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Every Man for Himself! Gender, Norms and Survival in Maritime Disasters

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Abstract

Since the sinking of the *Titanic*, there has been a widespread belief that the social norm of 'women and children first' gives women a survival advantage over men in maritime disasters, and that captains and crew give priority to passengers. We analyze a database of 18 maritime disasters spanning three centuries, covering the fate of over 15,000 individuals of more than 30 nationalities. Our results provide a new picture of maritime disasters. Women have a distinct survival disadvantage compared to men. Captains and crew survive at a significantly higher rate than passengers. We also find that the captain has the power to enforce normative behavior, that the gender gap in survival rates has declined, that women have a larger disadvantage in British shipwrecks, and that there seems to be no association between duration of a disaster and the impact of social norms. Taken together, our findings show that behavior in life-and-death situation is best captured by the expression '*Every man for himself*'.

Key words: Social norms, Disaster, Women and children first, Mortality, High stakes

JEL Codes: C70, D63, D81, J16

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Introduction

On April 15, 2012, a century has passed since RMS *Titanic* sank in the North Atlantic Ocean. The *Titanic* disaster has generated immense public and scholarly interest, and as one of the most extensively covered events in history obtained an almost mythological status. The evacuation of the *Titanic* serves as the prime example of chivalry at sea. Men stood back, while women and children were given priority to board the lifeboats. In the end, 70% of the women and children were saved compared to only 20% of the men (Hall, 1986). The social norm of saving 'women and children first' (WCF) in shipwrecks has often been referred to as the 'unwritten law of the sea'.

It is well known that social norms of fairness and cooperation influence human behavior in a wide range of situations.[1] For instance, charitable giving, and donation of blood and organs is widespread (Andreoni, 2006; List, 2011; Thorne, 2006). Men and women are, however, subject to different norms of helping behavior (Eagly and Crowley, 1986). Men are in general expected to help people in emergencies, while women are, to a higher degree expected to engage in care over the long-term. The expectation of men to display chivalry and heroism in maritime disasters can be seen as an archetypal example of gender differences in norms of helping behavior. Men displaying extreme altruism in disasters contrast the picture of men being more selfish than women.[2]

Rational individuals, whether with self-regarding or other-regarding preferences, compare the benefits and costs of helping. When helping substantially increases the risk of dying, it would be rational for most individuals to save themselves rather than helping others. This cost-benefit logic is fundamental in economic models of human behavior, including models in which individuals choose to comply with or violate social norms for instance by committing crimes (Becker, 1968).

Maritime disasters provide a valuable context in which it is possible to empirically investigate how people act and organize behavior in life-and-death situations and, in particular, if norms of helping behavior are being upheld. However, so far, only the shipwrecks of the *Titanic* and the *Lusitania* have been analyzed with respect to gender and survival (Folkesson, 2005; Frey et al., 2010, 2011; Gleicher and Stevans, 2004; Hall, 1986). It has been concluded that the men on board the *Titanic* followed the norm of WCF (Frey et al., 2010, 2011). Based on a comparison of the *Titanic* and the *Lusitania* (where the former sank in 160 and the latter in less than 20 minutes) a conjecture has been suggested to the effect that norm compliance is more pronounced in disasters that evolve slowly (Frey et al., 2010, 2011).

Do women normally have a survival advantage in maritime disasters, or was the evacuation of the *Titanic* an exception? What situational and cultural conditions determine who survives and who dies? And what role does the captain play?

To address these questions, we have compiled and analyzed a database of 18 maritime disasters over the period 1852–2011. Starting from the list *Some Notable Shipwrecks since 1854*, published in the 140th Edition of The World Almanac and the Book of Facts (Joyce, 2007), we have selected shipwrecks involving passenger ships, that have occurred in times of peace, and for which there are passenger and crew list containing information on the gender of survivors and decedents separately. We have added data for one shipwreck occurring before 1854, HMS *Birkenhead* (1852), since the *Birkenhead* is often referred to as giving rise to the expression 'women and children first'. Data for two shipwrecks that have taken place after year 2006 are added: MS *Princess of the Stars* (2008) and MV *Bulgaria* (2011). Despite

[1] See for instance Elster (1989) and Ostrom (2000).
[2] For a review of the literature on gender differences in experiments see Croson and Gneezy (2009).

it being a wartime disaster we also include data from *Lusitania* (1915) in the sample as it has been investigated in previous research. Our data cover the fate of over 15,000 passengers and crew members of more than 30 different nationalities. Table 1 gives an overview of the shipwrecks in the database. For details about selection of shipwrecks, see Appendix A, and for details of each disaster, see Appendix B.

Table 1: Maritime disasters from 1852 to 2011. Duration refers to the time period between the first indication of distress and the sinking. Quick (Slow) implies that the time period was shorter (longer) than 30 minutes. WCF order indicates if the captain gave the WCF order.

Name of ship	Year	Cause of disaster	Water	Nationality	Duration	WCF: order	Casualties	Survivors
HMS *Birkenhead*	1852	Grounding	Indian Ocean, RSA	British	Quick	Yes	365	191
SS *Arctic*	1854	Collision	North Atlantic, CAN	US	Slow	Yes	227	41
SS *Golden Gate*	1862	Fire	Pacific Ocean, MEX	US	Slow	No	206	172
SS *Northfleet*	1873	Collision	English Channel, UK	British	Quick	Yes	287	80
RMS *Atlantic*	1873	Grounding	North Atlantic, CAN	British	Slow	No	538	330
SS *Princess Alice*	1878	Collision	River Thames, UK	British	Quick	No	697	140
SS *Norge*	1904	Grounding	North Atlantic, UK	Danish	Quick	No	635	160
RMS *Titanic*	1912	Collision	North Atlantic, CAN	British	Slow	Yes	1,496	712
RMS *Empress of Ireland*	1914	Collision	St Lawrence River, CAN	British	Quick	No	983	465
RMS *Lusitania*	1915	Torpedoed	North Atlantic, UK	British	Quick	Yes	1,190	768
SS *Principessa Mafalda*	1927	Technical	Atlantic Ocean, BRZ	Italian	Slow	No	309	877
SS *Vestris*	1928	Weather	Atlantic Ocean, USA	British	Slow	No	125	183
SS *Morro Castle*	1934	Fire	Atlantic Ocean, USA	US	Slow	No	130	412
MV *Princess Victoria*	1953	Weather	North Channel, UK	British	Slow	No	135	44
SS *Admiral Nakhimov*	1986	Collision	Black Sea, UKR	Russian	Quick	No	423	820
MS *Estonia*	1994	Technical	Baltic Sea, FIN	Estonian	Slow	No	852	137
MS *Princess of the Stars*	2008	Weather	Philippine Sea, PHI	Philippine	Slow	Unknown	791	59
MV *Bulgaria*	2011	Weather	Volga, RUS	Russian	Quick	Unknown	110	76

Six hypotheses are tested. The first and main hypothesis (H1) is that women have a survival advantage over men in maritime disasters. Previous research on the *Titanic* has found, in line with the notion of WCF, that women have a survival advantage over men. There are, however, several reasons to believe that men have better survival prospects than women, if they do not engage in self-sacrificing helping behavior. The most important argument would be that men are physically stronger than women. In the evacuation of a sinking ship, success is typically determined by the ability to move fast through corridors and stairs, which is often made difficult by heavy list, congestion and debris. Other traits that may enhance survival prospects, such as aggressiveness, competitiveness and swimming ability, are also more prevalent in men (Croson and Gneezy, 2009; Mazur and Booth, 1998; Niederle and Vesterlund, 2007; Taylor et al., 2000) while for example resistance to cold water (McArdle et al., 1984; Mcardle et al., 1992; Rivers, 1982) may benefit either sex. Accordingly, if men try to save themselves, we expect women to have a relative survival disadvantage. On the other hand, if men comply with the norm of WCF, we would expect women to have a survival advantage over men. Evidence from the *Lusitania* disaster indicate no statistically significant difference in survival rates between men and women (Frey et al., 2010, 2011).

As a second hypothesis (H2), we posit that crew members have a survival disadvantage over passengers. According to maritime conventions, it is the duty of crew members – and in particular the captain – to conduct a safe evacuation of the ship (International Maritime Organization, 2004). If the crew follow procedures and leave the ship after the passengers, we expect them to suffer a survival disadvantage compared to passengers. Yet, crew members are familiar with the ship, often have emergency training and are likely to receive early information about the severity of the situation. We, therefore, expect them to have a relative survival advantage if they try to save themselves rather than assisting the passengers. Evidence from the *Titanic* suggests that crew members indeed have a significant survival advantage over passengers (Frey et al., 2011).

The third hypothesis (H3) is that women fare better in shipwrecks, in which the captain orders WCF, than when no such orders are given. The potentially important role of the captain has largely been overseen in previous studies. Evidence of people helping each other is not necessarily evidence of other-regarding preferences or social norms governing behavior. It has been shown, both theoretically and experimentally, that people who would not otherwise do so, may comply with a social norm if violation is threatened with punishment (Fehr and Fischbacher, 2003, 2004; Fehr and Schmidt, 1999). Unlike other types of catastrophes, e.g. earthquakes, tsunamis and terrorist attacks, a maritime disaster is characterized by the presence of a well-defined leader. On board a ship, the captain is the commanding officer with the supreme power to give and enforce orders. In the evacuation of the *Titanic*, the captain ordered 'women and children first' (Great Britain. Commissioner of Wrecks, 1912) and officers were reported to have shot at men who disobeyed the order (Chapman, 2001). The situation on the *Titanic* resonates with the situation in a Third-Party Punishment Game (TPPG), in which threat of punishment is necessary for self-regarding players to transfer resources to others (Fehr and Fischbacher, 2004). Similar to the TPPG, in which punishment is costly, the WCF order comes at a cost for the captain, because with the order he agrees to remain on board the ship until all women and children have been rescued. When the captain does not order priority to women, the situation resembles the allocation problem of a standard Dictator Game (Forsythe et al., 1994; Kahneman et al., 1986), in which self-regarding players comply with norms only if the cost of the social stigma of violation exceeds the cost of compliance.

While norms vary over time and space, it has been a grand challenge for scientists to understand when, where or how norms develop, strengthen or wane (Camerer and Fehr, 2006; Henrich et al., 2001; Ostrom et al., 1992). It is possible that chivalry at sea was a common phenomenon in the 19th and early 20th century and that the fates of women were determined by men. With the rise of more gender-equal societies, however, women may have become more capable of surviving on their own. For instance, improved swimming skills as well as less restrictive clothing may have increased the survival prospects of women. World War I has been seen as a paradigmatic shift in the general view of manliness and the role of women in society (Delap, 2006). The fourth hypothesis (H4) is that the survival difference between men and women is lower after World War I.

Helping behaviors differ between cultures (Henrich et al., 2001). Such differences may be present in maritime disasters involving ships with passengers and crew of different nationalities. Previous research on gender differences in survival has focused solely on British shipwrecks. Chivalry at sea has been seen as a defining characteristic of Britishness (Delap, 2006). If the expected stigma of norm violation is more severe for British men than for men of other nationalities, we expect higher compliance with the WCF norm on board British ships. The captains are British on all British ships in our sample, likewise crew and passengers are dominated by Brits on these ships. Our fifth hypothesis (H5) is that women have a greater

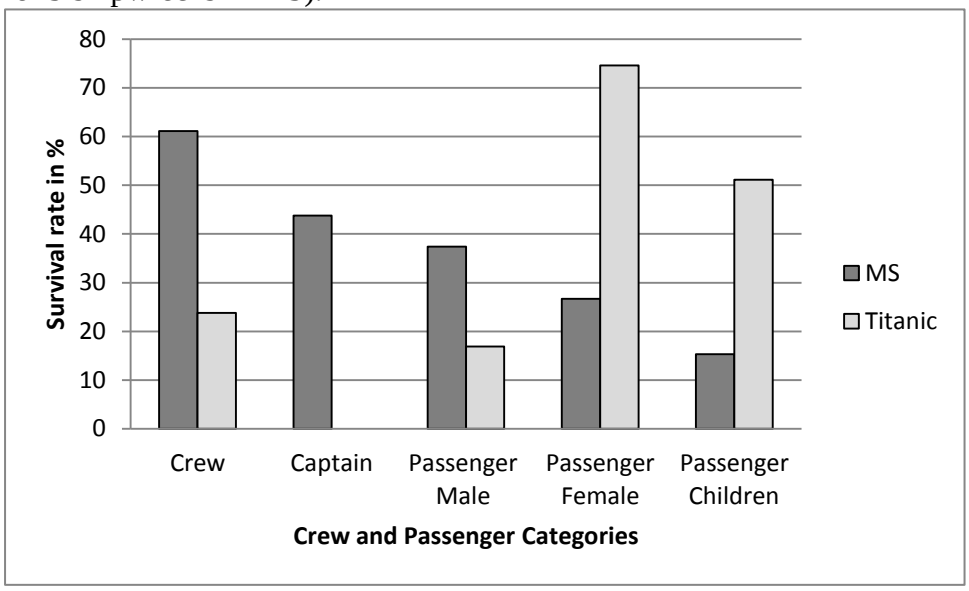
survival advantage over men in maritime disasters involving British ships, than in shipwrecks of other nationalities.

It has also been suggested that time is of critical importance for norms to guide behavior (Frey et al., 2011). When a ship sinks quickly, human actions are driven by hormonal reactions, such as a rapid increase of adrenaline, and selfish behavior should dominate. Evidence in favor of this argument rests on a comparison of the *Titanic* and the *Lusitania* disaster. The *Titanic* sank in 160 minutes while the *Lusitania* sank in less than 20 minutes. The sixth and final hypothesis (H6) is that the gender difference in survival rates is smaller when a ship sinks in less than 30 minutes, than if it takes longer.

Data

Because the hypotheses have been derived mainly from evidence from the *Titanic* disaster (and to some extent from the *Lusitania*), we focus on the 16 previously uninvestigated shipwrecks, data that we label as our main sample (MS). We denote the full sample including all shipwrecks in our data FS. Figure 1 displays that, in the MS, crew members have the highest survival rate, followed by captains and male passengers, while the lowest survival rates are observed for women and children.[3] This pattern stands in sharp contrast to the pattern observed for the *Titanic*, suggesting that evidence from the *Titanic* is not representative of maritime disasters in general.

Figure 1. Survival rates of passengers and crew (survival rates of children is only available for 9 shipwrecks in MS).



[3] See Appendix C for a description of the data underlying Figure 1.

Method

We test the hypotheses (H1–H6) by estimating linear probability models. We analyze the shipwrecks both individually and jointly. Individual analyses of the shipwrecks only allow us to test H1 and H2. The advantage of these tests, however, is that they are methodologically comparable to previous tests conducted on data from the *Titanic* and the *Lusitania.* The joint analyses of all shipwrecks make it possible to control for shipwreck specific circumstances and to test all 6 hypotheses. The unit of analysis is the individual passenger or crew member. The dependent variable (*Survival*) is binary and equals one if the person survived the disaster and zero if the person died. The independent variable of main interest is the binary variable *Female* (females=1, males=0). A positive (negative) coefficient implies that women have a higher (lower) survival rate than men. Crew status is indicated by the binary variable *Crew* (crew=1, passengers=0). For further details on coding and data sources, see Appendix A.

Results

In the separate analyses, of all of the shipwrecks (FS), we regress *Survival* on *Female*. In addition, we also control for *Crew* and other individual-level characteristics as well as estimate the coefficients with probit models (Detailed results available in Appendix C, Table C3). If women are given preferential treatment, we expect their survival rate to be at least as high as that of men (H1). We find that women have a survival advantage ($p<0.01$) over men, in only 2 out of the 18 disasters: the *Birkenhead* and the *Titanic*. Notably, the wreck of the *Birkenhead* in 1852 gave rise to the notion of WCF; a notion that became widespread first after the sinking of the *Titanic* (Delap, 2006). For 11 of the shipwrecks, we find that women have a survival disadvantage compared to men ($p<0.01$). For the 5 remaining shipwrecks we find no clear evidence of survival differences between men and women. If crew members try to save themselves rather than assisting the passengers, we expect them to have a survival advantage over passengers (H2). Indeed, we find that crew members have a relative survival advantage ($p<0.01$) in 9 out of the 18 disasters. For the 9 remaining shipwrecks we find no clear evidence of survival differences between crew and passengers.

To take full advantage of the data, we present results from analyses, including all shipwrecks of the MS, in each regression. To control for unobservable differences that vary between the ships, but affect everybody on board each ship equally, such as the severity of the disaster, we augment the regressions with shipwreck specific effects. For results of samples including the *Titanic* and the *Lusitania*, see Appendix C.

Table 2 reports tests of each of the 6 hypotheses conducted in separate regressions, as well as together in one regression. We find that the survival rate of women is 16.7 percentage points lower than, or about half of (17.8% vs. 34.5%), that of men. The results also show that crew members are 18.7 percentage points more likely to survive than passengers. The finding that women have a survival disadvantage compared to men, and that crew members have a survival advantage over passengers, holds even with the inclusion of data from the *Titanic* and the *Lusitania*.

