Migrants at Sea: Unintended Consequences of Search and Rescue Operations
Online Appendix

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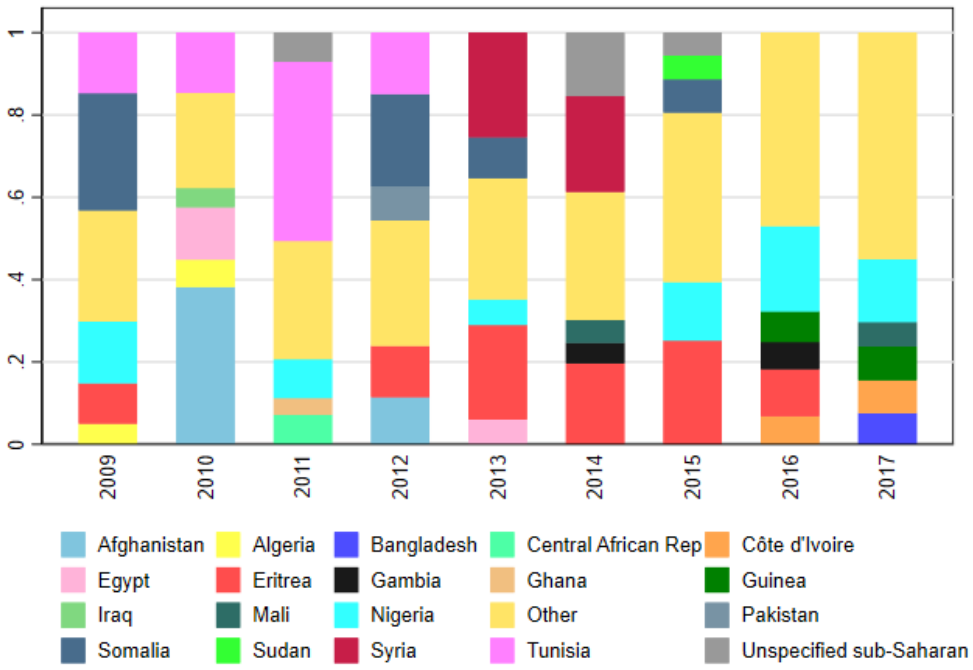
Appendix C: Additional Tables and Figures

Figure C.1. : Nationalities of Migrants on the Central Route by Year



Note: Data are collected by the European Border and Coast Guard Agency and are based on detections at the border. Our subset is based on detections along the Central Mediterranean Route and the figures show the fraction of detections for the top six nationality from 2009 to 2017.

