the 5 percent level. Noteworthy is that the survival probability of women compared to men in this stage is larger than that in the two previous analyses. This finding supports the hypothesis of women being more resistant to cold than men. In Columns 7-12 we check whether the results are robust to the inclusion of the same controls as in the two preceding analyses. However, since only two children survived until the second stage we omitted the *Age<16* variable in our specifications. The relationship between age and is nevertheless confirmed by a statistically significant negative coefficient on *Age>50*. The coefficient estimates on *Female* as well as the corresponding marginal effects are in line with those reported in columns 1–6. In contrast to Phase 1 there is no longer a statistically significant difference in survival rates between passengers and crew members. One possible explanation for this is that the crew members lost their comparative advantages when they left the ship. We also note that survival differences between men and women between the sub-groups are smaller than in the previous analyses. To summarize women had a much lower probability of surviving the sinking of *Estonia* than

men. Our analyses further reveal that women both had a lower probability of escaping the ship and survive until being rescued, conditional on having abandoned the ship.

Table 3: Estimates of gender differentials in success of abandoning *Estonia* (Phase 1)

	All	Passengers	Crew	Swedish	Estonian	Prime Age	All	Passengers	Crew	Swedish	Estonian	Prime Age
Female	-0.642***	-0.684***	-0.779***	-0.526***	-0.606***	-0.691***	-0.697***	-0.668***	-0.851***	-0.595***	-0.804***	-0.749***
	(0.092)	(0.109)	(0.189)	(0.131)	(0.145)	(0.110)	(0.098)	(0.115)	(0.193)	(0.137)	(0.159)	(0.116)
	-0.191	**-0.182**	**-0.297**	**-0.124**	**-0.216**	**-0.241**	**-0.197**	**-0.170**	**-0.324**	**-0.134**	**-0.282**	**-0.261**
Crew							0.420***			-0.055	0.624***	0.420***
							(0.128)			(0.366)	(0.158)	(0.134)
							0.119			**-0.012**	**0.219**	**0.146**
Age <16							-0.722*	-0.711*			-0.223	
							(0.427)	(0.426)			(0.681)	
							-0.205	**-0.180**			**-0.078**	
Age >50							-0.636***	-0.675***	-0.373	-0.676***	-0.496	
							(0.120)	(0.125)	(0.462)	(0.137)	(0.306)	
							-0.180	**-0.171**	**-0.142**	**-0.152**	**-0.174**	
Swedish							-0.048	0.014	-0.612			-0.024
							(0.120)	(0.129)	(0.373)			(0.131)
							-0.014	**0.003**	**-0.233**			**-0.008**
Others							0.060	0.097				-0.005
							(0.246)	(0.247)				(0.277)
							0.017	**0.025**				**-0.002**
Constant	-0.447***	-0.578***	0.133	-0.735***	-0.192**	-0.180**	-0.296***	-0.333***	0.236	-0.349***	-0.390***	-0.280***
	(0.058)	(0.065)	(0.136)	(0.087)	(0.093)	(0.071)	(0.095)	(0.098)	(0.147)	(0.119)	(0.117)	(0.100)
Observations	989	796	193	550	344	607	989	796	193	547	344	607
Pseudo R2	0.047	0.053	0.068	0.034	0.041	0.053	0.118	0.101	0.082	0.086	0.092	0.071

Table 4: Estimates of gender differentials in surviving Phase 2

	All	Passengers	Crew	Swedish	Estonian	Prime Age	All	Passengers	Crew	Swedish	Estonian	Prime Age
Female	-0.732***	-0.737***	-0.664**	-0.640**	-0.695***	-0.758***	-0.700***	-0.675***	-0.701**	-0.724**	-0.590**	-0.696***
	(0.185)	(0.236)	(0.306)	(0.284)	(0.263)	(0.204)	(0.195)	(0.252)	(0.312)	(0.299)	(0.275)	(0.211)
	-0.284	**-0.279**	**-0.264**	**-0.253**	**-0.273**	**-0.284**	**-0.271**	**-0.254**	**-0.280**	**-0.286**	**-0.231**	**-0.265**
Crew							-0.267			0.099	-0.428	-0.200
							(0.218)			(0.698)	(0.261)	(0.223)
							-0.103			**0.039**	**-0.168**	**-0.076**
Age >50							-0.883***	-0.872***	-0.745	-1.023***	-0.098	
							(0.253)	(0.270)	(0.774)	(0.302)	(0.603)	
							-0.342	**-0.328**	**-0.297**	**-0.404**	**-0.039**	
Swedish							0.102	0.047	0.532			0.235
							(0.226)	(0.246)	(0.690)			(0.240)
							0.040	**0.018**	**0.212**			**0.090**
Others							0.899	0.874				
							(0.624)	(0.626)				
							0.348	**0.329**				
Constant	0.447***	0.510***	0.298	0.353**	0.396***	0.578***	0.609***	0.631***	0.315	0.754***	0.626***	0.529***
	(0.101)	(0.121)	(0.186)	(0.168)	(0.146)	(0.115)	(0.169)	(0.176)	(0.198)	(0.222)	(0.211)	(0.172)
Observations	232	157	75	89	112	191	230	155	75	89	111	182
Pseudo R2	0.050	0.048	0.046	0.042	0.047	0.056	0.103	0.117	0.062	0.145	0.063	0.062