We find some evidence that the survival rate of women is higher when the captain orders WCF, compared to when no such order has been given. Since the WCF order was given only on 5 ships, including the *Titanic* and the *Lusitania,* MS is not ideal for testing this hypothesis. Nevertheless, the joint, and most reliable, test of the six hypotheses indicates that the survival rate of women is 7.3 percentage points higher in shipwrecks in which the order has been given. The result is strengthened when the *Titanic* and *Lusitania* are included in the analysis.

The survival rates of both men and women are higher in shipwrecks occurring after WWI. The gender gap in survival has decreased by about one-third compared to before WWI. This finding holds even with the inclusion of data from the *Lusitania* and the *Titanic*.

In contrast to the hypothesis, women fare worse, not better, in shipwrecks involving British ships. On average, the survival rate of women on board British ships is 13.9–15.3 percentage points lower than in disasters involving ships of other nationalities. This finding holds even with the inclusion of data from the *Lusitania* and the *Titanic*. We note that the WCF order is given more often on board British ships. However, even when controlling for if the WCF order has been given, we find a larger survival disadvantage for women on British dominated ships.

Finally, the results give no support for the hypothesis that the gender difference in survival rates is smaller when a ship sinks in less than 30 minutes than when the disaster evolves more slowly. Women have a disadvantage independently of whether the ship sinks quickly or slowly.

Table 2. Linear probability models for survival. Coefficients are followed by p-values, based on robust standard errors, in parentheses. All models include shipwreck specific fixed effects.

	Main hypothesis tested						
	H1	H2	H3*	H4*	H5*	H6*	H1–H6*
Female	-0.167	-0.126	-0.151	-0.195	-0.093	-0.145	-0.151
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Crew		0.187	0.157	0.158	0.159	0.157	0.160
		(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Female interacted with:							
WCF order			0.019				0.072
			(0.477)				(0.016)
Post WWI				0.085			0.053
				(<0.001)			(0.071)
British ship					-0.153		-0.139
					(<0.001)		(<0.001)
Quick						-0.009	0.032
						(0.663)	(0.195)
Constant	0.346	0.325	0.244	0.329	0.435	0.179	0.457
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Observations; R^2	10,978	10,976	10,976	10,976	10,976	10,976	10,976
R-squared	0.249	0.270	0.242	0.244	0.247	0.242	0.247

*These regressions also include the binary indicators which the female variable is interacted with. Since *WCF order*, *Post WWI*, *Quick*, and *British ship* do not vary within ships, observations in these regressions are weighted by the inverse of the number of individuals on board the ship to give all ships equal weight. Complete regression results, as well as results based on unweighted regressions, and regressions including the *Titanic* and the *Lusitania* can be found in Appendix C, Table C4–C11.

Discussion

Our results provide new insights about human behavior in life-and-death situations. By investigating a new and much larger sample of maritime disasters than has previously been done, we show that women have a substantially lower survival rate than men. That women fare worse than men has been documented also for natural disasters (Frankenberg et al., 2011; Ikeda, 1995; MacDonald, 2005; Neumayer and Plümper, 2007; Oxfam International, 2005). We also find that crew members have a higher survival rate than passengers and that only 7 out of 16 captains went down with their ship. Children appear to have the lowest survival rate. Moreover, we shed light on some common perceptions of how situational and cultural conditions affect the survival of women. Most notably, we find that it seems as if it is the policy of the captain, rather than the moral sentiments of men, that determines if women are given preferential treatment in shipwrecks. This suggests an important role for leaders in disasters. Preferences of leaders seem to have affected survival patterns also in the evacuations of civilians during the Balkan Wars (Carpenter, 2003). Moreover, we find that the gender gap in survival rates has decreased since WWI. This supports previous findings that higher status of women in society improves their relative survival rates in disasters (Neumayer and Plümper, 2007). We also show that women fare worse, rather than better, in maritime disasters involving British ships. This contrasts with the notion of British men being more gallant than men of other nationalities. Finally, in contrast to previous studies, we find no association between duration of the disaster and the influence of social norms. Based on our analysis, it becomes evident that the sinking of the *Titanic* was exceptional in many ways and that what happened on the *Titanic* seems to have spurred misconceptions about human behavior in disasters.

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Appendix to

Every man for himself!

Gender, norms and survival in maritime disasters

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Appendix A

This section provides a description of the database. It consists of three parts. In the first part, we describe the selection of shipwrecks. In the second part, we discuss the data obtained from passenger and crew lists. In the third part we discuss shipwreck characteristics that we use in the analysis. The database is available as Supporting Online Material in a separate excel file: Maritime Disasters.xlsx.

Selection of shipwrecks

Every year, hundreds or even thousands of accidents occur at sea. Fortunately, only a few cause substantial loss of life. No official list of the most severe maritime disasters exists. To select shipwrecks for the analysis, we therefore started off from the list *Some Notable Shipwrecks since 1854* in the 140th Edition of The World Almanac and the Book of Facts (Joyce, 2007). The list contains a total of 152 shipwrecks over the period 1854–2006. Although the list is comprehensive and covers maritime disasters globally, it is likely that disasters of the Western world and disasters that have gained much media attention are overrepresented. It is, however, the most extensive list we are aware of.

We have imposed five criterions that need to be fulfilled for the shipwreck to be included in our data: First, the disaster should have occurred in peacetime. Second, the shipwreck in question should involve a passenger ship. Third, there should be a positive number of survivors. Fourth, data (individual or aggregate) on survival rates of men and women separately should be available. The two first criteria can be seen as limiting the population of interest, while the latter two renders the sample somewhat unrepresentative. It should be mentioned that information about the shipwrecks and passenger lists are very difficult to obtain for disasters involving ships from many developing countries. This is unfortunate, since several of the deadliest disasters have involved such ships. For instance the sinking of Philippine registered MV *Doña Paz* and the Senegalese registered MV *Le Joola* are estimated to have resulted in more than 4,000 and 1,800 lives lost. Furthermore, language barriers have made it difficult to find extensive information about some shipwrecks. As a consequence, British and American ships are likely to be overrepresented in our sample.

Applying these sample criteria leaves us with a sample of 14 shipwrecks. We have added one shipwreck occurring before 1854, HMS *Birkenhead* (1852), since the *Birkenhead* is often referred to as giving rise to the expression ‘women and children first’. Moreover, we have added two shipwrecks that have taken place after year 2006: MS *Princess of the Stars* (2008) and MV *Bulgaria* (2011). We have also added RMS *Lusitania*, despite occurring in wartimes, since it has been analyzed in previous research. In total, we have a sample consisting of 18 shipwrecks, whereof only RMS *Titanic* and RMS *Lusitania* have previously been systematically investigated with respect to individual and social determinants of survival.

Individual level data for each shipwreck have been collected from the ship’s passenger and crew lists. 5 of the lists are obtained from books, 4 from official sources, such as e.g. inquiry commissions or government authorities, 7 from web sites and 2 are collected from newspaper articles. It difficult to say which source is most reliable. Logbooks and ship records have often been lost in the wreck, especially in earlier years. Moreover, it takes time to establish accounts of a maritime disaster. As a consequence, we have used the latest source available. The main sources have been cross-checked with other sources whenever possible.

We only include persons who have been confirmed to have been on board the ship at the time of the accident, or put differently, only those persons appearing in the particular passenger and crew lists. As a consequence, the total number of passengers, as well as the number of survivors and deceased, sometimes differs from the numbers appearing in other references.

We have individual level data for 17 of the shipwrecks. For the *Admiral Nakhimov* there are aggregate data on the number of male and female passengers and crew. Accordingly, we use the aggregate statistics to construct individual level data.

Data from passenger and crew lists

Below follows details about how the variables obtained from passenger and crew lists are coded and for which shipwrecks they are available. Table A1shows which variables that are available for each shipwreck.

Survival. Some passenger lists discriminate between deceased and missing persons. In the majority of cases 'missing' implies that the body has not been recovered, but that the person is presumed dead. For our analysis we have grouped the two categories and created a dummy variable that takes the value one (=1) if the individual survived the disaster and zero (=0) if the individual died (either confirmed dead or missing). We have compared our statistics with the casualty figures appearing in other sources and can conclude that there are only minor discrepancies.

Female. Gender is the individual characteristic of primary interest to us. Only a few passenger lists provide explicit information about the gender of the persons on board the ship. For most ships we have used the individual's name to determine gender. When there are uncertainties regarding the gender associated with a particular name we have used online name dictionaries that provide information on the origin of the name and informative statistics on whether it is typically a male name or a female name. In some passenger lists, especially those dating back to the 19th century, the classification is simplified by the presence of gender based prefixes such as MRS (if married female), MISS (if unmarried female) or MR (if adult male). Professional titles such as e.g. Dr, Professor, Stewardess, Captain, etc., have also been helpful for determining the gender of passengers and crew members. We have been unable to determine the gender of some individuals as they are stated with initials instead of forenames in the passenger manifests. This appears primarily for shipwrecks in the 19th century. Other difficulties come from misspellings in transcription of names. This occurs especially among East European emigrants travelling on American or British ships. The observations, which remained inconclusive after applying the above methods, were left out from the empirical analysis. In many cases, we cannot discriminate between women and girls or men and boys. Hence, we use the terms female and male. Gender enters our empirical analyses as a binary variable *Female*, taking the value one (=1) for females (women and girls) and zero (=0) for males (men and boys).

Age. 9 passenger lists contain information on age. In some cases it seems as if the availability is systematic. For example, the emigrant ships tend to have more extensive documentation of the age of the first class (saloon) passengers than the third class (steerage) passengers. For two of the ships (the *Estonia* and the *Bulgaria*) age is not given explicitly but in the form of year-of-birth. We have then calculated age as the year of the disaster minus the person's year-of-birth. Age enters the empirical specifications in the form of categorical variables, namely: persons younger than 16 (*<16*); persons 16–50 years old (*16–50*); and persons older than 50 (*>50*), with *16–50* being the reference group. Similar age groups have been used in previous studies (Frey et al., 2010, 2011). 2 passenger lists (the *Golden Gate* and the *Vestris*) do not contain information on age but make a distinction between adults and children. We create a dummy variable *Child* which equals one (=1) if the person is child and zero (=0) if adult. When we analyze children explicitly we denote persons younger than 16 as children.

Table A1: Availability of individual level data

Ship/Variable	Survival	Gender	Age	Crew	Passenger class	Nationality	Companionship
HMS *Birkenhead*	X	X		X			
SS *Arctic*	X	X		X			X
SS *Golden Gate*	X	X	X[1]	X	X		X
SS *Northfleet*	X	X	X	X			
SS *Atlantic*	X	X		X	X		
SS *Princess Alice*	X	X	X[2]	X			
SS *Norge*	X	X	X	X	X	X	
RMS *Titanic*	X	X	X	X	X		
RMS *Empress of Ireland*	X	X		X	X		
RMS *Lusitania*	X	X	X	X	X	X	
SS *Principessa Malfalda*	X	X	X[3]	X	X		
SS *Vestris*	X	X	X[4]	X			
SS *Morro Castle*	X	X		X	X		X
MV *Princess Victoria*	X	X	X[5]	X		X	
SS *Admiral Nakhimov*[a]	X	X		X			
MS *Estonia*	X	X	X	X		X	
MV *Princess of the Stars*	X	X		X			
MV *Bulgaria*	X	X	X	X			

Notes. [a]Data are compiled from aggregate statistics. [1]No information on age. Only indicator for whether the individual is a child or adult [2] Some individuals are marked as children in the passenger list. [3]The data are incomplete for the crew. [4]Children are indicated, but some uncertainty remains about the exact number. [5] Some individuals are marked as children in the passenger list.

Crew. All the passenger lists we have gathered provide some sort of indictor of whether listed persons are passengers or members of the crew. In some passenger lists there is more detailed information about the crew such as e.g. in which department (i.e., deck, engineering, or steward) the crew members worked, and in some cases even the specific title. The amount, quality and type of crew characteristics vary substantially between the ships. We therefore treat the crew as a homogenous entity. For most shipwrecks the great majority of crew members are men. This implies that the information on crew membership is not only important in the test of H2 but also that crew membership is an important control variable in the other tests as well. Accordingly, we have constructed a binary variable *Crew* taking the value one (=1) for crew members and zero (=0) for passengers. The captain is included in the crew.

Passenger Class. 8 passenger lists, especially those dating back in time, separate passengers into different classes: often first class, second class and third class, or saloon (first class) and steerage (second and third class). We have constructed three dummy variables: *First class* (*Saloon*); *Second class*; and *Third class* (*Steerage*), each taking the value one (=1) if the passenger belongs to the particular class and zero (=0) otherwise.

Nationality. 4 passenger lists contain information on the nationalities of the passengers and crew members. We create dummy variables for each nationality. These take the value one (=1) if the passenger, or crew member, is of the particular nationality and zero (=0) otherwise.

Companionship. 3 passenger lists provide some sort of indicator of the social relationships between the passengers, e.g. information on whether people were married or whether they shared cabins. We create a dummy variable *Companionship* which takes the value one (=1) if the individual traveled in a group and zero (=0) otherwise.

Shipwreck characteristics

We complement the data obtained from the passenger and crew lists with shipwreck specific characteristics. The information underlying these variables has been collected from the key references for each shipwreck, and whenever possible crosschecked against alternative sources.

WCF order. We have searched the shipwreck accounts for evidence of whether the captain, or any other officer, gave the order 'Women and children first' at some point during the evacuation. For 5 of the shipwrecks we have found supporting evidence of the order while for 9 cases there is no indication of the order been given. For 2 shipwrecks (the *Princess of the Stars* and the *Bulgaria*) we cannot conclude whether such orders were given or not. For the empirical analysis we create a dummy variable *WCF order* equal to one (=1) if the order was given and zero (=0) otherwise.

Post WWI. The sample spans the period 1852–2011. For the empirical analysis we define a dummy variable, *Post WWI*, which equals one (=1) if the disaster took place after World War I and zero (=0) if it took place before, or during the war. The only shipwreck in our sample that took place during World War I is the *Lusitania* disaster in 1915. The first shipwreck after the World War I, in our sample, is the *Principessa Mafalda* in 1927.

British ship. Refers to the country in which the ship was registered at the time of the accident. In all cases, but three (the *Titanic*, the *Empress of Ireland* and the *Estonia*), there is an exact match between the ship's flag and the nationality of the ship owner. Also, all captains have the same nationality as their respective ship. In the empirical analysis we discriminate between British ships and vessels of other nationalities. There are 8 British ships in FS. We create a dummy variable (=1) if the ship is British and (=0) otherwise.

Quick. We define sinking time as the time period between the first indication of distress and the sinking. For ease of interpretation we classify the disasters into two categories: 'Quick' and 'Slow'. A disaster is defined as 'Quick' if the time period is shorter than 30

minutes and ‘Slow’ if the time period is longer than 30 minutes. 8 disasters in FS are quick according to our definition. In the econometrical specifications we include a dummy variable *Quick*, which equals one (=1) if the disaster was quick and zero (=0) if it was slow.

Appendix B

Here we give a general description of each shipwreck, including information on things such as: the nationality of the ship, the crew and the passengers, the year, the date, the time, and the water in which each shipwreck took place. We also provide an account of the course of events of the disaster, together with an estimate of the length of the time between the first serious indication of danger and the actual sinking. It is important to remember that a maritime disaster does not end with the foundering but rather that it continues until the final survivor is rescued. We have therefore tried to find information on when rescue ships arrived at the wreck site and for how long the rescue mission continued. A special emphasis is placed on how the passengers and the ship’s officers and crew behaved while the disaster was unfolding and immediately thereafter. We have also spent much time to cover the captain’s role in the evacuation process and in particular, if he gave and enforced orders that women and children were to be given priority. The technical causes underlying the accident are often well-documented with the help of logbooks and for more recent shipwrecks, black box recorders and communication transcripts. However, to ascertain the facts regarding how the passengers and crew behaved during the disaster there is often only one source available—the testimonies of those who survived. It should therefore be noted that the subjective nature of some of the reports may give a biased portrayal of the course of events. Nevertheless, we think that witness reports, especially those appearing in reports from inquiry commissions, contributes to a deeper understanding of the shipwreck.

HMS *Birkenhead*

This description of the *Birkenhead* disaster is largely based on A Deathless Story (Addison and Matthews, 1906).

In the early morning of February 26, 1852 the British troopship HMS *Birkenhead* was wrecked at Danger Point outside Cape Town, South Africa. According to the records, 445 of the 638 people on board died (Addison and Matthews, 1906).

On her final voyage *Birkenhead* was transporting troops from the United Kingdom to the 8th Xhosa War in South Africa. Along the sail from United Kingdom were some of the officers' wives and families. Although most of them disembarked in Simonstown twenty civilians continued the voyage towards the final destination, Algoa Bay outside Port Elisabeth (Addison and Matthews, 1906). The weather was calm and sight clear. These conditions had, however, a devastating consequence for the *Birkenhead*. At 2 AM it struck an underwater rock that was clearly visible in rough seas, but was not immediately apparent in calmer conditions.