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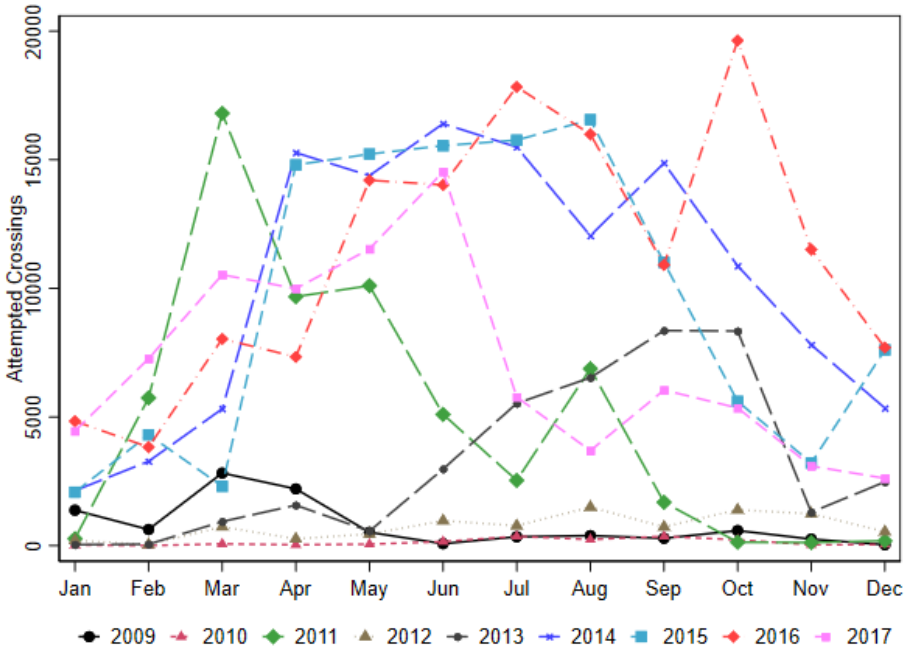
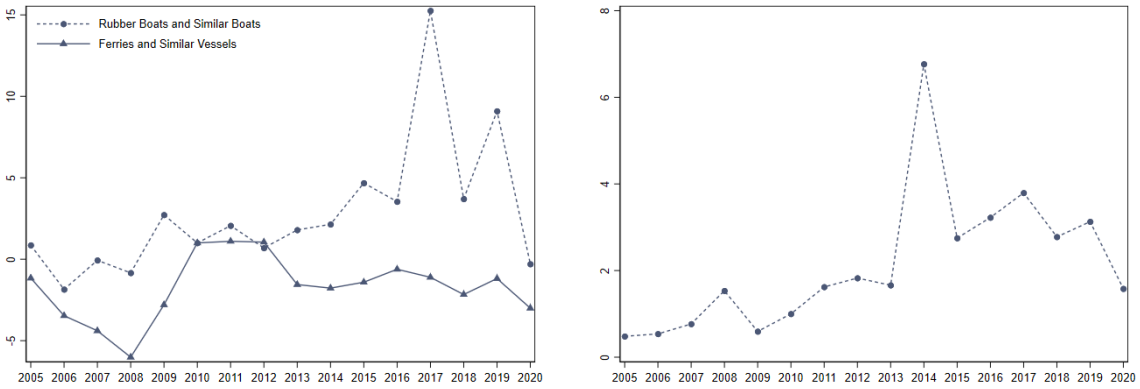
Figure C.2. : Monthly Crossing Attempts



Data on crossings are provided by *Polizia di Stato*, the Italian State Police. Data on deaths at sea are described in Section 2.4. The figure shows the total number of monthly crossing attempts that sum the crossings and the deaths in transit.