5. Discussion of the results

[This section only sketches what it eventually may be about]

Limited and selected disasters

A considerable problem in this literature is that analyses have only been conducted on four out of possibly hundreds of significant maritime disasters. We realize, however, that it is intrinsically difficult to analyze a large number of maritime disasters. Instead we plan to characterize major maritime disasters, in terms of passengers, survivors, time, place etc. We expect, however, that most disasters will not be suited for detailed analysis for two reasons. First, it seems to be common that survival patterns are deterministic from exogenous factors, such as fire in one part of ship. Second, individual level data is not accessible. It seems as if lack of reliable statistics is a major problem. In other cases data may be classified. Further, language problems may severely hinder analyses.

Confounding factors

The fact that virtually none of the passengers on board *Estonia* travelled with children, allows us to rule out the explanation is the consequence of women were slowed down by helping their children. Moreover, it is reasonable to assume that both the women and the men on board Estonia were able to swim. Similarly both men and women were similarly dressed – many wearing only underwear. It is possible that due to mere physical strength men had a better chance of surviving the *Estonia* disaster relative to the *Titanic* disaster. It is clear, however, that there were ample possibilities for this be moderated by helping women. This further strengthens our conclusion that women were much less likely than men to survive the *Estonia* disaster, because no significant help or priority were given to women. Instead, it seems as the situation could be characterized as one in which every man fought for himself.

"Women and children first" over time and space

Although no systematic evidence of the prevalence and strength of the "women and children" first norm seem to exist, we would like to collect the scattered evidence that exists. This may come from anecdotes, newspaper articles etc. We would also like to present of picture of the normative arguments that have been used to justify that women and children should be saved first in maritime and other disasters.

Links to other disasters

By comparing the *Estonia* disaster to other disasters in the literature, more lessons emerge. It has been argued that women have a higher survival probability in disasters due to norms making men more dispensable (Folkesson 2005), for instance by letting women be evacuated before men or requiring men to engage in dangerous rescue operations or by helping their wives. Others argue that men have a higher survival probability due to being physically stronger or better dressed, more able to swim, less likely to care for and help children (Frankenberg, Gillespie, Preston, Sikoki, and Thomas, 2011).

Studies of other disasters indicate that the "women and children first" norm is prevalent and influence rescue operations also in modern times and in settings other than maritime disasters. Some studies, argue on the contrary that women are more vulnerable, less likely to be helped and therefore less likely to survive disasters than are men (The Asian Tsunami: Frankenberg, Gillespie, Preston, Sikoki, and Thomas, 2011). One obvious reason for why the results may differ is that the investigated disasters differ in important ways from each other. The answers to whether women are less likely to survive disasters, and if so why, and when, are therefore likely to be found in the details.

In contrast to other to other disasters, such as e.g. those occurring in sky scrapers, subways etc., maritime disasters are characterized by the presence of a distinct leader, a captain, who is responsible for the evacuation process. In the case of *Titanic* it is evident that the captain had a prominent role. He ordered that women and children were to be saved first and that anyone disobeying these order were to be punished.

6. Concluding remarks

There has been a widespread notion that women and children are saved first in maritime disasters. Evidence, primarily from *Titanic* but also from *Luisitania* have led to the conclusion that men give priority to women – if time allows. Should women feel safe? We have provided evidence from a previously neglected maritime disaster – the sinking of *Estonia* in 1994 – that women had a much lower survival rate than men (5% vs. 22%). The *Estonia* disaster has several similarities with the *Titanic* disaster. In particular, both events allowed enough time for helping behavior to be possible during evacuation and the time in life rafts (boats). Instead, we argue that the defining difference lies in that the captain on *Titanic*, but not the captain on *Estonia*, gave and enforced orders that women and children should be saved first. We show that the survival patterns from *Birkenhead, Titanic*, *Luisitania* and *Estonia* can be explained by the behavior of the captain. Women have a survival advantage only when the captain orders that women should be saved before men and threatens disobedience with violence. Otherwise women will have lower survival chances.