Immediately after the grounding Commander Salmond ordered the anchor to be dropped and the engines to be set in reverse to back the ship of the rock. However, the sea had quickly flooded the engine room and lower compartments, drowning 100 of the soldiers who were still in their berths. To save the ship, the commander ordered some of the men to the pumps, while the rest were assembled on the poop deck in order to raise the forward part of the ship.

The *Birkenhead* did not carry enough lifeboats for all the passengers. At order soldiers tried to launch those available. However, one was immediately swamped and another could not be launched due to poor maintenance(Addison and Matthews, 1906). The three remaining lifeboats were filled with the women and children and rowed toward the shore. Lieutenant-

Colonel Seton, who was in charge of all military personnel, recognized that rushing the lifeboats would risk swamping them and endanger the women and children. He ordered his men to maintain discipline and to stand fast, allowing the women and children to board the boats safely. A survivor reports that, Lieutenant-Colonel Seton, drew his sword to keep the way free for the women and children (Addison and Matthews, 1906). All 13 children and 7 women onboard were saved. The accounts of the soldiers' chivalry and courage gave rise to the 'women and children first' protocol.

Ten minutes after the first impact, during the attempt to get the ship off the rock, the *Birkenhead* took another strike, this time beneath the engine room, tearing open her bottom (Addison and Matthews, 1906). The ship instantly broke in two just aft of the mainmast and the ship's bow sank at once. The stern section, however, remained afloat for a few minutes, before sinking. About 20 minutes after striking the rock, the *Birkenhead* had disappeared from the surface. At this time, the soldiers had been given the order to abandon the ship. Some of them managed to swim the 3 kilometers to shore, while others stayed afloat by hanging on to debris from the wreck. Most of the men, however, drowned. In the morning after the incident a schooner discovered two of the lifeboats. In the afternoon it arrived at the scene of the disaster. At that time 40 people were still clinging to the rigging, the only part of the ship remaining above the surface.

Most of the victims died from drowning as they did not manage to swim to the shore. Some unfortunate died as the funnel collapsed and landed over them. According to the accounts, 40 of the survivors had climbed the rigging, 76 had escaped in lifeboats, 9 escaped in the gig and 68 had reached the shore swimming or floating on debris(Addison and Matthews, 1906).

Neither Commander Salmond nor Lieutenant-Colonel Seton survived the disaster (Addison and Matthews, 1906).

The lists of military personnel and the civilian crew members and passengers were lost with the ship. The data for the *Birkenhead* has been collected from the passenger list provided in the book *The Drums of the Birkenhead* (Bevan, 1989). To our knowledge this is the only passenger list available for the *Birkenhead*. One caveat, however, is that it contains only 556 names, that is 137 fewer than what is reported in other sources (Addison and Matthews, 1906). The explanation for the discrepancy is that the record keeping was poor and that a large number of crew members remained unidentified. Since we need to have information about the names of the persons on board to determine their gender we use the data source at hand. Table B1 summarizes the data with respect to characteristics of survivors and decedents. According to the data, 191 of the persons on board the ship at the time of the wreckage survived and 365 perished. As noted previously, all women and children were saved. This compares to a survival rate of the male passengers of about one-third. Moreover, we have information on who belonged to the crew, and who belonged to the military contingent. Although it may be the case that some of those in latter group had sailed with, or served on, the *Birkenhead* before and thus, had equally good knowledge about rescue equipment and escape ways as the crew members, we chose to categorize them, as well as all the women, as passengers. We note that the crew had a clear survival advantage over the passengers—the survival probabilities are 82.8% and 28.2% respectively. According to the historical records on the shipwreck there were 13 children onboard the *Birkenhead*. Unfortunately, the passenger list lacks information on age. We do not have information about the nationality of the people onboard. However, since the *Birkenhead* was a British troopship it is reasonable to assume that her entire complement was of British nationality.

Table B1: Survival patterns in the HMS *Birkenhead* disaster

		Survivors	Deceased	Total
Overall		191 (34.4)	365 (65.6)	556
Gender				
	Women	7 (100)	0 (0)	7
	Men	184 (33.5)	365 (66.5)	549
Traveler status				
	Passengers	138 (28.2)	352 (71.8)	490
	Crew	53 (82.8)	11 (17.2)	64

Notes. Survival rates in parentheses

SS *Arctic*

The main source of this description is *The Sea Shall Embrace Them*(Shaw, 2003).

The American ocean liner SS *Arctic* left Liverpool for New York on September 21, 1854 with a complement of 233 passengers and 175 crewmembers. The second class passengers were mainly immigrants of British, French and German origin. The ship was built four years earlier and was one of the most modern ships of its time.

At noon on September 27, the *Arctic* steamed at full speed along the shores of New Foundland, Canada. A heavy fog made the sight limited and the *Arctic* came on a collision course with the French steamer SS *Vesta*. The outlook discovered the *Vesta* too late, and the collision was inevitable. The crew on board the *Arctic* believed that the ship was intact and directed their attention to the French steamer, which seemed to be sinking. One of the *Arctic's* lifeboats was lowered to pick up passengers from the *Vesta*. Soon, however, it became apparent that the *Arctic* took in water. Several attempts were made to seal the leak, but they were all unsuccessful. Instead, the captain ordered the engines set in full speed, in an attempt to reach the safety of the shore. However, the high speed just caused more water to enter the ship. There is no exact sinking time, but several hours had passed from the collision until the ship eventually sank.

The evacuation did not begin directly after the collision, as Captain Luce tried to keep the ship afloat and reach shore. It became evident that this was not possible and that no ships were coming to rescue. Captain Luce ordered the lifeboats to be launched. It should be noted that the lifeboat capacity was insufficient to carry all passengers (Shaw, 2003). Women and children were ordered to board the boats first (Shaw, 2003). The evacuation was disorganized and the attempts to calm passengers failed. The lifeboats were soon filled with crew members. The captain threatened disobedience with violence, but he hesitated to enforce his orders (Shaw, 2003). After the crew had left in the lifeboats, the passengers left behind started to build a raft. Several did not manage to escape in time and went down with the ship. The water temperature was about 7 degrees Celsius (Shaw, 2003), and hypothermia soon weakened the powers of those struggling to keep afloat. Captain Luce was reported to have stayed with the ship until it sank, but managed to survive on a piece of debris and was picked up two days after the accident.

As several hours passed between the impact and the sinking, most passengers managed to reach the deck. The main determinant of survival seems to have been success in obtaining a seat in a lifeboat. All the women and children on board died and most of the survivors were crew members. The tragic irony is that the *Vesta* did not sink, and if the ship had stayed at the location of the collision, most of its passengers could have been saved.

The data are obtained from *The New York Daily Times(The New York Daily Times, 1854)*. Some passengers did not have their names written out; only an initial was given. We are thus unable to determine the gender of these 78 individuals. Consequently they are omitted from the empirical analysis, but it should be noted that all of them but one died. Descriptive statistics of the sample are presented in Table B2. The overall survival rate was 15.3%. As noted earlier all women on board died. This compares to a survival rate of men of 19.9%. The data discriminates between crew members and passengers. We note that he survival rate of passenger is higher than that of the crew, 20.5% vs. 11.3%. The data also contain information about whether people traveled alone or as part of a group. People who traveled alone had a survival rate of 18.8%, whereas the corresponding number for people traveling in group was 2.8%.

Table B2: Survival patterns in the SS *Arctic* disaster

	Survivors	Deceased	Total
Overall	41 (15.3)	227 (84.7)	268
Gender			
Women	0 (0)	62 (100)	62
Men	41 (19.9)	165 (80.1)	206
Traveler status			
Passengers	17 (11.3)	134 (88.7)	151
Crew	24 (20.5)	93 (79.5)	117
Companionship			
In group	2 (2.8)	69 (97.2)	71
Alone	15 (18.8)	65 (81.2)	80

Notes. Survival rates in parentheses

SS *Golden Gate*

There literature on the sinking of SS *Golden Gate* is scarce. This description is derived from several contemporary articles in the *New York Times*. It should be noted that they are quite polemic. Some of them try to blame the Pacific Steamship Company for the disaster, whereas others are published in their defense. Hence, great care with details has been taken and the description is somewhat brief.

The SS *Golden Gate* left San Francisco for Panama July 27, 1862. According to the *New York Times* (The New York Times, 1862a) there were a complement of 95 first class passengers, 147 second class and steerage passengers, and 95 crew members on board. About 30 of them were children and 35 were women. There is no account on the general reason why the passengers travelled. Onboard the ship was also a treasure worth 1,400,000 $[4](The New York Times, 1862a).

At 4.45 PM, July 27, when the ship was a few miles off Manzanilla, Mexico, a fire broke out. Intents were immediately made to extinguish it, but to no avail. The fire spread quickly and after 30 minutes the upper deck fell (The New York Times, 1862c). Meanwhile, the captain had changed the course, intending to beach the ship. At 5.30 PM it grounded almost 300 meters from shore and was evacuated (The New York Times, 1862b).

By this time several lifeboats had already burnt in their tackles and others capsized at launch. A few boats appear to have been successfully launched, but there are no reports on the number of people who managed to get into them. Because of the calm sea and the temperate water a total of 100 persons managed to swim the shore (The New York Times, 1862a).

There are no exact accounts on the original number of lifeboats. Ships at this time were not required to carry sufficient lifeboats for all its passengers. However, the *Golden Gate* had capacity to carry nearly 900 hundred passengers, but held only one third of that at the time of the disaster. According to the *New York Times* (The New York Times, 1862d) there were 8 to 12 lifeboats with a capacity of several hundred passengers. Thus we cannot conclude whether this was enough to carry all on board. It should be noted that there were several complaints made to the press regarding the life-saving apparatus.

The captain survived the disaster. In his account of it he does not mention that he ordered priority to women and children (The New York Times, 1862b). We therefore find it unlikely that any such orders were given.

There is no exact list of the ship's complement. The passenger list was on the ship at the time of the disaster and was lost. The data are compiled from the list of survivors and victims in several contemporary newspapers by Andrew Czernek (Golden Gate Resource, 2011). We note that the numbers differ slightly from the ones stated in *The New York Times* (The New York Times, 1862a). The data give us information on gender, age groups (child/adult), passenger class and traveler status. We were unable to determine the gender of 20 children and 2 servants. These were excluded from the analyses. Table B3 presents descriptive statistics. We note that men survived to a greater extent than women, 50% compared to 36.4%. The survival rates of passengers and crew, 38.4% and 65.7% respectively, indicates that the latter group had an advantage in survival. Further, adults had higher survival rates than children, 46.9% vs. 28.6%. Second class passengers survived to a greater extent than others, and people traveling as part of a social entity had lower survival than people who traveled alone.

[4] Its value in 2010 was between 2.5 and 3.5 billion dollars

Table B3: Survival patterns in the SS *Golden Gate* disaster

		Survivors	Deceased	Total
Overall		172 (45.5)	206 (54.5)	378
Gender				
	Women	16 (36.4)	28 (63.6)	44
	Men	156 (50)	156 (50)	312
Traveler status				
	Passengers	107 (38.4)	172 (61.6)	279
	Crew	65 (65.7)	34 (34.3)	99
Class				
	1st	28 (37.8)	46 (62.2)	74
	2nd	28 (50)	28 (50)	56
	3rd	51 (34.2)	98 (65.8)	149
Companionship				
	In group	18 (36.7)	31 (63.3)	49
	Alone	154 (50.2)	153 (49.8)	307
Age groups				
	Children	8 (28.6)	20 (71.4)	28
	Adult	164 (46.9)	186 (53.1)	350

Notes. Survival rates in parentheses

SS *Northfleet*

This is a summary of the description in *The Loss of the Ship Northfleet* (Society for Promoting Christian Knowledge, 1873).

The *Northfleet* was a full rigged British passenger ship operating the route between Britain and Australia. On January 13, 1873, it left London for Hobart Town, Tasmania. There were 344 passengers on board, besides the 37 crewmembers (Society for Promoting Christian Knowledge, 1873). Most of the passengers were emigrants and railroad construction workers. At 10.30 PM, on January 22, when the *Northfleet* was on anchor outside Dungeness, UK, waiting for a storm to abate, it was rammed by the Spanish steamer *Murillo*. The steamer cut through the *Northfleet'*s hull amidships on the starboard side and the ship immediately began to take in water. Attempts were made to seal the leak but too much water had entered the ship and it sank about 30 minutes after the collision (Society for Promoting Christian Knowledge, 1873).

The *Northfleet* tried to contact the steamer, but to no avail. The *Murillo* is reported to have left the scene in an attempt to escape its responsibility of the accident. Instead the captain sent up signal rockets to inform nearby ships about the situation. Several ships were in the area, but because of the strong winds and the heavy seas, only a few came to assistance.

The captain initiated the evacuation immediately after the leak was discovered. He ordered women and children to be saved first (Society for Promoting Christian Knowledge, 1873). However, panic broke out and the order was not followed. Men are reported to have rushed to the lifeboats. In an attempt to impede this, the captain threatened to enforce his order with violence. One man who disobeyed the order, was shot in his leg (Society for Promoting Christian Knowledge, 1873). According to the reports most people reached the boat deck (Society for Promoting Christian Knowledge, 1873) However, the *Northfleet* did not carry lifeboats for all its passengers (although the inquiry concluded that they were sufficient enough to meet up with the regulations) and because of the limited time not all of those that were available were launched. Consequently, many people drowned when the ship vanished. It seems like most of those who survived did so because they had the strength to climb up the rigging, and stay there until they were picked up by the assisting ships.

The captain did not survive the disaster. His wife was however put in the first lifeboat that left the ship and was one of the two adult female survivors.

The passenger list from the *Northfleet* has been obtained from the book *The Loss of the ship "Northfleet"(Society for Promoting Christian Knowledge, 1873).* Four observations have been dropped because of missing data on first name, leaving us with a sample of 367 individuals; it is notable that this number differs from the one given at other parts of the book. The overall survival rate in this sample is 21.8%. The corresponding survival rates for men and women are 26.6% and 3.9% respectively. We see that passengers and crew had about an equal chance of surviving the shipwreck. It should be noted though that the survival rate of the crew is based on 29 observations only (eight of the crewmembers stated at other parts of the book appears to be missing in this data). Moreover, we see that decedents are on average younger than survivors and that adults (Age>16) are more than five times as likely to survive as children. These statistics are presented in Table B4.

Table B4: Survival patterns in the SS *Northfleet* disaster

		Survivors	Deceased	Total
Overall		80 (21.8)	287 (78.2)	367
Gender				
	Women	3 (3.9)	74 (96.1)	77
	Men	77 (26.6)	213 (73.4)	290
Traveler status				
	Passengers	74 (21.9)	264 (78.1)	338
	Crew	6 (20.7)	23 (79.3)	29
Age		25.4	22.7	23.3
Age groups				
	Age<16	2 (3.6)	54 (96.4)	56
	Age>16	72 (25.5)	210 (74.5)	282

Notes. Survival rates in parentheses

RMS *Atlantic*

This description is based on the accounts given in *SS Atlantic: The White Star Line's first disaster at sea* (Cochkanoff and Chaulk, 2009).

In the early morning April 1, 1873, en route from Liverpool to New York, the transatlantic ocean liner RMS *Atlantic* struck an underwater rock and sank off the coast of Nova Scotia, Canada. It carried 811 passengers and 141 crewmembers, of which 538 died (Cochkanoff and Chaulk, 2009).

The *Atlantic* was owned by the White Star Line and was one of the most modern ships at the time. It was operating both as a luxurious ocean liner and as mode of transportation for European emigrants. Similar to other ocean liners the saloon passengers were accommodated on the ship's upper decks, whereas the emigrants berthed below deck, with the families placed in the amidships compartments and the single women and men (and crew) separated into the stern and bow quarters, respectively.

The *Atlantic* faced rough weather on its voyage. This caused the ship to consume more coal than usual. Captain Williams was afraid that the supply would be insufficient for the sail to New York, and decided to make port at Halifax, Nova Scotia, to replenish the supplies. When approaching Halifax, the *Atlantic* had drifted off course and was closer to the shore than the captain and his officers had estimated. A combination of high waves and haze (Cochkanoff and Chaulk, 2009) made it difficult for the watchmen to spot breakers. At 3:10 AM the *Atlantic* struck an underwater rock—Marr's Head—in full speed, which was maintained in spite of the weather (Cochkanoff and Chaulk, 2009). The ship was quickly flooded and ten minutes after the grounding it lurched on its side. However, the ship did not sink immediately but remained in this position for several days.