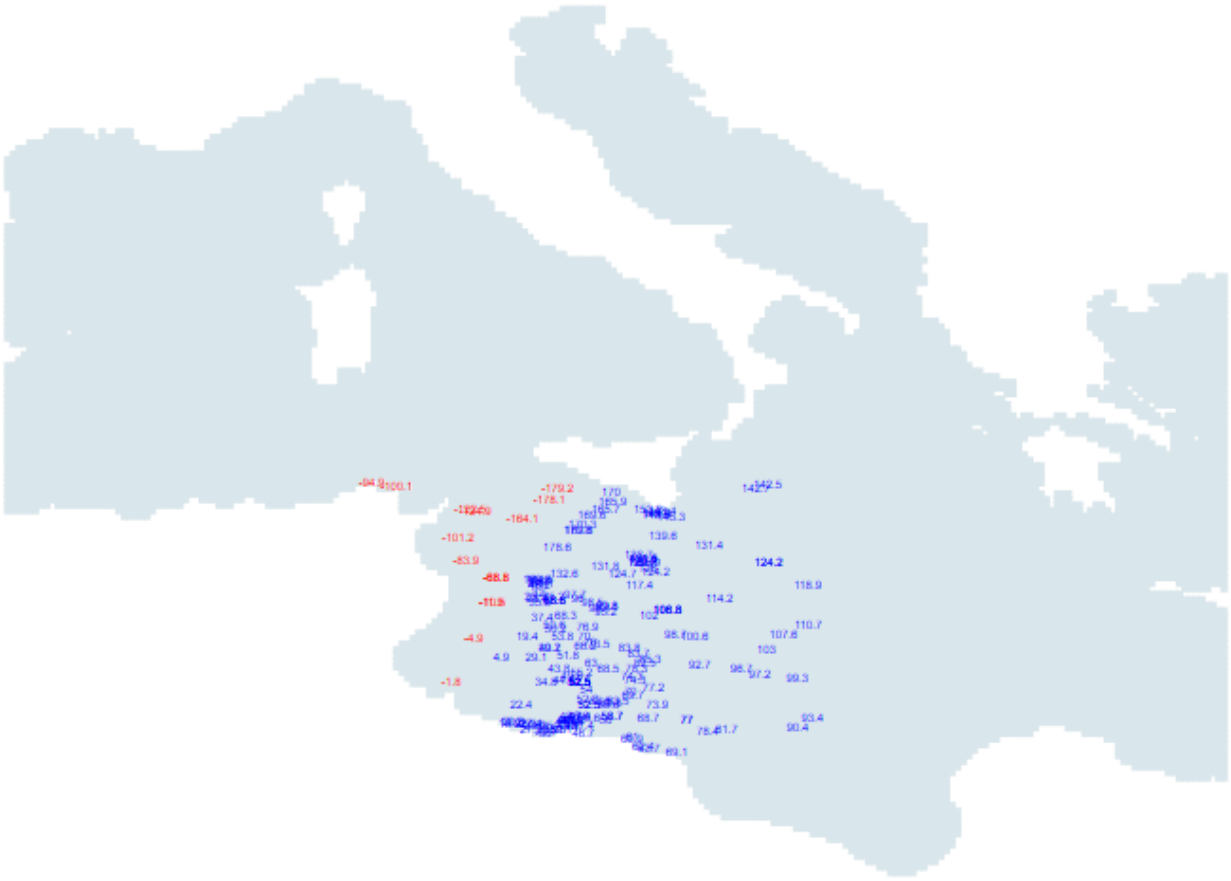
Figure C.3. : Net-Imports of Rubber Boats, Wooden Ferries and Life Jackets



Rubber Boats, Wooden Ferries | Life Jackets

Note: Data come from UN Comtrade over the period 2005-2020. The series show net-imports of rubber boats and ferries (left panel) and Life Jackets (right panel) to countries near Libya for which data are available (Malta, Turkey, and Egypt). Both series are normalized to 1 in 2010.

Figure C.4. : Map of Angles



Note: The figure shows the location of shipwrecks and the corresponding angle with respect to Lampedusa. The angle is normalized to be zero between Lampedusa and the shore at the border between Tunisia and Libya, close to the island of Djerba. The angle becomes more negative moving west towards Tunisia and more positive moving East towards Libya. The total number of observations is 143.