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Appendix A: Descriptive statistics

Table A.1: Gender specific survival patterns on *Estonia*

	Survivors	Deceased	Total
Women			
Age	32.7	46.4	45.7
Age groups			
<16	0 (0)	5 (100)	5
16-50	24 (8.2)	268 (91.8)	292
50+	2 (1.1)	186 (98.9)	188
Nationality			
Swedish	12 (4)	287 (96)	299
Estonian	13 (8.1)	147 (91.9)	160
Traveler status			
Passengers	16 (4.2)	361 (95.8)	377
Crew	10 (9.3)	98 (90.7)	108
Men			
Age	34.6	46.4	43.8
Age groups			
<16	2 (18.2)	9 (81.8)	11
16-50	97 (30.8)	218 (69.2)	315
50+	12 (6.7)	166 (93.3)	178
Nationality			
Swedish	37 (14.7)	214 (85.3)	251
Estonian	51 (27.7)	133 (72.3)	184
Traveler status			
Passengers	82 (19.6)	337 (80.4)	419
Crew	29 (34.1)	56 (65.9)	85

Note: Percentages in parentheses.

Table A.2: Patterns of success in abandoning *Estonia* (Phase 1)

	Reached outer deck	Missing	Total
Sex			
Women	67 (13.8)	418 (86.2)	485
Men	165 (32.8)	339 (67.2)	504
Nationality			
Swedish	89 (16.2)	461 (83.8)	550
Estonian	112 (32.6)	232 (67.4)	344
Latvian	10 (35.7)	18 (64.3)	28
Finnish	7 (43.8)	9 (56.2)	16
Russian	3 (21.4)	11 (78.6)	14
Others	11 (29.7)	26 (70.3)	37
Traveler status			
Passengers	157 (19.7)	639 (80.3)	796
Crew	75 (38.9)	118 (61.1)	193
Age	37.1	47.1	44.7
Age groups			
<16	2 (12.5)	14 (87.5)	16
16-50	191 (31.5)	416 (68.5)	607
50+	39 (10.7)	327 (89.3)	366

Note: Percentages in parentheses.

Table A.2.1: Gender patterns of success in abandoning *Estonia* (Phase 1)

	Reached outer deck	Missing	Total
Women			
Age	37.6	47.0	45.7
Age groups			
<16	0 (0)	5 (100)	5
16-50	56 (19.2)	236 (80.8)	292
50+	11 (5.6)	177 (94.4)	188
Nationality			
Swedish	31 (10.4)	268 (89.6)	299
Estonian	34 (21.2)	126 (78.8)	160
Traveler status			
Passengers	39 (10.3)	338 (89.7)	377
Crew	28 (26)	80 (74)	108
Men			
Age	37	47.1	43.8
Age groups			
<16	2 (18.2)	9 (81.8)	11
16-50	135 (42.9)	180 (57.1)	315
50+	28 (15.7)	150 (84.3)	178
Nationality			
Swedish	58 (23.1)	193 (76.9)	251
Estonian	78 (42.4)	106 (57.6)	184
Traveler status			
Passengers	118 (28.2)	301 (71.8)	419
Crew	47 (55.3)	38 (44.7)	85

Note: Percentages in parentheses.

Table A.3: Survival patterns on *Estonia* in Phase 2

	Survivors	Deceased	Total
Sex			
Women	26 (38.8)	41 (61.2)	67
Men	111 (67.3)	54 (32.7)	165
Nationality			
Swedish	49 (55.1)	40 (44.9)	89
Estonian	64 (57.1)	48 (42.9)	112
Latvian	6 (60)	4 (40)	10
Finnish	6 (85.7)	1 (14.3)	7
Russian	2 (66.7)	1 (33.3)	3
Others	10 (90.9)	1 (8.1)	11
Traveler status			
Passengers	98 (62.4)	59 (37.6)	157
Crew	39 (52)	36 (48)	75
Age	34.2	41.3	37.1
Age groups			
<16	2 (100)	0 (0)	2
16-50	121 (63.4)	70 (36.6)	191
50+	14 (35.9)	25 (64.1)	39

Note: Percentages in parentheses.

Table A.3.1: Gender specific survival patterns on *Estonia* in Phase 2

	Survivors	Deceased	Total
Women			
Age	32.7	40.3	37.6
Age groups			
<16	0 (0)	0 (0)	0
16-50	24 (42.9)	32 (57.1)	56
50+	2 (18.2)	9 (81.8)	11
Nationality			
Swedish	12 (38.7)	19 (61.3)	31
Estonian	13 (38.2)	21 (61.8)	34
Traveler status			
Passengers	16 (41)	23 (59)	39
Crew	10 (35.7)	18 (64.3)	28
Men			
Age	34.6	42	37
Age groups			
<16	2 (100)	0 (0)	2
16-50	97 (71.9)	38 (28.1)	135
50+	12 (42.9)	16 (57.1)	28
Nationality			
Swedish	37 (63.8)	21 (36.2)	58
Estonian	51 (65.4)	27 (34.6)	78
Traveler status			
Passengers	82 (69.5)	36 (30.5)	118
Crew	29 (61.7)	18 (38.3)	47

Note: Percentages in parentheses.