Most of the passengers woke up by the impact. Some of them remained under deck, not realizing the severity of the situation, but soon found themselves trapped. Officers and crew immediately rushed to the deck in an attempt to launch the ship's lifeboats. The total lifeboat capacity was 500 persons (Cochkanoff and Chaulk, 2009). However, some of the lifeboats were washed away whereas others were smashed against the hull when the ship capsized. According to witness accounts, people panicked when they realized that the end was coming. The tumultuous situation worsened by the fact that many of the emigrant passengers did not speak English. According to the records, the crew had to use violence to prevent the large crowds of passengers from entering the endangered lifeboats.

Despite the prolonged sinking many passengers perished in the shipwreck because they were unable to reach the boat deck. The single women, in the stern compartments, drowned as the water flooded their beds. The families suffered a similar fate in the amidships compartments. It has been estimated that only two or three families and not a single woman from the steerage made it to the boat deck (Cochkanoff and Chaulk, 2009). The bow compartments on the other hand were not flooded immediately. This gave the single men an advantage as they had more time to escape. Some people sought safety in the ship's rigging which remained partly over the surface. Others managed to get ashore by climbing the ropes that had been spanned between the wreck and a nearby islet. However, the majority drowned when they tried to swim in the frigid water. When local residents of the nearby fishing village were notified about the accident, they immediately went out to rescue survivors from the islet and the rig. The final survivor on the wreck was rescued at around 9 AM, six hours after the grounding.

The loss of the *Atlantic* called into question the actions of the captain. However, according to witness testimonies he had remained calm throughout the disaster; he directed people to move towards the safer bow and instructed them how to overcome hypothermia (Cochkanoff and Chaulk, 2009). He also remained on the wreck and made sure that everybody who was still alive made it to shore. We have found no indications of the captain

ordering ‘women and children first’. He was finally picked up by a boat (Cochkanoff and Chaulk, 2009).

The inquiry was praising Captain Williams’s leadership and his brave efforts in helping to save lives after the ship struck (Cochkanoff and Chaulk, 2009). The inquiry did, however, suspend William’s master license for two years.

The data are collected from Cochkanoff and Chaulk (Cochkanoff and Chaulk, 2009). It includes information on gender, class (saloon and steerage), as well as information on passengers and the crew. Several sources report that there were around 180 children on board the *Atlantic (Cochkanoff and Chaulk, 2009)*. Unfortunately we do not have information on age and thus we are unable to account for this in the empirical analysis. We have been unable to determine the gender of 80 persons, who were stated in the lists as unknown, or only with last names. We know however that all of them were steerage passengers and that forty of them survived the disaster. For another 4 individuals we do not have data on whether they died or survived in the accident. Excluding these 84 observations leaves as with a sample of 868 observations. Table B5 presents the number of survivors and deceased, together with the corresponding survival rates (in parentheses) for a set of different sub-groups (men, women, passengers, crew, saloon, steerage). In total, 330 persons survived the disaster. This corresponds to a survival probability of 38%. We note that there were more men than women on board the ship. None of the 235 women survived the disaster. Atlantic had a crew of 80 at her final voyage.[5] The crew survived to a higher extent than the passengers: the survival rates were 32.6% and 91.3%. Moreover, we note that the saloon passengers had a higher survival rate than the steerage passengers (44.1% vs. 32.1%).

[5] Only two of the crew members were females.

Table B5: Survival patterns in the SS *Atlantic* disaster

		Survivors	Deceased	Total
Overall		330 (38)	538 (62)	868
Gender				
	Women	0 (0)	235 (100)	235
	Men	330 (54.7)	303 (45.3)	603
Traveler status				
	Passengers	257 (32.6)	531 (67.4)	788
	Crew	73 (91.3)	7 (8.7)	80
Class				
	Saloon	15 (44.1)	19 (55.9)	34
	Steerage	242 (32.1)	512 (67.9)	754

Notes. Survival rates in parentheses

SS *Princess Alice*

This text is a summary of the information given on www.portcities.uk.org (Portcities UK, 2011), a webpage containing archive material concerning British port cities, and various contemporary newspaper articles.

On September 3, 1878, the London Steam Company owned SS *Princess Alice*, was on her normal route on the River Thames, UK, from London Bridge to Gravesend. The *Princess Alice* left Gravesend at 6 PM, carrying approximately 800 passengers and 40 crewmembers. Most of the passengers were making a daytrip to the Rosherville Gardens in Gravesend. There were many children on board. At passing the Tripcock Point on the river Thames, the *Princess Alice* met the collier steamer *Bywell Castle*. There was no rule on how ships on the Thames should pass each other at the time. The *Bywell Castle* tried to pass astern, but the captain of the *Princess Alice* got confused and skewed the ship, thereby placing it in *Bywell Castle'*s intended course. As a response the captain of the *Bywell Castle* reversed the engines, but the collision was inevitable. The *Princess Alice* was hit amidships and split in two. It sank within 4 minutes, the time being 7.40 PM. The *Bywell Castle* did not sink and immediately commenced the rescue operation, which was assisted by people from the shore.

There are scarce reports of the evacuation of the ship. What is known is that *Princess Alice* did not carry enough lifeboats for all its passengers and that it was not enough time to launch those that were available. Most people fell or jumped into the water. Few could swim at this time. Swimming was further made difficult by the polluted water, which was thick by sewage from a nearby industry. In addition, the darkness of the evening made it difficult for rescuers to find people in the water. According to the *Bywell Castle'*s logbook the weather was slightly hazy(The New York Times, 1878), which may also have reduced visibility. The survivors had either managed to reach the ropes thrown from the *Bywell Castle* or were fortunate enough to be picked up by other assisting boats.

There are no explicit reports on the actions of the captain but some witnesses report that they did not hear any orders given by him after the collision (Manchester Guardian, 1878). It is thus unlikely that he ordered priority to women and children. The inquiry, following the disaster, blamed the captain for the collision. He did not survive.

The data are obtained from http://www.alsbury.co.uk/princessalice/alice0.htm (Princess Alice Resource, 2011), and contains all persons connected to the disaster, i.e. also witnesses, relatives and rescue helpers. We only included those specified as either passengers or crew. The data give us information on gender and age. 58 persons were deleted because of missing data on gender, 37 of theme survived. There were 5 female crew members onboard the *Princess Alice*, of who none survived. Descriptive statistics are presented in Table B6. According to the data, the overall survival rate was 16.7%. The survival rate of men was 22%, whereas the rate of women was12.4%. The survival rate of crew was 33.3% while it was only 16% for passengers. Children seem to have had lower survival rate than adults. However, we lack age data for 259 individuals.

Table B6: Survival patterns in the SS *Princess Alice* disaster

		Survivors	Deceased	Total
Overall		140 (16.7)	697 (83.3)	837
Gender				
	Women	57 (12.4)	403 (87.6)	460
	Men	83 (22)	294 (78)	377
Traveler status				
	Passengers	128 (16)	673 (84)	801
	Crew	12 (33.3)	24 (66.7)	36
Age		27.6	28.4	28.3
Age groups				
	<16	4 (2.6)	147 (97.4)	151
	16-50	21 (5.9)	337 (94.1)	358
	>50	4 (5.8)	65 (94.2)	69

Notes. Survival rates in parentheses

SS *Norge*

The information in this description is based on *Titanic's Predecessor – The SS Norge disaster* (Sebak, 2004).

The SS *Norge* was a Danish emigrant ship built in 1880. On June 22, 1904, the *Norge* left Copenhagen, Denmark for New York. After calls in Norwegian ports, the captain sat course for the final destination. On board the ship were 727 passengers and 68 crewmembers. The passengers were Scandinavian and Jewish emigrants who, with a few exceptions, travelled in the steerage compartments. The weather in the North Atlantic was favorable and in an attempt to save time Captain Gundel decided to take the quicker route, south of Helen's Reef, which is located in the mid-Atlantic, west of the British Islands. However, the captain had underestimated the currents and the ship had drifted straight toward the perilous reef. At 7.45 AM June 28, SS *Norge* ran aground on an underwater rock.

At first, it seemed like the impact on the ship's hull was minor. To avoid further damage, the captain decided to reverse the ship off the rock. By doing so, however, he allowed large amounts of water to flood through the broken hull. The ship immediately slanted forwards which in turn left the aft propeller above the surface. The captain realized that the ship was doomed and ordered evacuation. According to the records there had been no safety drills onboard the ship for three years and as a consequence, some crew members did not know which lifeboats they were supposed to attend. Directions from the crew were given in Danish and other Scandinavian languages. Although this supposedly caused some confusion among the Russian emigrants, we have found no indications of a widespread panic among the passengers. Instead the officers managed to keep the order and there are several stories of people helping each other.

The *Norge* carried lifeboats for 251 persons, i.e. sufficient for only about one third of the people on board (Sebak, 2004). According to the records, the captain ordered that women and children were to be given priority to those that were available (Sebak, 2004). We have, however, found no indications of the order being enforced by the captain or any of his officers. It seems like the list made it difficult to lower the boats. One lifeboat is reported to have been severely damaged and almost all of its passengers vanished in the sea. However, before the *Norge* went down, only 20 minutes after the grounding, at least 5 of the 8 lifeboats had been successfully launched (Sebak, 2004).

It appears as if most people managed to reach the deck. However, the ones, who did not reach a lifeboat were, given the distance to land and the fact that no ships came to its assistance, left to a certain death. Some of the lifeboats drifted for several days before they were picked up. One of them had reached as far as the Faroe Islands.

The captain survived the disaster (Sebak, 2004) and the prosecution following the disaster granted him for his good seamanship, and especially his ability to keep the passengers calm throughout the evacuation.

The data are obtained from *Titanic's Predecessor – The SS Norge disaster* (Sebak, 2004). It gives us information on gender, age, and if the person was a crew member or passenger, as well as and nationality. As shown in Table B7 the overall survival rate was 20.1%. Men had higher survival rate than women, 29.1% and 19.9%. The crew appears to have had a survival advantage over passengers, with a survival rate of 33.8% compared to 18.8% for the passengers. The age category 16-50 survived to a larger extent than other members of the complement. Danish passengers survived to a higher degree than passengers of other nationalities.

Table B7: Survival patterns in the SS *Norge* disaster

		Survivors	Deceased	Total
Overall		160 (20.1)	635 (79.9)	795
Gender				
	Women	37 (9.9)	336 (90.1)	373
	Men	123 (29.1)	299 (70.9)	422
Traveler status				
	Passengers	137 (18.8)	590 (81.2)	727
	Crew	23 (33.8)	45 (66.2)	68
Age		22.7	21	21.3
Age groups				
	<16	30 (11.5)	230 (88.5)	260
	16-50	129 (25.6)	374 (74.4)	503
	>50	1 (3.1)	31 (96.9)	32
Nationality				
	Danish	35 (27.6)	92 (32.4)	127
	Others	125 (18.7)	543 (81.3)	668

Notes. Survival rates in parentheses

RMS *Titanic*

This description is based on the accounts given in the British inquiry following the disaster(Great Britain. Commissioner of Wrecks, 1912).

The *Titanic* was owned by the White Star Line and was the most modern ship of its time. It sank on its maiden voyage in what is one of the world's most well-known disasters.

RMS *Titanic* left Southampton April 10, 1912, bound for New York, under command of Master E. C. Smith. According to the inquiry, there were 885 crewmembers and 1,316 passengers on board(Great Britain. Commissioner of Wrecks, 1912). The majority of them travelled in third class and was mostly made up by emigrants of British or Scandinavian origin.

The ship travelled the southern winter route in order to avoid icebergs. However, icebergs were not uncommon in these waters and on April 12, the *Titanic* received several ice warnings from other ships in the area. In spite of the warnings, the captain did not reduce the speed nor change the course. The inquiry gives him no blame for this as it was common to rely on the lookouts under such conditions(Great Britain. Commissioner of Wrecks, 1912).

At 11 PM, the same day, the lookout saw an iceberg straight ahead. The bridge was informed and, to avoid collision, the ship skewed and engines were set in reverse. This was not sufficient and the iceberg tore up the hull on the *Titanic's* starboard side. To avoid sinking, the doors between the watertight compartments were closed before the collision, but the damage exposed six of the compartments to the sea. This implied that the ship was doomed to sink, and it eventually foundered at 2.20 AM, April 15.

The severity of the situation was not immediately realized, but at 12 AM the captain ordered the lifeboats to be prepared. There were 20 lifeboats on board, with a capacity of 1,178 persons, *i.e.* less than the ship's complement. The captain gave specific orders that women and children were to be prioritized. At 12.15 AM the first lifeboat left the ship. The inquiry concludes that there were no lack of discipline at this stage of the evacuation, but that it was disorganized (Great Britain. Commissioner of Wrecks, 1912). It is notable that there had been no safety drills prior to the disaster and that most of the lifeboats were not filled to capacity when they left the ship.

The ship sank bow first, and as the sinking proceeded it became increasingly difficult to move. It was especially difficult for the third class passengers, who could only reach deck by first moving towards the stern. Further, all lifeboats were placed on the deck to which, normally, only first class passengers had access. According to the inquiry 712 persons were saved. About 650 of these were saved from the lifeboats(Great Britain. Commissioner of Wrecks, 1912).

The first call for assistance was sent out at 12.15 AM. Several ships answered, but few were in the vicinity. The first ship to arrive was the *Carpathia* at 4 AM. The ship picked up people from the lifeboats and searched for survivors. However, few had managed to sustain in the near freezing water. The captain did not survive the disaster.

The data are obtained from the Encyclopedia Titanica(Encyclopedia Titanica, 2012). It contains information on gender, nationality, age, and if the person was a crewmember or passenger. According to the data, the overall survival rate was 32.2%. Women had a quite remarkable survival advantage over men, 73.3% compared to 20.7%. First class passengers had ha survival rate of 62%, second class 41.8 % and third class 25.4%. Children had a higher survival rate than adults. There are no great differences in average age of survivors and deceased. Table B8 presents descriptive statistics.

Table B8: Survival patterns in the RMS *Titanic* disaster

		Survivors	Deceased	Total
Overall		712 (32.2)	1496 (67.8)	2208
Gender				
	Women	356 (73.3)	130 (26.7)	486
	Men	356 (20.7)	1366 (79.3)	1722
Traveler status				
	Passengers	500 (38)	817 (62)	1317
	Crew	212 (23.8)	679 (76.2)	891
Class				
	1st	201 (62)	123 (38)	324
	2nd	119 (41.8)	166 (58.2)	285
	3rd	180 (25.4)	528 (74.6)	708
Age		29.3	30.2	29.9
Age groups				
	<16	68 (50.4)	67 (49.6)	135
	16-50	606 (31.1)	1341 (68.9)	1947
	>50	38 (32.8)	78 (67.2)	116

Notes. Survival rates in parentheses

RMS *Empress of Ireland*

This text is a summary of several sources, mostly the *Empress of Ireland – The story of an Edwardian Ocean Liner* (Grout, 2002) and articles from Encyclopedia Titanica (Encyclopedia Titanica, 2001).

The Canadian ocean liner RMS *Empress of Ireland* was owned by the Canadian Pacific Railway Company. On May 29, 1914, en route from Quebec to Liverpool, the latter being its port of registry, the *Empress of Ireland* collided with the Norwegian coal freighter SS *Storstad*. On board were 1,017 passengers and 431 crewmembers.

The collision occurred at approximately 2.00 AM , and was the result of both captains failing to maintain their bearings in the heavy fog. The *Storstad*, which was later found guilty of ramming the *Empress of Ireland*, was badly damaged but did not sink. The *Empress of Ireland* on the other hand took in large amounts of water and sank in 14 minutes (Encyclopedia Titanica, 2001). Captain Kendall immediately ordered a distress call to be transmitted and the lifeboats to be launched. There were 64 lifeboats with a total capacity of 1,948 passengers (Grout, 2002). However, a heavy starboard list resulted in only nine of them being launched successfully (Encyclopedia Titanica, 2001). These were filled with occupants of the upper deck cabins that had quickly made it out onto the boat deck. Most of the occupants in the lower compartments drowned in their cabins. Several people were thrown off the boat by the impact and others jumped off in desperate attempts to save themselves (Encyclopedia Titanica, 2001; Grout, 2002). Some of them were picked up by the crew of SS *Storstad*, whereas most of them drowned. Other ships arrived at the wrecksite two hours after the sinking. By that time there were no survivors left.

There are scarce reports on the acting of the passengers and the crew. It is notable that the survival rate of crew members is much higher than the passenger's. However, the official inquiry speaks of no selfishness or cowardice of the crew; instead this is to be explained by the fact that Captain Kendall ordered 'all hands on deck' when he realized that the collision was inevitable. This gave the crew a significant advantage over the sleeping passengers(Grout, 2002).

We have not found any indication that the captain gave specific orders to prioritize women and children. Captain Kendall survived the disaster. He was thrown off the bridge as the ship capsized but managed to reach a lifeboat (Encyclopedia Titanica, 2001).

The data are collected from the 'Final Journey "Passenger & Crew List " of the Empress of Ireland' published by the Canadian Pacific Railway Company in 1914 (Empress of Ireland Resource, 2004). The dataset contains information on the names of the passengers, together with information on who died and who survived. It also contains information on the crew as wells as information about which class the passengers traveled in.[6] The gender of the passengers and crew members has been inferred from their names. We are unable to determine the gender of 35 individuals. These are excluded from the empirical analysis.