Table C.1—: Irregular Migration During Search and Rescue Operations

	(1) **Crossing Attempts**	(2) Crossing Risk	(3)	(4)	(5)	(6)	(7)
			Distance (in km) to:				
			Tripoli	Bengazi	Al Huwariyah	Min (Tripoli Bengazi & Al Huwariyah)	Lampedusa
Hermes 2011	2.214	0.003	-34.195	-49.703	38.009	-5.162	0.707
	(0.381)	(0.029)	(28.781)	(21.430)	(27.196)	(20.709)	(25.131)
Hermes 2011a	-0.261	0.033	-32.633	-120.588	120.099	37.411	66.968
	(0.491)	(0.049)	(32.877)	(47.014)	(58.849)	(26.820)	(53.770)
Hermes 2012	0.230	0.029	-22.268	-7.751	-1.340	5.570	-32.664
	(0.337)	(0.020)	(50.063)	(42.103)	(55.997)	(27.392)	(52.359)
Hermes 2013	1.700	0.002	47.337	-61.759	26.278	95.944	-17.002
	(0.349)	(0.021)	(38.765)	(36.189)	(34.143)	(21.385)	(31.530)
Hermes 2013a	0.490	0.059	-47.906	-20.130	44.605	-19.753	16.760
	(0.502)	(0.057)	(26.483)	(28.599)	(29.925)	(18.823)	(26.472)
Mare Nostrum	2.554	0.070	-107.554	-106.336	123.249	-29.174	66.636
	(0.301)	(0.027)	(33.611)	(22.857)	(28.027)	(25.077)	(21.065)
Triton I	2.420	0.076	-180.596	-102.924	160.504	-63.948	83.784
	(0.371)	(0.032)	(26.518)	(25.916)	(25.704)	(17.959)	(16.501)
Triton II	2.564	0.101	-171.165	-101.383	167.246	-77.340	106.632
	(0.292)	(0.020)	(25.274)	(18.767)	(23.673)	(15.815)	(17.137)
Week FE	✓	✓	✓	✓	✓	✓	✓
Pre SAR Period Statistics							
Pre Mean Outcome	24	.03	326	784	259	206	135
Observations	3287	1579	503	503	503	503	503

Note: The sample in column (1) consists of daily observations from 1 January 2009 to 31 December 2017 (3,287). The sample in column (2) consists of daily observations from 1 January 2009 to 31 December 2017 (1,579), i.e. when deaths and total attempts are simultaneously different from zero. The sample in column (3)-(7) consists of 503 geo-localized rescue events from 18 January 2009 to 22 December 2017. SAR coefficients (Hermes, Mare Nostrum, Triton I and II) are estimated relative to the baseline period in which no SAR operations were in place. Crossing attempts sum crossings and deaths in transit. Significant wave height in Tripoli (Libya) is measured in meters. Crossing Risk is defined as the number of deaths over total attempts. Distances, expressed in Km, measures the shortest linear distance between different locations (Tripoli, Bengazi (Libya), Al Huwariyah (Tunisia) and Lampedusa (Italy) and the latitude and the longitude of the casualties at sea. All regressions control for 52 weeks of the year fixed effects. Regressions estimated with PPML and OLS. Standard errors clustered by month of the year.

Table C.2—: Wave and Swell Explanations

Wave: Description	Height (metres)	Effect
Calm (rippled)	0.00 - 0.10	No waves breaking
Smooth	0.10 - 0.50	Slight waves breaking
Slight	0.50 - 1.25	Waves rock buoys and small craft
Moderate	1.25 - 2.50	Sea becoming furrowed
Rough	2.50 - 4.00	Sea deeply furrowed
Very rough	4.00 - 6.00	Sea much disturbed with rollers
High	6.00 - 9.00	Sea disturbed with damage to foreshore
Very high	9.00 - 14.00	Towering seas
Phenomenal	>14	Precipitous seas (only in cyclones)

Swell: Description	Wave Length (metres)	Wave Height (metres)
Low swell of short or average length	0 - 200	0 - 2
Long, low swell	over 200	0 - 2
Short swell of moderate height	0 - 100	2 - 4
Average swell of moderate height	100 - 200	2 - 4
Long swell of moderate height	over 200	2 - 4
Short heavy swell	0 - 100	over 4
Average length heavy swell	100 - 200	over 4
Long heavy swell	over 200	over 4

Note: The Bureau of Meteorology provides significant wave height that describes the combined height of the sea and the swell that mariners experience on open waters. See `http://www.bom.gov.au/marine/knowledge-centre/reference/waves.shtml`

Table C.3—: Crossing Attempts: Robustness using OLS

	(1)	(2)	(3)
	Crossing Attempts		
	Definition of Unsafe Boat		
	Inflatable	*Inflatable + Unknown*	*Inflatable + Unknown + Other*
Wave Height * Post SAR * Fr. Boat	-257.329	-305.542	-273.079
	(252.349)	(96.346)	(83.639)
Wave Height	-76.947	-104.775	-111.961
	(39.139)	(40.085)	(41.056)
Wave Height * Fr. Boat	74.521	94.501	93.443
	(245.665)	(83.678)	(74.219)
Wave Height * Post SAR	-15.939	62.099	70.488
	(45.382)	(44.336)	(44.831)
Week-Year FE	✓	✓	✓
Pre SAR Period Statistics			
Mean Total Attempt	120	120	120
Mean Wave Height	.63	.63	.63
Mean Frac. Unsafe Boat	.07	.27	.29
Observations	1612	1612	1612

Note: The sample consists of daily observations from 7 May 2013 to 4 October 2017. SAR coefficients are estimated relative to a baseline in which Hermes operations (single boat type regime) were in place (164 days). Post SAR dummy is equal to one for all observations after October 18, 2013 (the beginning of the intense SAR when multiple types of boats were used). Crossing attempts sum crossings and deaths in transit. Significant wave height in Tripoli (Libya) is measured in meters. Frac. Unsafe Boat measures the share of attempted crossings using unsafe boats aggregated at the week-year level. We define three different categories of unsafe boats based on the main vessels used. The share of crossing attempts using "inflatable" rubber boats over the total; we then add the "unknown boats" and "other boats", excluding any sturdy and motor boats. All regressions control for week-by-year fixed effects. Regressions are estimated using OLS. Standard errors are heteroscedasticity- and autocorrelation-robust using Newey-West with a bandwidth equal to 28 days.

Table C.4—: Crossing Attempts: Robustness on Cluster Standard Errors

	(1)	(2)	(3)
	Crossing Attempts		
	Definition of Unsafe Boat		
	Inflatable	*Inflatable + Unknown*	*Inflatable + Unknown + Other*
Wave Height * Post SAR * Fr. Boat	-6.546	-5.450	-4.168
	(1.633)	(1.306)	(1.374)
	[2.975]	[1.745]	[1.496]
	{1.951}	{1.422}	{1.310}
	|2.132|	|1.582|	|1.426|
Wave Height	-0.891	-1.430	-1.458
	(0.381)	(0.614)	(0.687)
	[0.414]	[0.782]	[0.775]
	{0.387}	{0.647}	{0.663}
	|0.388|	|0.727|	|0.740|
Wave Height * Fr. Boat	2.135	1.907	1.632
	(1.466)	(1.248)	(1.202)
	[2.895]	[1.693]	[1.355]
	{1.847}	{1.371}	{1.167}
	|2.039|	|1.535|	|1.290|
Wave Height * Post SAR	0.209	1.165	1.004
	(0.479)	(0.655)	(0.784)
	[0.491]	[0.821]	[0.892]
	{0.464}	{0.682}	{0.767}
	|0.465|	|0.760|	|0.839|
Observations	1,612	1,612	1,612
Week-Year FE	✓	✓	✓
Pre SAR Period Statistics			
Mean Total Attempt	120.34	120.34	120.34
Mean Wave Height	0.63	0.63	0.63
Mean Frac. Unsafe Boat	0.07	0.27	0.29

Note: The sample consists of daily observations from 7 May 2013 to 4 October 2017. SAR coefficients are estimated relative to a baseline in which Hermes operations (single boat type regime) were in place (164 days). Post SAR dummy is equal to one for all observations after October 18, 2013 (the beginning of the intense SAR when multiple types of boats were used). Crossing attempts sum crossings and deaths in transit. Significant wave height in Tripoli (Libya) is measured in meters. Frac. Unsafe Boat measures the share of attempted crossings using unsafe boats aggregated at the week-year level. We define three different categories of unsafe boats based on the main vessels used. The share of crossing attempts using "inflatable" rubber boats over the total; we then add the "unknown boats" and "other boats", excluding any sturdy and motor boats. All regressions control for week-by-year fixed effects. Regressions are estimated using Poisson quasi-maximum likelihood models. Standard errors are clustered at the month of the year and week of the year level in parentheses and squared brackets, respectively. Standard errors are heteroscedasticity- and autocorrelation-robust using Newey-West with a bandwidth equal to 7 days and 14 days in curly brackets and vertical bars, respectively.