The Empress of Ireland had an overall capacity of 1,580 passengers and crew members. According to this data there were 1,448 persons on board the ship, of whom 983 perished. Of the 465 survivors, 420 were men and 45 women. The corresponding survival probabilities are 40% and 11.3% for men and women, respectively. Table B8 reveals that the crew members had a substantially higher survival probability than the passengers (59.4% vs. 20.6%). We also note that passengers traveling in first class had higher chance of survival than the second and third class passengers, who had about equal survival rates.

[6] The dataset contains information on nationality only for the first and second class passengers. Since third class passengers and crew constitute the majority of the people on board the *Empress of Ireland* we do not make use of this data in the empirical analysis.

Table B9: Survival patterns in the SS *Empress of Ireland* disaster

		Survivors	Deceased	Total
Overall		465 (32.1)	983 (67.9)	1448
Gender				
	Women	45 (11.3)	354 (98.7)	399
	Men	420 (40)	629 (60)	1049
Traveler status				
	Passengers	209 (20.6)	808 (79.4)	1017
	Crew	256 (59.4)	175 (40.6)	431
Class				
	1st	36 (41.4)	51 (58.6)	87
	2nd	46 (18)	209 (82)	255
	3rd	127 (18.8)	548 (81.2)	675

Notes. Survival rates in parentheses

RMS *Lusitania*

Most of this description is a summary of the reports found in the Mersey inquiry following the disaster(British Commisioner of Wrecks, 2012).

RMS *Lusitania* was a British passenger ship owned by the Cunard Steamship Company. It left New York on May 1, 1915, for its final voyage, heading for Liverpool. On board were 702 crew members and 1,257 passengers. The great majority consisted of British and Canadian British passengers. About 150 passengers were children.

On May 7, the *Lusitania* entered the so called Danger zone. England was at this time engaged in WWI. Germany had declared that all ships traveling in this zone, was liable to attack. As a measure of precaution the captain had ordered extra lookouts and all lifeboats to be prepared. At 2.10 PM an officer spotted two torpedoes, which were fired from a German submarine. They hit the ship almost simultaneously, amidships on starboard side. The ship took a heavy starboard list and foundered within 20 minutes.

The captain immediately ordered all to reach for the lifeboats. The total lifeboat capacity was 2,605 persons. However, there were several difficulties in launching the lifeboats due to the limited time, the heavy list and the fact that the ship did not stop.

Accounts give that the evacuation was characterized by confusion rather than panic. Critique on the crew's behavior was heard afterwards, stating that their acting was disorganized. The passengers received conflicting instructions on what to do and several believed that the ships was not sinking. Other reports tell of passengers trying to help in the launching of the lifeboats, but the Mersey inquiry states that their inexperience caused them to do more harm than good.

The report does not give satisfactory accounts on how people died and survived in the disaster. Because of the short sinking time it is reasonable to believe that many passengers were trapped inside the ship as it foundered. Several were swept down by the whirlpool created by the sinking ship(Lusitania Resource, 2012).

The captain ordered women and children to be saved first. We have however, not found any indications of this order to being enforced. The captain remained on the bridge until the end, but did survive the disaster.

The data are obtained from http://www.rmslusitania.info/ (Lusitania Resource, 2012). They contain information on passenger and crew status as well as class, age, and nationality. There were three presumed German spies in the stowaway which are missing from our analysis as their gender cannot be determined from the passenger manifest. Besides this the data differ only slightly from the accounts given by other sources (Grout, 2002). Table B10 show the descriptive statistics of the sample. The overall survival rate was 39.2%. Men and women had more or less equal survival rates (40% vs. 37.1%). Likewise the difference between crewmembers and passengers was relatively small. People aged 16–50 appears to have had a survival advantage over children and older adults. Nationality seems to be unrelated to survival rates.

Table B10: Survival patterns in the RMS *Lusitania* disaster

	Survivors	Deceased	Total
Overall	768 (39.2)	1190 (60.8)	1958
Gender			
Women	192 (37.1)	326 (62.9)	518
Men	576 (40)	864 (60)	1440
Traveler status			
Passengers	476 (37.7)	788 (62.3)	1264
Crew	292 (42.1)	402 (57.9)	694
Class			
1st	113 (39)	177 (61)	290
2nd	229 (38.1)	372 (61.9)	601
3rd	134 (35.9)	239 (64.1)	373
Age	31.5	32.5	32.1
Age groups			
<16	48 (32.2)	101 (67.8)	149
16-50	444 (43.9)	567 (56.1)	1011
>50	36 (28.3)	91 (71.7)	127
Nationality			
British	646 (39.7)	981 (60.3)	1627
US	72 (36.4)	126 (63.6)	198
Others	50 (37.6)	83 (62.4)	133

Notes. Survival rates in parentheses

SS *Principessa Mafalda*

This description is based on the accounts of the disaster summarized by Christopher Ecclestone (Principessa Mafalda Resource, 2010). Ecclestone gathered the information from contemporary Argentinian newspaper articles on the disaster.

The ocean liner SS *Principessa Mafalda* left Genoa for Buenos Aires October 18, 1927. On board were 288 crew members and 971 passengers. Most of the passengers were emigrants of Italian, East European and Syrian origin. The ship was reported to be in bad condition and it stopped several times during the voyage. On October 25, the ship was 70 kilometers off the coast of Brazil, close to the Abrolhos Islands. In the afternoon the propeller shaft broke. This caused the propeller to gauge into the ship's stern tearing up a big hole, through which water begun to enter. Attempts were made to seal the leak, but to no avail. The sinking was slow and the ship did not founder until midnight, about 4 hours and 20 minutes later.

Shortly after the ship started to take in water a distress call was sent out. There were several nearby ships and the first of them arrived at the scene at 5 PM. Accounts of the evacuation describe it as chaotic. Passengers were reported to loot and fight over valuables. As Italian law forbade officers to carry guns, there were no means to impede this.

As the disaster occurred after the sinking of the *Titanic* it is reasonable to believe that the *Pricipessa Mafalda* did carry enough lifeboats. However, it was reported that the lifeboats were in bad condition and that some were not possible to launch. Several of the lifeboats were swamped and others collapsed. Complaints were also made about the crew not helping the passengers. In the first lifeboat to leave, 40 out of 42 people were reported to be crew members and after they had reached the assisting ships, they did not return to pick up more passengers. The sea was relatively calm and temperate and many of the survivors reached the assisting ships swimming.

Given the prolonged sinking time, one would expect all passengers to have had a chance to reach the deck. However, it was reported that debris and the list made it difficult to move within the ship.

There are no indication of Captain Gulli giving orders to prioritize women and children and he did not survive the disaster. There was no official blame given to the captain, but complaints of nonchalant acting were reported. Accounts tell that several first class passengers stayed with him and did not bother to reach for the lifeboats.

The data were compiled by C. Ecclestone from several contemporary Argentinian newspapers (Principessa Mafalda Resource, 2010). According to the data the *Principessa Mafalda* carried 1,186 passengers and crew members. This number differs from the one stated above, because a group of Syrian passengers have been excluded. We decided to exclude them from the analysis because of substantial uncertainty in the records of survivors from this group. Table B11 presents the descriptive statistics. The overall survival rate in the sample is 73.9 percent. The survival rates of women and men were 73.3% and 74.1%, respectively. The passengers had a lower survival rate than the crew. Interestingly, we note that the relationship between class and survival is the opposite of what we have found for most other shipwrecks. The survival rate for first class passengers was 48.2%, compared to 72.2% for third class passengers.

Table B11: Survival patterns in the SS *Principessa Mafalda* disaster

		Survivors	Deceased	Total
Overall		877 (73.9)	309 (26.1)	1186
Gender				
	Women	187 (73.3)	68 (26.7)	255
	Men	690 (74.1)	241 (25.9)	931
Traveler status				
	Passengers	631 (70)	271 (30)	902
	Crew	246 (86.6)	38 (13.4)	284
Class				
	1st	27 (48.2)	29 (51.8)	56
	2nd	67 (65)	36 (35)	103
	3rd	537 (72.2)	206 (27.8)	743

Notes. Survival rates.

SS *Vestris*

The following description of the last voyage of the SS *Vestris* is based on the report found in the official inquiry of the disaster (Aspinall and Great Britain. Board of Trade, 1929).

The British owned passenger cargo ship SS *Vestris* left New York at 3.45 PM November 10, 1928, for its normal route to Barbados and South American ports. According to the inquiry there were 128 passengers and 198 crew members on board the ship.

According to reports from eyewitnesses, the ship left port with a slight starboard list (Aspinall and Great Britain. Board of Trade, 1929). The inquiry concludes that, because of overloading, the ship was tender and did not have the freeboard required by regulations. In the early morning of November 11, members of the crew recognized that water had begun to enter the ship. In addition, rough weather conditions, with squalls of possibly hurricane force and heavy sea caused the improperly stored cargo to shift to the starboard side, which in turn, tilted the ship further. In an attempt to straighten the ship up the crew began to empty the water tanks and pump out the entering sea water, but to no avail. At 8.37 AM the captain sent out the first general call, followed up by a distress call two hours later. According to the inquiry commission the captain should have called for assistance at a much earlier stage. About 5 hours later, at 2 PM, the *Vestris* foundered off the coast of Virginia, US.

The captain and the crew started the evacuation of the ship at 10 AM. Records show that women and children were separated from the men and placed in different lifeboats. There are, however, no reports of any explicit order to prioritize women and children. The weather conditions in combination with the heavy list made it difficult to launch these boats. One was damaged and sunk when it reached the surface, whereas the other two were left hanging on the side of the ship when it went down. As a consequence, none of the 12 children, and only 8 of the 33 women survived (the two women of the crew not included) the shipwreck. The first rescue ships arrived at the scene several hours after the sinking and picked up eight lifeboats. There are no reports of them picking up anyone from the water.

Surviving passengers have described the evacuation as disorganized. Complaints were made by the passengers, to the press, about the crew securing the best life boats for themselves (Baltimore News, 1928).

The captain did not survive the disaster. The inquiry commission concludes that he had no responsibility for the incorrect loading of cargo but that more lives could have been spared if he had sent out the distress call, and initiated the evacuation, earlier.

The passenger data are compiled from the *New York Times* list of missing, confirmed dead and surviving passengers, published November 25, 1928(The New York Times, 1928). The report of the inquiry commission was established later in time, probably causing the discrepancy between the numbers presented below and those appearing in the aggregate statistics reported by the inquiry.

The list contains a total of 328 persons, for whom we have either first name, last name or both. Moreover, there is information on who belonged to the crew. We have deleted 20 observations for which we lack information on the first name. The number differs slightly (2 individuals) from the one given in the official inquiry. Table B12 presents the descriptive statistics of the sample. The overall survival rate is about 59 percent. The survival rates for men and women are 64.8% and 24.4% respectively, indicating that women had a clear survival disadvantage compared to men. Likewise, we note that crew members were much more likely to survive the disaster than the passengers.[7] As noted previously, none of the children survived. This compares to a survival rate of adults of 61.8%.

[7] There are 3 female crew members in the passenger list, of who all died.

Table B12: Survival patterns in the SS *Vestris* disaster

		Survivors	Deceased	Total
Overall		183 (59.4)	125 (40.6)	308
Gender				
	Women	10 (24.4)	31 (75.6)	41
	Men	173 (64.8)	94 (35.2)	267
Traveler status				
	Passengers	46 (40.7)	67 (59.3)	113
	Crew	137 (70.3)	58 (29.7)	195
Age groups				
	Children	0 (0)	12 (100)	12
	Adults	183 (61.8)	113 (38.2)	

Notes. Survival rates in parentheses

SS *Morro Castle*

The following description of the sinking of SS *Morro Castle* is based on *When the dancing stopped* by Brian Hicks (Hicks, 2008).

The Ward Lines' SS *Morro Castle* left Havana for its return to New York on September 5, 1934. According to Hicks there were 318 passengers and 231 crew members on board (Hicks, 2008). The ship was built four years earlier and was one of the most modern ships of the American East Cost. Most of the passengers did the travel as a holiday trip and they were not divided into classes in such distinct ways as on transatlantic emigrant ships (Hicks, 2008).

On the evening of the last day at sea Captain Wilmott died as a result of a heart attack (Hicks, 2008). First officer Warms replaced him as Master of the ship. At 2.45 AM September 8, a passenger reported what he thought to be smoke and the fire was soon discovered (Hicks, 2008). The fire had started in the foremost part of the ship. Acting Captain Warms did not realize its true scale and tried to continue the trip towards New York. The course and the speed of the ship fanned the fire which spread quickly. The crew attempted to extinguish the fire but to no avail. At 4.00 AM the hoses were abandoned and evacuation begun.

The evacuation is described as disorganized especially with respect to behavior of the crew. Captain Wilmott's death had caused confusion in the order of ranks among them and no distress call was sent out until 3.24 AM (Hicks, 2008). There is no indication of acting Captain Warms ordering women and children to be saved first. It should also be noted that because of low wages and hardships, the moral among the crew was low.

The lifeboat capacity was 2,000 persons. However, the fires location caused it to cut off all access to the A-deck were they were placed. Further, some of the crew members had left the ship in lifeboats even before the evacuation begun. The passengers gathered at the stern of the ship, this being the place furthest away from the fire. Most of the survivors jumped into the water and were picked up by assisting ships, which arrived at approximately 5 AM. The water temperature was 21 degrees Celsius (Hicks, 2008), but the rescue operation was made difficult by the rough seas. Also, the life vests injured several passengers who had not been informed of the danger of jumping into the water with them put on. Drowning seems to have been the most common cause of death. Many people were trapped in their cabins and killed by the fire.

Acting Captain Warms and most of the ship's officers survived the disaster. They were among the last survivors to leave the ship. The ship never sank. It drifted ashore at Asbury Park, New Jersey.

The data for the *Morro Castle* are collected from the passenger list appearing in *Morro Castle: the forgotten* voices, by Jim Kalufus(Encyclopedia Titanica, 2004). The list is primarily based on the Ward Line ticketing and cabin lists and contains the names of passengers known to have been on board the *Morro Castle* at the time of the accident. The figures on numbers of passengers and crew differ slightly from the numbers given by Hicks(Hicks, 2008). We are unable to determine the gender of 4 individuals. These are excluded from the empirical analysis.

Table B13 shows that the overall survival rate of the 542 people onboard the ship is 76%. This is high relative to the other disasters investigated in this survey. The survival probability of women is only slightly lower than that of men: 74.6% vs. 76.8%. Likewise, the difference in survival between passengers and crew is small relative to those for the other disasters in our survey. We note that passengers traveling in the company of family and friends had a slightly higher chance of survival than passengers traveling alone. Information on travel companionship is inferred from cabin data. The individual is treated as being part of a group if this is stated in the list or she shared cabin with someone, either spouse or other.

The *Morro Castle* had passenger cabins distributed on four decks (A, C-E). The passenger list contains information on which deck people resided. However, there seems to be

no systematic deck-survival pattern onboard the *Morro Castle*. A-deck passengers, which occupied the cabins placed in the uppermost part of the ship, have the lowest survival rate (47.4%) whereas people on the C and D decks had the highest (75.8 and 75.7%).

Table B13: Survival patterns in the SS *Morro Castle* disaster

		Survivors	Deceased	Total
Overall		412 (76)	130 (24)	542
Gender				
	Women	147 (74.6)	50 (25.4)	197
	Men	265 (76.8)	80 (23.2)	345
Traveler status				
	Passengers	226 (71.1)	92 (28.9)	318
	Crew	186 (83)	38 (17)	224
Companionship				
	In group	118 (72.4)	45 (27.6)	163
	Alone	108 (69.7)	47 (30.3)	155
Deck				
	A	9 (47.4)	10 (52.6)	19
	C	119 (75.8)	38 (24.2)	157
	D	76 (75.7)	27 (24.3)	103
	E	22 (56.4)	17 (43.6)	39

Notes. Survival rates in parentheses

MV *Princess Victoria*

This is a summary of the description of the disaster found *in Death in the North Channel* (Cameron, 2002).

During a severe windstorm on 31 January 1953, the roll-on, roll-off (RORO) ferry *Princes Victoria* sank in the North Channel en route from Scotland to Northern Ireland with a loss of 135 lives.

The vessel left Stranraer (Scotland) for its regular, 20 miles sail to Larne (Northern Ireland) at 07:45 AM. On board the ship were 128 passengers, mainly traveling in business or on vacation, and 51 crewmembers. The captain, James Ferguson, who had served as master on ferries in the North Channel for 17 years, had decided to put to sea despite the fact that gale warnings (winds of 75-80 mph) had been issued throughout the night before the departure. After leaving the calmer waters of the Scottish inland sea, *Princess Victoria* sat a westward course that exposed the ship to the high seas in the North Channel. A series of huge waves damaged the stern doors. The crew struggled to seal the doors but they were too badly broken. Sea water quickly flooded the car deck and the vessel took on a sharp list to starboard. Captain Ferguson made an attempt to prevent more water from entering the ship by going in reverse back to the Scottish mainland. But because of inability to use the bow rudder, this proved impossible and the ship was forced to continue its trip towards Northern Ireland. Captain Ferguson managed to sail the stricken vessel for four hours through the storm. However, at 2 PM the ship capsized and sank

When the captain realized that the capsizing was unavoidable he ordered the passengers to reach for the port side deck. However, the 60 degree list made it difficult for people to move and the crew had to rig lines by which people could climb up the deck. The list also made it difficult to lower the lifeboats. There were five of them with a capacity of 1,440 persons, but only three were launched and one was smashed against the hull. All its occupants, mostly women and children, were thrown into the water.

It appears as if most passengers managed to reach the deck. Several of the survivors were standing on the portside deck. When the ship lurched on its side, they managed to haul themselves over to the ship's side, an act demanding strength and agility. With the ship's side serving as floor they could reach the lifeboats that were gathered at the stern (Cameron, 2002). The less fortunate passengers fell off the deck as the list increased. The weather made it difficult to reach people in the water from the lifeboats and they were soon pulled down by the heavy sea or succumbed to hypothermia and drowned.

Witness accounts tell that Captain Ferguson did no attempts to save himself. There is no indication that he gave the order 'women and children first'. The captain had tried to calm the passengers, and the evacuation is not to be described as disorganized. Instead there are several descriptions of passengers and crew helping each other to reach the deck and the lifeboats.

The *Princess Victoria* asked for urgent assistant forty-five minutes after the stern doors were damaged. Although the coast guard had continuous radio contact with the *Pricipessa Mafalda*, it was difficult for them to locate the ship. Consequently, it took almost one and a half hour before the first rescue ship arrived at the wreck site. The extreme weather conditions made it very difficult to locate and pick up survivors from the water, which was 4 degrees Celsius (Cameron, 2002). In total, 44 persons had been recovered when the rescue operation was called off in the early evening. Notably, none of the women and children on board the ship was among the survivors.

We have obtained individual level data from the passenger and crew manifest provided in the Death in the North Channel: The loss of the Princess Victoria (Cameron, 2002). According to the records there were 179 people on board the ship. This data are summarized in Table B14. We have information on the city of residence of the passengers and crew members. Accordingly, we can determine their nationality. Passengers from Northern Ireland,

Scotland and England had survival rates of 78.4%, 72.5% and 66.7% respectively. As mentioned all women on board died. The crew had a lower survival rate than passengers (20% vs. 26.4%).

Table B14: Survival patterns in the SS *Princess Victoria* disaster

	Survivors	Deceased	Total
Overall	44 (24.6)	135 (75.4)	179
Gender			
Women	0 (0)	31 (100)	31
Men	44 (29.3)	104 (70.7)	148
Traveler status			
Passengers	34 (26.4)	95 (73.6)	129
Crew	10 (20)	40 (80)	50
Age groups			
Children	0 (0)	5 (100)	5
Adults	44 (25.3)	130 (74.7)	174
Nationality			
Northern Ireland	24 (21.6)	87 (78.4)	111
Scotland	11 (27.5)	29 (72.5)	40
England	7 (33.3)	14 (66.7)	21
Ireland	0 (0)	5 (100)	5
Wales	2 (100)	0 (0)	2

Notes. Survival rates in parentheses

SS *Admiral Nakhimov*

This text is based on the thorough description given by Andrey Leonov, who has conducted impressive research on the disaster (Admiral Nakhimov Resource, 2012).

The SS *Admiral Nakhimov* was a passenger liner of the German Weimar Republic, before it became a Soviet passenger ship. On the day of the disaster the ship left Novorossiysk by the Black Sea for the resort town Sochi with 888 passengers and 346 crew members on board. Soon after the departure, the ship's pilot noticed that they were on a collision course with the bulk carrier *Pyotr Vasev*.

The pilot radioed a warning to the *Pyotr Vasev* but its captain neither slowed down nor changed course. Captain Markov of the *Admiral Nakhimov,* was convinced that the freighter would pass without incident and retired to his cabin, leaving his second mate in charge. At 11:10 PM it became clear that the freighter headed directly for the ship and both ships immediately set their engines in reverse, but the collision was inevitable and a few minutes later *Pyotr Vasev* rammed into *Admiral Nakhimov's* starboard side.

Water flooded into a large hole in the hull and through the open cabin windows. *Admiral Nakhimov* took on a starboard list. Electricity shot down immediately after the collision and left the ship in darkness. Many passengers had gone to bed by this time and those who woke up by the collision found themselves lost in the dark. The situation was worsened by the hard list which made it difficult to move. Although many of the crew members had worked on board *Admiral Nakhimov* for a long time and had been trained in evacuation, the quickness of the accident resulted in only one lifeboat and 8 out 24 life rafts being launched. With little time to escape, passengers as well as crew members jumped into the water. Although the water temperature was 24 degrees Celsius, the fuel oil leaking out from the engine room made objects slippery and people had a difficulties staying afloat. Survivors give different reports on the situation: some were trying to save the life of others, while some were seen trying to save themselves at the expense of others.

Seven minutes after the collision the *Admiral Nakhimov* leaned over on her starboard side and sank. Ten minutes later 64 ships, including *Pyotr Vasev* which had not been badly damaged, and 20 helicopters came to rescue.

The only order given by the captain was to evacuate the ship. Hence there were no order to prioritize women and children. Captain Markov survived the disaster and was sentenced to 15 years prison for misconduct.

The data are obtained from the work of Andrey Leonov (Admiral Nakhimov Resource, 2012). Aggregate survival statistics, for men and women separately, are available for both passengers and crew. Table B15 summarizes the data. The overall survival rate was 66%. For men it was 69%, whereas for women it was 63.5%. Crew members appear to have had an advantage over passengers as their survival rates were 81.5% and 60% respectively.

Table B15: Survival patterns in the MS *Admiral Nakhimov* disaster

	Survivors	Deceased	Total
Overall	820 (66)	423 (34)	1243
Gender			
Women	437 (63.5)	251 (36.5)	688
Men	383 (69)	172 (31)	555
Traveler status			
Passengers	538 (60)	359 (40)	897
Crew	282 (81.5)	64 (18.5)	346

Notes. Survival rates in parentheses

MS *Estonia*

The description of the sinking is based on the official report established by the *Joint Accident Investigation Commission of Estonia, Finland, and Sweden* (The Joint Accident Investigation Commision of Estonia Finland and Sweden, 1997).

MS *Estonia* departed Tallin, Estonia, on the evening of September 27, 1994 with a scheduled arrival in Stockholm, Sweden, the following morning. It carried 989 people, whereof 821 were passengers, who travelled to Sweden on a business trip or enjoyed a holiday cruise.

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). At 00.55 AM passengers and crew members have reported hearing a loud bang from the bow. The sound continued for about 20 minutes, with concurrent shakings and vibrations. The front bow visor had been ripped off by the power of the waves and enormous amounts of water entered the cargo deck. The *Estonia*'s lower compartments were quickly flooded and it took on a heavy starboard list. A few minutes later several alarms were heard on the ship and about the same time the commando bridge sent out a Mayday message asking for urgent assistance. Half an hour later, at 1.50 AM, it sank. From the first serious indications that something was wrong it took nearly one hour before the *Estonia* disappeared from the radar screens.

When it became apparent to people on board that there was an emergency situation, they tried to reach the boat deck. However, as time elapsed and the list increased it became very difficult to move inside the ship. 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 by debris making it practically impossible to move safely. It has been estimated that about 300 persons managed to reach the boat deck, whereas the great majority seems to have been stuck inside the ship (The Joint Accident Investigation Commision of Estonia Finland and Sweden, 1997). Those who reached the outer deck fell or jumped into the water. Because of the list in combination with the strong winds only 3 out of the *Estonia's* 10 lifeboats were successfully launched. Instead, passengers and crew members tried to launch the inflatable life rafts. The lifeboats and life rafts had a combined capacity of 1,575 persons.

Because of the late hour people were poorly dressed, many wearing only underwear. The water temperature was between 10 and 12 degrees Celsius at the time of the sinking. Many people drowned as they were unable to get up into a life raft. The first ship came to rescue at 2.12 AM – about 20 minutes after the sinking. However, the rough weather made it very difficult to pick up survivors and the persons who were still alive had to spend several hours in the life rafts. People suffered from severe hypothermia and those who were unable to hold on to the rafts were washed overboard. Nevertheless, witness accounts tell that some persons helped others to get up from the water into the life rafts, despite an obvious risk to their own lives.

Several ships and helicopters assisted in the rescue operation during the night and the following day. The last survivors were found at around 8.00 AM, 7 hours after the sinking. In the end, only 137 persons had survived the disaster.

The evacuation of the *Estonia* was not orderly organized. There is little information about the captain's whereabouts during the accident. We know that his body has not been recovered but there are no records about his particular role in the evacuation. Neither witness reports nor any other sources indicate that he ordered "women and children first". Unfortunately, there is limited information about the behavior of the crew during the disaster. There are, however, some witness reports of crew members assisting in the unloading of lifeboats.

The data originate 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 have been provided to us by the *National Archives and the Regional State Archives of Sweden* (Riksarkivet). The data contain information on passenger/crew status, as well as information on gender, nationality and age. As indicated in Table B16, men had a survival rate of 22% compared to 5.4% for women. Among the different nationalities, the Swedish passengers had the lowest survival rate. The crew appears to have had an advantage as their survival rate was 20.2%, compared to 12.3% for passengers. Individuals in age group 16–50 had higher survival rate than children and older adults.

Table B16: Survival patterns in the MS *Estonia* disaster

	Survivors	Deceased	Total
Overall	137 (13.9)	852 (86.1)	989
Gender			
Women	26 (5.4)	459 (94.6)	485
Men	111(22)	393 (78)	504
Traveler status			
Passengers	98 (12.3)	698 (87.7)	796
Crew	39 (20.2)	154 (78.8)	193
Age	39.2	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
Nationality			
Swedish	49 (8.9)	501 (91.1)	550
Estonian	64 (18.6)	280 (81.4)	344
Others	24 (25.3)	71 (74.7)	95

Notes. Survival rates in parenthesis

MV *Princess of the Stars*

We have not been able to find an official report on the sinking of the MV *Princess of the Stars*. Instead, this description is based on various newspaper articles about the disaster.

The Philippine passenger ship MV *Princess of the Stars* was owned by the Sulpicio Lines. It left Manila, Philippines, for Cebu City, on June 20, 2008. Reports on the number of passengers vary. According to the ship's manifest there were 626 passengers and 121 crew members, later reports tell of a complement totaling 850 people (BBC, 2008). We have no information on whether people travelled as a holiday trip or as a pure means of transportation.

On June 21, the ship encountered a typhoon and at 12.30 PM it sent out a distress call telling that its engines were malfunctioning. After this radio contact, the ship was lost (BBC, 2008). The ship ran aground, because of the weather conditions, and capsized soon afterwards (The Guardian, 2008a). The ship did not sink entirely; its bow was visible for several days.

There are scarce accounts on the evacuation. According to the report from one witness people were ordered to abandon the ship. The ship tilted and it became difficult to move on the rain soaked deck, especially for older people and children (BBC, 2008). There were big problems in launching the lifeboats. Several of them flipped over by the heavy wind. Many passengers chose to jump off the ship instead, but they had to struggle with the heavy sea and most of them drowned (The Guardian, 2008a). We have no information on whether there were enough lifeboats, but there is no mentioning of them being insufficient in the reports following the disaster, neither was the ship overloaded. We therefore find it likely that the ship had enough lifeboats. The weather also reduced the possibilities to reach shore in life rafts. Many people were washed off the rafts by the huge waves. It appears to have been difficult to reach the deck. Divers who investigated the wreck have found many passengers trapped inside the ship (The Guardian, 2008a). Because of the weather, no rescue ship arrived until 24 hours after the sinking.

We have not found any reports on the acting of the passengers, the crew or the captain. Thus, we do not know whether the captain gave order to prioritize women and children. We know, however, the captain did not survive the disaster.

The weather was the main cause of the sinking. It was reported that the typhoon had wind gusts of 150 km/hour at its peak. The heavy rain diminished visibility and passengers reported that, though at noon, it was dark (The Guardian, 2008b). The prosecution following the disaster concluded that the blame was to put on the shipowner, the Sulpicio Line, for allowing its ship to sail despite the typhoon warnings.

The data are collected from the list published by the Sulpicio Lines and the Philippine Coast Guard (Sulpicio Lines, 2008).[8] The data contain the names of the surviving and deceased passengers and crew members. According to the records there were 850 people onboard the ship at the time of the accident. An overall survival rate of only 6.9% indicates that the wreckage of the *Princess of the Stars* was a very deadly disaster. We have determined the gender of those on board using information about their names. We lack information on the first name of 6 individuals however. Consequently, we omit them from the empirical analysis. Regarding the gender specific survival rates we note that women have about four times lower probability of survival than the men and that the passengers had a higher chance of survival than crew members. Table B17 presents descriptive statistics.

[8] The Sulpicio Line's homepage is no longer available but the data are obtainable from the reference cited.

Table B17: Survival patterns in the SS *Princess of the Stars* disaster

	Survivors	Deceased	Total
Overall	59 (6.9)	791 (93.1)	850
Gender			
Women	8 (2.4)	320 (97.6)	328
Men	51 (9.8)	471 (90.2)	522
Traveler status			
Passengers	54 (7.3)	685 (92.7)	739
Crew	5 (4.5)	106 (95.5)	111

Notes. Survival rates in parentheses

MV *Bulgaria*

This description is composed by information from several news articles on the sinking of the MV *Bulgaria*.

The Russian river cruise ship *Bulgaria* left Bolgar, Russia, heading towards Kazan on the Volga River, on July 10, 2011. On board were 36 crewmembers and 154 passengers, of which 52 were younger than 16 years old. This was in violation with the safety requirements which only allowed 120 passengers on board the *Bulgaria* (Rianovosti, 2011b). It was reported that one engine was out of order and that the ship listed when it left port.

Six hours after its departure the *Bulgaria* encountered stormy weather, with thunder and wind gusts of 70 km/h (Rianovosti, 2011b). When the captain tried to turn the ferry around water rushed through the open portholes. The list increased and eventually *Bulgaria* capsized and sank at 1.58 PM. Reports on the sinking time vary between 2 and 8 minutes (Rianovosti, 2011a, b).

There are scarce reports on the evacuation of the ship. The lifeboat capacity was 196 people, which was enough to carry the complement on board. However, because of the short sinking time, it is unlikely that all lifeboats were launched. According to witnesses no alarm informed the passengers of the danger. The electric power shut down before minutes before the incident which may explain this. This may also be the reason for the failure to send a distress call (Lenta, 2011). Divers found several passengers inside the ship, an indication of them not having time to reach the deck. Also, most of the children were at a venue in the ship's music room, many without their parents (Rianovosti, 2011a). This may explain the high death toll in this passenger category.

Most of the survivors were rescued by a nearby ship. There were several ships passing by, which for some reason did not stop to assist the sinking ship (Rianovosti, 2011c). The captain did not survive the disaster (Rianovosti, 2011d) and we have not found any indication of him giving order to prioritize women and children. However, as there are such scarce reports on his action we do not conclude that he did not.

The cause of the accident was determined to be the ship's poor condition (Portnews, 2011). Following the disaster, charges were pressed against the inspector who examined the ship before it left port, and against the ship owner (Rianovosti, 2011b).

Individual level data on the passengers and crew members on board the *Bulgaria* have been collected from the official list established by the Ministry of the Russian Federation for Civil Defense, Emergencies and Elimination of Consequences of Natural disasters (Emercom, 2011). Table B18 shows that the overall survival rate was 40.9%. In addition to information on whether the individuals survived or died in the disaster, the dataset includes the names of the passenger and crew members together with information on their date-of-birth. This allows us to determine gender and age. We lack information on date-of-birth for 18 individuals. We note that there were more women than men on board the *Bulgaria* at the time of the accident, 108 and 78 respectively. Regarding the gender specific survival rates we see that women had a survival rate of 26.9%, while that of men was 60.3%. Moreover, we note that the crew members were more than two times as likely to survive the shipwreck as the passengers. The survivors are about 3 years younger than the deceased, on average.

Table B18: Survival patterns in the MV *Bulgaria* disaster

		Survivors	Deceased	Total
Overall		76 (40.9)	110 (59.1)	186
Gender				
	Women	29 (26.9)	79 (73.1)	108
	Men	47 (60.3)	31 (39.7)	78
Traveler status				
	Passengers	52 (33.8)	102 (66.2)	154
	Crew	24 (75)	8 (25)	32
Age		28.6	31.9	30.5
Age groups				
	<16	16 (30.8)	36 (69.2)	52
	16-50	47 (53.4)	41 (46.6)	88
	50+	8 (27.6)	21 (72.4)	29

Notes. Survival rates in parentheses

Appendix C

In this section we present more detailed results than we provide in the main text. We also discuss results from supplementary analyses intended to show the robustness of the conclusions presented in the main text.