Table C.5—: Crossing Attempts: Robustness on Wave Height

	(1)	(2)	(3)	(4)	(5)	(6)
	Crossing Attempts					
	Definition of Unsafe Boat					
	Inflatable	*Inflatable + Unknown*	*Inflatable + Unknown + Other*	*Inflatable*	*Inflatable + Unknown Other*	*Inflatable + Unknown +*
Wave Height * Post SAR * Fr. Boat	-1.005	-1.964	-1.711	-2.438	-3.131	-2.713
	(2.528)	(0.971)	(1.034)	(2.012)	(0.956)	(0.902)
Wave Height	0.183	-0.062	-0.061	-0.264	-0.661	-0.682
	(0.383)	(0.399)	(0.399)	(0.306)	(0.348)	(0.347)
Wave Height * Fr. Boat	-1.530	0.273	0.220	-0.736	0.759	0.657
	(2.465)	(0.867)	(0.884)	(1.956)	(0.891)	(0.756)
Wave Height * Post SAR	0.198	0.483	0.548	0.161	0.761	0.895
	(0.459)	(0.489)	(0.571)	(0.359)	(0.393)	(0.489)
	Wave Height in Tripoli (t-1)			**Max Wave Height in Tripoli (t and t-1)**		
Week-Year FE	✓	✓	✓	✓	✓	✓
Pre SAR Period Statistics						
Mean Total Attempt	120	120	120	120	120	120
Mean Wave Height	.72	.72	.72	.72	.72	.72
Mean Frac. Unsafe Boat	.07	.27	.29	.07	.27	.29
Observations	1611	1611	1611	1612	1612	1612

Note: The sample consists of daily observations from 7 May 2013 to 4 October 2017. SAR coefficients are estimated relative to a baseline in which Hermes operations (single boat type regime) were in place (164 days). Post SAR dummy is equal to one for all observations after October 18, 2013 (the beginning of the intense SAR when multiple types of boats were used). Crossing attempts sum crossings and deaths in transit. Significant wave height in Tripoli (Libya) is measured in meters. In columns 1-3, we use one-day lag ($t-1$); in columns 4-6 the maximum values between wave height at time t and $t-1$. Frac. Unsafe Boat measures the share of attempted crossings using unsafe boats aggregated at the week-year level. We define three different categories of unsafe boats based on the main vessels used. The share of crossing attempts using "inflatable" rubber boats over the total; we then add the "unknown boats" and "other boats", excluding any sturdy and motor boats. All regressions control for week-by-year fixed effects. Regressions are estimated using Poisson quasi-maximum likelihood models. Standard errors are heteroscedasticity- and autocorrelation-robust using Newey-West with a bandwidth equal to 28 days.

Table C.6—: Crossing Attempts on Wave Height Squared

	(1)	(2)	(3)
	Crossing Attempts		
	Definition of Unsafe Boat		
	Inflatable	*Inflatable + Unknown*	*Inflatable + Unknown + Other*
Wave Height * Post SAR * Fr. Boat	-5.933	-3.761	-2.732
	(1.559)	(0.821)	(1.003)
Wave Height	-0.480	-0.645	-0.839
	(0.213)	(0.343)	(0.413)
Wave Height * Fr. Boat	1.649	0.759	1.092
	(1.497)	(0.774)	(0.801)
Wave Height * Post SAR	0.372	0.676	0.722
	(0.234)	(0.352)	(0.465)
Week-Year FE	✓	✓	✓
Pre SAR Period Statistics			
Mean Total Attempt	120	120	120
Mean Wave Height	.49	.49	.49
Mean Frac. Unsafe Boat	.07	.27	.29
Observations	1612	1612	1612