Data underlying Figure 1.

Here we present the statistics that are used to construct Fig 1, in the main text. Table C1 displays the casualty statistics for MS. Note that the information about children is based on 9 shipwrecks only. This means that, for these 9 shipwrecks, the sub-groups Men and Women exclude boys and girls. For the remaining 7 shipwrecks, however, boys and girls are included in Men and Women.

Table C3 shows the casualty statistics for the *Titanic* disaster.

Table C1: Casualty statistics of MS

	Survivors	Deceased	Total
Passengers			
Men	1,802 (37.4)	3,010 (62.6)	4,812
Women	849 (26.7)	2,335 (73.3)	3,184
Children	95 (15.3)	526 (84.7)	621
Crew	*1,441 (61.1)*	*918 (38.9)*	*2,359*
Captain	7 (43.8)	9 (76.2)	16

Notes. Survival rates are in parentheses. *Crew* also includes captains.

Table C2: Casualty statistics of the *Titanic*

	Survivors	Deceased	Total
Passengers			
Men	132 (16.9)	650 (83.1)	782
Women	300 (74.6)	102 (25.4)	402
Children	68 (51.1)	65 (48.9)	133
Crew	*212 (23.8)*	*679 (76.2)*	*891*
Captain	0 (0)	1 (100)	1

Notes. Survival rates are in parentheses. *Crew* includes the captains.

Table C3: Regression results for each shipwreck in FS

Shipwreck	Estimates of the coefficient for *Female*						Estimates of the coefficient for *Crew*						*N*
	LPM			Probit			LPM			Probit			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
HMS *Birkenhead*	0.665	0.729	n.a.	n.a.	n.a.	n.a.	0.546	0.557	n.a.	0.561	0.567	n.a.	547-554
	(<0.001)	(<0.001)					(<0.001)	(<0.001)		(<0.001)	(<0.001)		
SS *Arctic*	-0.199	-0.188	-0.168	n.a.	n.a.	n.a.	0.093	0.021	-0.034	0.090	0.022	-0.059	206-268
	(<0.001)	(<0.001)	(<0.001)				(0.043)	(0.697)	(0.589)	(0.039)	(0.697)	(0.325)	
SS *Golden Gate*	-0.136	-0.075	-0.120	-0.139	-0.079	-0.141	0.240	0.229	0.295	0.245	0.234	0.303	356
	(0.082)	(0.334)	(0.136)	(0.091)	(0.343)	(0.124)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	
SS *Northfleet*	-0.227	-0.233	-0.184	-0.312	-0.317	-0.244	-0.012	-0.065	n.a.	-0.012	-0.058	n.a.	338-367
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.879)	(0.419)		(0.880)	(0.446)		
RMS *Atlantic*	-0.521	-0.469	-0.469	n.a.	n.a.	n.a.	0.586	0.460	0.465	0.692	0.640	0.648	633-868
	(<0.001)	(<0.001)	(<0.001)				(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	
SS *Princess Alice*	-0.096	-0.087	-0.032	-0.095	-0.086	-0.032	0.174	0.136	0.082	0.141	0.103	0.041	578-837
	(<0.001)	(0.001)	(0.076)	(<0.001)	(0.001)	(0.047)	(0.030)	(0.085)	(0.233)	(0.011)	(0.059)	(0.158)	
SS *Norge*	-0.192	-0.183	-0.180	-0.197	-0.190	-0.181	0.150	0.062	0.026	0.130	0.047	0.018	795
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.012)	(0.314)	(0.716)	(0.005)	(0.304)	(0.745)	
RMS *Titanic*	0.526	0.542	0.499	0.506	0.526	0.527	-0.142	0.035	0.141	-0.145	0.042	0.192	2198-2208
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.067)	(<0.001)	(<0.001)	(0.069)	(<0.001)	
RMS *Empress of Ireland*	-0.288	-0.165	-0.171	-0.335	-0.215	-0.229	0.388	0.330	0.354	0.372	0.303	0.332	1448
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	
RMS *Lusitania*	-0.029	-0.013	-0.028	-0.023	-0.013	-0.029	0.044	0.040	0.034	0.044	0.039	0.035	1287-1958
	(0.238)	(0.633)	(0.346)	(0.240)	(0.634)	(0.343)	(0.057)	(0.114)	(0.465)	(0.056)	(0.114)	(0.458)	
SS *Principessa Mafalda*	-0.008	0.036	0.053	-0.008	0.034	0.05	0.167	0.175	0.154	0.187	0.195	0.175	1186
	(0.803)	(0.270)	(0.105)	(0.802)	(0.284)	(0.119)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	
SS *Vestris*	-0.404	-0.269	-0.254	-0.416	-0.287	-0.287	0.295	0.209	0.168	0.296	0.214	0.161	296-308
	(<0.001)	(0.002)	(0.002)	(<0.001)	(0.003)	(0.004)	(<0.001)	(0.002)	(0.012)	(<0.001)	(0.001)	(0.016)	
SS *Morro Castle*	-0.022	0.079	0.073	-0.022	0.071	0.068	0.12	0.166	0.308	0.123	0.163	0.281	542
	(0.569)	(0.121)	(0.148)	(0.566)	(0.121)	(0.142)	(0.001)	(0.001)	(0.001)	(0.001)	(<0.001)	(<0.001)	
MV *Princess Victoria*	-0.297	-0.311	-0.332	n.a.	n.a.	n.a.	-0.064	-0.095	-0.134	-0.066	-0.112	-0.176	148-179
	(<0.001)	(<0.001)	(<0.001)				(0.358)	(0.169)	(0.075)	(0.373)	(0.185)	(0.092)	
SS *Admiral Nakhimov*	-0.055	0.002	n.a.	-0.055	-0.001	n.a.	0.215	0.216	n.a.	0.234	0.234	n.a.	1243
	(0.041)	(0.933)		(0.042)	(0.972)		(<0.001)	(<0.001)		(<0.001)	(<0.001)		
MS *Estonia*	-0.167	-0.172	-0.161	-0.166	-0.171	-0.150	0.079	0.094	0.034	0.071	0.083	0.031	989
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.012)	(0.002)	(0.351)	(0.006)	(0.001)	(0.203)	
MS *Princess of the Stars*	-0.073	-0.085	n.a.	-0.080	-0.087	n.a.	-0.028	-0.061	n.a.	-0.032	-0.053	n.a.	850
	(<0.001)	(<0.001)		(<0.001)	(<0.001)		(0.201)	(0.012)		(0.269)	(0.041)		
MV *Bulgaria*	-0.334	-0.257	-0.216	-0.339	-0.271	-0.231	0.412	0.300	0.514	0.425	0.322	n.a.	148-186
	(<0.001)	(0.001)	(0.006)	(<0.001)	(0.001)	(0.005)	(<0.001)	(0.002)	(<0.001)	(<0.001)	(0.003)		

Notes. p-value, based on robust standard errors, in parentheses below the coefficient (marginal effect). N refers to the number of observations over which the models have been estimated. N varies within some shipwrecks. This is because, for some shipwrecks, the information underlying the regressor(s) is not available for everybody in the shipwreck.

Tests of H1 for individual shipwrecks: linear probability models

In this section we provide additional support to the discussion surrounding the separate analyses of the shipwrecks of FS in the main text. In all models, the dependent variable is *Survival*.

Table C3, column 1–3, reports the coefficient for *Female* from a set of linear probability models (LPM). These models serve as tests of the hypothesis (H1): that women have a survival advantage over men in maritime disasters. The baseline model (Model 1) is: $Survival_i = constant + \beta_1 Female_i$. The subscript i indicate that the variables are estimated at the individual level. We estimate Model 1 separately for each shipwreck.

Column 1 shows the regression estimates of β_1, which we denote $\hat{\beta}_1$. We note that $\hat{\beta}_1$ is negative and statistically significant ($p<0.01$) for 11 of the 18 shipwrecks. In the case of both the *Admiral Nakhimov* and the *Golden Gate,* $\hat{\beta}_1$ is negative but the corresponding p-values are somewhat higher. In three cases $\hat{\beta}_1$ is statistically insignificant ($p>0.10$). And in two cases (the *Titanic* and the *Birkenhead)* $\hat{\beta}_1$ is statistically significant ($p<0.01$) and positive.

Next, we augment Model 1 with the variable *Crew*. The results, reported in column 2, do not change much; $\hat{\beta}_1$ becomes negative and statistically significant ($p<0.01$) for the *Admiral Nakhimov* in addition to the previously 11 shipwrecks. Also, $\hat{\beta}_1$ remains statistically significant ($p<0.01$) and positive for the *Birkenhead* and the *Titanic*.

Next, we further augment Model 1 with more control variables. Physical strength and mobility are likely to be important determinants of survival in a shipwreck. Unfortunately, there is no information on these attributes available for any of the shipwrecks. It is however reasonable to assume that young adults are stronger and more mobile than older adults and children, which in turn may give them a relative survival advantage. Consequently, we would like to control for age in the regressions. We have individual level information on age (or child/adult) for 12 of the shipwrecks. For the *Principessa Mafalada* we lack information on age for the crew and therefore do not control for age in the regression. Likewise, we do not control for age in the regression for the *Princess Victoria*. Model 3 for these shipwrecks is accordingly augmented with the age controls *<16* and *>50* (*16–50* being the reference group), or with *Child* (*Adult* being the reference group). Persons in these shipwrecks, for whom we lack information on age, are omitted from the regressions.

Nationality is another individual characteristic that may have an impact on peoples' chances of surviving in shipwrecks. For example, passengers belonging to the same nationality as the crew may have an advantage in the evacuation because of shared language. Information on the nationality of passengers and crew is available for 4 shipwrecks. We augment Model 3 for these cases with nationality dummies, equal to one (=1) if the passenger/crew member belong to the particular nationality and zero (=0) otherwise.

Another individual characteristic that may correlate with survival is passenger class. First and second class cabins are often located further up in the ship, close to the lifeboats, while third class compartments are often located at the lower decks, away from the lifeboats. Also, in the case of a collision, or grounding, the ship's hull, beneath, or just above, the water level often takes the initial strike with the consequence that third class compartments are flooded quicker than the first and second class decks. Previous studies on the loss of the *Titanic* and the *Lusitania* report that first and second class passengers had a significantly better chance to survive than third class passengers (Frey et al., 2011; Hall, 1986). For the 8 shipwrecks, for which we have information on passenger class, we augment Model 3 with a set of dummy variables for class: *First class* (*Saloon*) and *Second class* (*Third class* (*Steerage*) being the reference group). The variables take the value one (=1) if the passenger belong to the passenger class and zero (=0) otherwise.

We further augment Model 1 with a dummy variable *Companionship,* for the 3 shipwrecks for which the information is available. The social attachment model of human

behavior in disasters (Mawson, 2005) predicts that the presence of familiar persons affect peoples' perceptions of, and responses to, danger. A general finding is that people want to keep proximity to attachment figures, such as family and friends (Becker and Eagly, 2004). Accordingly, we may see differences survival probabilities between persons traveling alone and those traveling as a part of a social entity. 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, the social attachment model suggest that 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. On the other hand a social entity can provide information and physical help which in turn may increase the survival chances among its members.

Column 3 reports the results from Model 1 augmented with *Crew* as well as the additional control variables (see Table A1). The set of control variables differ between the shipwrecks, according to what which variables that are available for each shipwreck (see Table A1). For three shipwrecks (*Birkenhead*, *Admiral Nakhimov*, *Princess of the Stars*) we lack any regressors other than *Female* and *Crew*. Accordingly, the cells in column 3 are denoted by n.a. (*not available*) for these shipwrecks.

The results in column 3 are similar in terms of statistical significance to those in column 2. In one case (the *Princess Alice*), $\hat{\beta}_1$ and the corresponding p-value increase substantially ($p<0.076$).

Tests of H1 for individual shipwrecks: probit models

Next, we show that our results are insensitive to the choice between the linear probability model and the (non-linear) probit model, which has been used in previous studies of the *Titanic* and the *Lusitania*. We estimate probit models (Model 2) of the form: $Survival_i = \phi\ (constant + \beta_1 Female_i)$, where ϕ is the cumulative standard normal distribution function.

The $\hat{\beta}_1$'s are obtained using a Maximum Likelihood estimator. However, for ease of interpretation, as well as to make the results comparable with the results from the linear models we present the marginal effects. The impact of a change in a regressor on the dependent variable is calculated with the finite difference method (Cameron and Trivedi, 2005). Table C3, column 4–6, reports the marginal effects for *Crew* from models augmented with the same control variables as for the linear probability model. One caveat with the probit model is that it falls short when all or no women survive. This is the case for four shipwrecks: the *Birkenhead* (all of the women on board survived), the *Arctic*, the *Princess Victoria*, and the *Atlantic* (all women perished). Accordingly, the cells corresponding to these shipwrecks are denoted n.a. (*not available*).

We note that the probit results with respect to *Female* are very similar in terms of statistical significance to those obtained from the linear models. Likewise, the marginal effects are similar in size to the $\hat{\beta}_1$'s in column 1–3.

Tests of H2 for individual shipwrecks: linear probability models

The hypothesis that crew members have a survival advantage over passengers (H2) is tested using the same approach as we used to test for gender differences. Table C3, column 7–9, reports the coefficient for *Crew* from a set of linear probability models (LPM). We start by estimating the following model (Model 3): $Survival_i = constant + \beta_2 Crew_i$. $\hat{\beta}_2$ is the estimate of β_2. Table C3 shows that $\hat{\beta}_2$ is statistically significant ($p<0.01$) and positive for 9 of the 18 shipwrecks. In four cases $\hat{\beta}_2$ is positive, but p-values slightly higher ($p<0.05$). These results show that, being a crew member, compared to a passenger, is associated with higher probability of survival. This is in line with the hypothesis that the crew members have

informational advantages over the passengers, e.g. in knowledge about escape routes. In fact, *Titanic* is the only shipwreck where $\hat{\beta}_2$ is statistically significant (p<0.01) and negative.

To control for the influence of gender on the relationship between crew membership and survival we augment the Model 3 with *Female* (this model is equivalent to Model 1 augmented with *Crew*). The results are reported in column 8, and are very similar to those in column 7. However, for the *Titanic*, the coefficient changes sign. The p-value increases somewhat for the *Princess Alice*. For the *Norge* and the *Lusitania* the p-values increase and becomes statistically insignificant at conventional levels (p>0.1), when we control for *Female*. Noteworthy, $\hat{\beta}_2$ is negative (p=0.012) for the *Princess of the Stars,* when we control for *Female,* suggesting that crew members have a survival disadvantage compared to passengers.

We continue by estimating Model 3 with additional individual level controls. The results are presented in column 9. The general conclusion from this exercise is that the inclusion of additional controls does not change the precision of the $\hat{\beta}_2$s. One exception is the *Titanic*, for which $\hat{\beta}_2$ increases and becomes statistically significant (p<0.01).

Tests of H2 for individual shipwrecks: probit models

Next, we switch to a probit model of the form: $Survival_i = \phi\ (constant + \beta_2 Crew_i)$. We denote this model: Model 4. We augment the model in the same way as before. The results are reported in column 10–12. We can conclude that the probit results are similar to the results from the linear model in terms of statistical significance. The marginal effects are also very similar to the corresponding coefficient estimates in column 7–9.

Regression results for: MS, MS+*Lusitania*, MS+*Titanic*, and FS

This section supports the results reported in Table 2 in the main text. We also show how the results change when we augment MS with the data from the *Lusitania* and the *Titanic* separately, and together (FS). Moreover, we report the regression results from a set of unweighted models. Table C4–C7 report the results.

Table C4 reports the full results of Table 2 in the main text. The results in table C5–C7 follow the same logic as in Table C4.

The results in column 1 are generated by the following model (Model 5): $Survival_i = constant + \beta_1 Female_i + \boldsymbol{\delta}_s$. The subscript i indicates that the variable is measured at the individual level. $\boldsymbol{\delta}_s$ is a vector of shipwreck specific effects, which is included as a control for unobservable differences that vary between the ships but do not vary between persons within the ship. We let $\hat{\beta}_1$ denote the regression estimate of β_1.

The results in column 2 are generated by the model (Model 6): $Survival_i = constant + \beta_1 Female_i + \beta_2 Crew_i + \boldsymbol{\delta}_s$. We let $\hat{\beta}_2$ denote the regression estimate of β_2.

Column 3–6 reports the separate tests of the hypotheses H3–H6, and column 7 reports the joint test. The results are generated by the model (Model 7): $Survival_i = constant + \beta_1 Female_i + \beta_2 Crew_i + \gamma_1 \boldsymbol{X}_s + \gamma_2 (\boldsymbol{X}_s Female_i) + \boldsymbol{\delta}_s$. In the separate tests of H3–H6 (column 3–6) $\boldsymbol{X}_s$ is a dummy: *WCF*, *Post WWI, British ship*, or *Quick*. $\boldsymbol{X}_s Female_i$ is the interaction between the hypothesis specific dummy variable and *Female*. In the joint test $\boldsymbol{X}_s$ is a vector including all hypothesis specific dummies (i.e. *WCF*, *Post WWI, British ship, Quick*). $\hat{\gamma}_1$ and $\hat{\gamma}_2$ are the regression estimates of γ_1 and γ_2.

Table C5 displays the regression results when we augment MS with the *Lusitania* data. We note that the results are largely similar to those for MS. Taken together; not much happens when we add the *Lusitania* to MS. We note, however, that the coefficient for *WCF*Female* becomes statistically significant.

Table C6 displays the results when we augment MS with the *Titanic* data. A few things happen. The gender gap, and the crew-passenger gap decrease and p-values increase marginally. The result that the WCF order benfits women is strengthened, compared to for the MS. Otherwise, we find only minor changes in size or significance of the coefficients.

Table C7 presents the regression results for FS, i.e., the sample including data on all 18 shipwrecks. We note that our previous findings with respect to *Female* and *Crew* hold also for this sample: the coefficients on *Female* and *Crew* are negative ($p<0.001$) and positive ($p<0.001$), respectively. Regarding the results of the separate tests of H3–H6, we see that they differ somewhat from those obtained for MS. The most notable discrepancy is that *Quick*Female* is negative ($p<0.01$) and negative ($p<0.10$) in the separate and joints tests, respectively. Another discrepancy is that *Post WWI*Female* is negative and statistically insignificant on conventional levels ($p>0.10$) in table C7. In the joint test (column 7) it is however similar to *Post WWI*Female* for MS (joint test) in terms of sign and p-value. Likewise, *British*Female* is statistically insignificant ($p>0.10$), negative, in the separate test (column 5) and statistically significant ($p=0.01$) negative in the joint test.

We can conclude that our findings in the main text i.e., that women have a distinct survival disadvantage compared to men and that captains and crew survive at a significantly higher rate than passengers, are robust to the inclusion of data from the *Titanic* and the *Lusitania*. Although our findings with respect to the separate tests of H3–H6 are somewhat sensitive to the inclusion of *Lusitania* and the *Titanic* the joint, and most reliable, tests of the 6 hypotheses is highly robust.

Table C4: Regression results for MS

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model	(7) Model
Female	-0.167	-0.126	-0.151	-0.195	-0.093	-0.145	-0.151
	(0.008)	(0.009)	(0.011)	(0.013)	(0.014)	(0.013)	(0.029)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Crew		0.187	0.157	0.158	0.159	0.157	0.160
		(0.011)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
		(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
WCF			0.085				0.027
			(0.024)				(0.026)
			(0.001)				(0.295)
WCF*Female			0.019				0.072
			(0.026)				(0.030)
			(0.477)				(0.016)
Post WWI				0.116			0.092
				(0.041)			(0.028)
				(0.004)			(0.001)
Post WWI*Female				0.085			0.053
				(0.019)			(0.029)
				(<0.001)			(0.071)
British					-0.106		-0.025
					(0.041)		(0.028)
					(0.009)		(0.367)
British*Female					-0.153		-0.139
					(0.019)		(0.024)
					(<0.001)		(<0.001)
Quick						0.149	-0.131
						(0.024)	(0.029)
						(<0.001)	(<0.001)
Quick*Female						-0.009	0.032
						(0.020)	(0.025)
						(0.663)	(0.195)
Constant	0.346	0.325	0.244	0.329	0.435	0.179	0.457
	(0.020)	(0.020)	(0.015)	(0.020)	(0.036)	(0.014)	(0.027)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Observations	10,978	10,976	10,976	10,976	10,976	10,976	10,976
R-squared	0.249	0.270	0.242	0.244	0.247	0.242	0.247

Notes. Robust standard errors and p-value in parentheses below the coefficient. Model 1-7 include controls for shipwreck specific fixed effects. Observations in regressions of model 3-7 are weighted by the inverse of the number of individuals on board the ship.

Table C5: Regression results for MS augmented with the *Lusitania*

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model	(7) Model
Female	-0.147	-0.109	-0.154	-0.169	-0.097	-0.148	-0.181
	(0.008)	(0.008)	(0.011)	(0.012)	(0.014)	(0.013)	(0.028)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Crew		0.153	0.147	0.146	0.146	0.145	0.149
		(0.010)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
		(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
WCF			0.083				0.033
			(0.024)				(0.026)
			(0.001)				(0.191)
WCF*Female			0.077				0.148
			(0.021)				(0.023)
			(<0.001)				(<0.001)
Post WWI				0.119			0.295
				(0.041)			(0.032)
				(0.003)			(<0.001)
Post WWI*Female				0.056			0.071
				(0.019)			(0.028)
				(0.003)			(0.013)
British					-0.109		0.173
					(0.041)		(0.028)
					(0.007)		(<0.001)
British*Female					-0.110		-0.116
					(0.018)		(0.023)
					(<0.001)		(<0.001)
Quick						0.147	0.060
						(0.024)	(0.030)
						(<0.001)	(0.043)
Quick*Female						0.015	0.052
						(0.019)	(0.024)
						(0.412)	(0.031)
Constant	0.345	0.329	0.245	0.330	0.440	0.183	0.062
	(0.020)	(0.020)	(0.015)	(0.020)	(0.036)	(0.014)	(0.035)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.079)
Observations	12,936	12,934	12,934	12,934	12,934	12,934	12,934
R-squared	0.209	0.224	0.227	0.226	0.228	0.226	0.231

Notes. Robust standard errors and p-value in parentheses below the coefficient. Model 1-7 include controls for shipwreck specific fixed effects. Observations in regressions of model 3-7 are weighted by the inverse of the number of individuals on board the ship.

Table C6: Regression results for MS augmented with the *Titanic*

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model	(7) Model
Female	-0.065	-0.034	-0.155	-0.112	-0.099	-0.080	-0.159
	(0.008)	(0.009)	(0.011)	(0.012)	(0.014)	(0.012)	(0.030)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Crew		0.125	0.142	0.137	0.137	0.139	0.145
		(0.010)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
		(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
WCF			-0.198				0.028
			(0.034)				(0.026)
			(<0.001)				(0.270)
WCF*Female			0.254				0.310
			(0.024)				(0.028)
			(<0.001)				(<0.001)
Post WWI				0.193			0.110
				(0.034)			(0.028)
				(<0.001)			(<0.001)
Post WWI*Female				-0.004			0.065
				(0.019)			(0.030)
				(0.813)			(0.030)
British					-0.127		-0.050
					(0.033)		(0.027)
					(<0.001)		(0.071)
British*Female					-0.037		-0.058
					(0.019)		(0.024)
					(0.050)		(0.015)
Quick						-0.186	-0.114
						(0.034)	(0.029)
						(<0.001)	(<0.001)
Quick*Female						-0.078	-0.035
						(0.020)	(0.025)
						(<0.001)	(0.159)
Constant	0.344	0.331	0.525	0.330	0.457	0.517	0.462
	(0.020)	(0.020)	(0.028)	(0.020)	(0.026)	(0.028)	(0.027)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Observations	13,186	13,184	13,184	13,184	13,184	13,184	13,184
R-squared	0.195	0.205	0.225	0.218	0.218	0.219	0.228

Notes. Robust standard errors and p-value in parentheses below the coefficient. Model 1-7 include controls for shipwreck specific fixed effects. Observations in regressions of model 3-7 are weighted by the inverse of the number of individuals on board the ship.

Table C7: Regression results for FS

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model	(7) Model
Female	-0.061	-0.030	-0.156	-0.098	-0.101	-0.083	-0.157
	(0.008)	(0.008)	(0.011)	(0.011)	(0.014)	(0.012)	(0.028)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Crew		0.111	0.135	0.128	0.128	0.129	0.138
		(0.009)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
		(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
WCF			0.081				0.027
			(0.024)				(0.026)
			(0.001)				(0.286)
WCF*Female			0.235				0.300
			(0.020)				(0.023)
			(<0.001)				(<0.001)
Post WWI				0.124			0.328
				(0.041)			(0.032)
				(0.002)			(<0.001)
Post WWI*Female				-0.020			0.062
				(0.018)			(0.029)
				(0.273)			(0.032)
British					-0.114		0.167
					(0.041)		(0.028)
					(0.005)		(<0.001)
British*Female					-0.015		-0.060
					(0.018)		(0.023)
					(0.405)		(0.010)
Quick						0.178	0.101
						(0.024)	(0.029)
						(<0.001)	(<0.001)
Quick*Female						-0.054	-0.038
						(0.019)	(0.023)
						(0.004)	(0.097)
Constant	0.344	0.332	0.247	0.331	0.445	0.154	0.032
	(0.020)	(0.020)	(0.015)	(0.020)	(0.036)	(0.013)	(0.035)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.360)
Observations	15,144	15,142	15,142	15,142	15,142	15,142	15,142
R-squared	0.169	0.178	0.212	0.205	0.205	0.205	0.214

Notes. Robust standard errors and p-value in parentheses below the coefficient. Model 1-7 include controls for shipwreck specific fixed effects. Observations in regressions of model 3-7 are weighted by the inverse of the number of individuals on board the ship.

Results from unweighted regressions

In table C8 we present the results of the separate tests of H3–H6, as well as the results of the joint tests, from models estimated without sample weights. Since the results column H1 and H2 in Table 2 in the main text are generated without sample weights we omit them in this analysis. From column 1 we can see that the coefficient on *WCF*Female* is similar in sign, size, and p-value to its equivalent in Table 2. This is the case also for the joint test (column 7). In fact, the p-value for *WCF*Female* is smaller than the corresponding p-value in Table 2 (<0.001 vs. 0.016). Regarding *Post WWI*Female* (column 2) we note that the coefficient is, still, positive ($p<0.001$) but almost twice as large as the corresponding coefficient in Table 2 ($p<0.001$). The coefficient obtained in joint test (column 7) is also relatively large. Noteworthy is that the p-value is smaller than the corresponding p-value in Table 2.

Moreover, we note that the coefficient on *British*Female* ($p<0.001$) in column 3 is marginally larger than the corresponding coefficient in Table 2 ($p<0.001$). This finding remains also for the joint test.

The coefficients on *Quick*Female* (columns 4 and 7) are, similarly to their equivalents in Table 2, statistically insignificant on all conventional levels ($p>0.10$).

Table C9–C11 report the results from unweighted regressions for the MS+*Lusitania*, MS+*Titanic*, and the FS. We note that these results are very similar to the results in Table C5–C7. The most notable differences are that the coefficient for *Quick*Female* vary in terms of sign, size and significance. Furthermore the significance of the coefficient for *British*Female* is somewhat sensitive to the inclusion of the *Titanic*.

We can conclude that the results in Table 2 are not particularly sensitive to omission of sample weights.

Table C8: Results from unweighted regressions on MS

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model
Female	-0.127	-0.210	-0.062	-0.131	-0.216
	(0.009)	(0.012)	(0.011)	(0.011)	(0.026)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Crew	0.187	0.188	0.187	0.187	0.189
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
WCF	0.109				0.039
	(0.038)				(0.033)
	(0.004)				(0.245)
WCF*Female	0.017				0.114
	(0.030)				(0.032)
	(0.574)				(<0.001)
Post WWI		-0.123			0.123
		(0.039)			(0.041)
		(0.001)			(0.003)
Post WWI*Female		0.157			0.138
		(0.016)			(0.026)
		(<0.001)			(<0.001)
British			0.240		0.048
			(0.030)		(0.030)
			(<0.001)		(0.108)
British*Female			-0.178		-0.117
			(0.016)		(0.023)
			(<0.001)		(<0.001)
Quick				0.108	0.182
				(0.038)	(0.030)
				(0.005)	(<0.001)
Quick*Female				0.009	0.104
				(0.016)	(0.019)
				(0.564)	(<0.001)
Constant	0.216	0.326	0.086	0.216	0.056
	(0.033)	(0.020)	(0.023)	(0.033)	(0.035)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.110)
Observations	10,976	10,976	10,976	10,976	10,976
R-squared	0.270	0.275	0.276	0.270	0.279

Notes. Robust standard errors and p-value in parentheses below the coefficient. Model 1-5 include controls for shipwreck specific fixed effects.

Table C9: Results from unweighted regressions on MS augmented with the *Lusitania*

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model
Female	-0.133	-0.149	-0.070	-0.138	-0.246
	(0.009)	(0.011)	(0.011)	(0.011)	(0.025)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Crew	0.157	0.151	0.151	0.154	0.159
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
WCF	-0.132				0.024
	(0.039)				(0.033)
	(0.001)				(0.457)
WCF*Female	0.133				0.230
	(0.022)				(0.023)
	(<0.001)				(<0.001)
Post WWI		0.089			0.117
		(0.040)			(0.041)
		(0.027)			(0.004)
Post WWI*Female		0.088			0.157
		(0.016)			(0.025)
		(<0.001)			(<0.001)
British			0.226		0.053
			(0.030)		(0.029)
			(<0.001)		(0.070)
British*Female			-0.087		-0.097
			(0.016)		(0.022)
			(<0.001)		(<0.001)
Quick				0.101	0.186
				(0.038)	(0.030)
				(0.008)	(<0.001)
Quick*Female				0.051	0.115
				(0.016)	(0.018)
				(0.001)	(<0.001)
Constant	0.459	0.329	0.103	0.227	0.063
	(0.034)	(0.020)	(0.023)	(0.033)	(0.035)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.069)
Observations	12,934	12,934	12,934	12,934	12,934
R-squared	0.226	0.225	0.225	0.224	0.234

Notes. Robust standard errors and p-value in parentheses below the coefficient. Model 1-5 include controls for shipwreck specific fixed effects.

Table C10: Results from unweighted regressions on MS augmented with the *Titanic*

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model
Female	-0.135	-0.004	-0.075	0.044	-0.231
	(0.009)	(0.012)	(0.011)	(0.012)	(0.028)
	(<0.001)	(0.718)	(<0.001)	(<0.001)	(<0.001)
Crew	0.147	0.126	0.128	0.128	0.148
	(0.010)	(0.010)	(0.010)	(0.010)	(0.009)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
WCF	0.094				-0.207
	(0.038)				(0.021)
	(0.013)				(<0.001)
WCF*Female	0.562				0.671
	(0.022)				(0.027)
	(<0.001)				(<0.001)
Post WWI		0.096			-0.215
		(0.040)			(0.037)
		(0.018)			(<0.001)
Post WWI*Female		-0.063			0.164
		(0.017)			(0.027)
		(<0.001)			(<0.001)
British			-0.100		0.240
			(0.040)		(0.022)
			(0.013)		(<0.001)
British*Female			0.092		-0.018
			(0.017)		(0.024)
			(<0.001)		(0.463)
Quick				0.129	0.095
				(0.039)	(0.020)
				(0.001)	(<0.001)
Quick*Female				-0.179	0.017
				(0.017)	(0.020)
				(<0.001)	(0.386)
Constant	0.228	0.330	0.430	0.202	0.194
	(0.032)	(0.020)	(0.035)	(0.033)	(0.022)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Observations	13,184	13,184	13,184	13,184	13,184
R-squared	0.246	0.206	0.207	0.212	0.251

Notes. Robust standard errors and p-value in parentheses below the coefficient. Model 1-5 include controls for shipwreck specific fixed effects.

Table C11: Results from unweighted regressions on FS

VARIABLES	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model
Female	-0.139	-0.003	-0.078	0.039	-0.115
	(0.009)	(0.011)	(0.011)	(0.012)	(0.026)
	(<0.001)	(0.798)	(<0.001)	(0.001)	(<0.001)
Crew	0.130	0.112	0.114	0.111	0.131
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
WCF	0.093				-0.001
	(0.038)				(0.033)
	(0.014)				(0.969)
WCF*Female	0.387				0.467
	(0.019)				(0.021)
	(<0.001)				(<0.001)
Post WWI		-0.105			0.173
		(0.038)			(0.040)
		(0.006)			(<0.001)
Post WWI*Female		-0.068			0.082
		(0.016)			(0.026)
		(<0.001)			(0.002)
British			-0.103		0.036
			(0.040)		(0.029)
			(0.011)		(0.227)
British*Female			0.092		-0.053
			(0.016)		(0.023)
			(<0.001)		(0.022)
Quick				0.125	0.277
				(0.039)	(0.029)
				(0.001)	(<0.001)
Quick*Female				-0.138	-0.104
				(0.016)	(0.017)
				(<0.001)	(<0.001)
Constant	0.234	0.332	0.434	0.208	0.016
	(0.032)	(0.020)	(0.035)	(0.033)	(0.035)
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.645)
Observations	15,142	15,142	15,142	15,142	15,142
R-squared	0.203	0.179	0.179	0.182	0.210

Notes. Robust standard errors and p-value in parentheses below the coefficient. Model 1-5 include controls for shipwreck specific fixed effects.

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