Note: The sample consists of daily observations from 7 May 2013 to 4 October 2017. SAR coefficients are estimated relative to a baseline in which Hermes operations (single boat type regime) were in place (164 days). Post SAR dummy is equal to one for all observations after October 18, 2013 (the beginning of the intense SAR when multiple types of boats were used). Crossing attempts sum crossings and deaths in transit. Significant wave height squared in Tripoli (Libya) is measured in meters. Frac. Unsafe Boat measures the share of attempted crossings using unsafe boats aggregated at the week-year level. We define three different categories of unsafe boats based on the main vessels used. The share of crossing attempts using "inflatable" rubber boats over the total; we then add the "unknown boats" and "other boats", excluding any sturdy and motor boats. All regressions control for week-by-year fixed effects. Regressions are estimated using Poisson quasi-maximum likelihood models. Standard errors are heteroscedasticity- and autocorrelation-robust using Newey-West with a bandwidth equal to 28 days.

Table C.7—: Crossing Attempts with Different Locations

	(1)	(2)	(3)	(4)	(5)
			Crossing Attempts		
			Definition of Unsafe Boat *Inflatable + Unknown + Other*		
Wave Height * Post SAR * Fr. Boat	-4.436	-2.096	-3.256	-1.749	-0.191
	(1.821)	(0.936)	(0.952)	(1.605)	(0.971)
Wave Height	-1.511	-1.069	-1.478	-0.737	-0.459
	(0.796)	(0.594)	(0.451)	(0.567)	(0.453)
Wave Height * Fr. Boat	1.818	1.762	2.313	1.237	0.057
	(1.558)	(0.834)	(0.723)	(1.339)	(0.875)
Wave Height * Post SAR	0.314	0.403	0.587	-1.231	-0.391
	(0.964)	(0.673)	(0.615)	(0.867)	(0.568)
Week-Year FE	✓	✓	✓	✓	✓
Wave measured in	**Zuwara** Libya	**Monastir**	**Al Huwariyah** Tunisia	**Djerba**	**Annaba** Algeria
Pre SAR Period Statistics					
Mean Total Attempt	120	120	120	120	120
Mean Wave Height	.58	.76	.67	.68	.77
Mean Frac. Unsafe Boat	.29	.29	.29	.29	.29
Observations	1612	1612	1612	1612	1612

Note: The sample consists of daily observations from 7 May 2013 to 4 October 2017. SAR coefficients are estimated relative to a baseline in which Hermes operations (single boat type regime) were in place (164 days). Post SAR dummy is equal to one for all observations after October 18, 2013 (the beginning of the intense SAR when multiple types of boats were used). Crossing attempts sum crossings and deaths in transit. Significant wave height in the different locations (Zuwara and Monastir, Libya; Al Huwariyah and Djerba, Tunisia; and Annaba, Algeria) is measured in meters. The different coordinates are reported in Table 2. Frac. Unsafe Boat measures the share of attempted crossings using "inflatable" rubber boats, "unknown boats" and "other boats" boats aggregated at the week-year level. All regressions control for week-by-year fixed effects. Regressions are estimated using Poisson quasi-maximum likelihood models. Standard errors are heteroscedasticity- and autocorrelation-robust using Newey-West with a bandwidth equal to 28 days.

Table C.8—: Crossing Attempts on Bad Weather Dummies

	(1)	(2)	(3)
		Crossing Attempts	
		Definition of Unsafe Boat *Inflatable*	
1[Bad weather] * Post SAR * Fr. Boat	-3.050	-4.544	-9.473
	(0.915)	(3.598)	(4.317)
1[Bad weather]	-0.587	-0.424	-0.642
	(0.213)	(0.426)	(0.625)
1[Bad weather] * Fr. Boat	1.565	1.665	3.854
	(0.841)	(3.538)	(3.520)
1[Bad weather] * Post SAR	0.101	-0.230	-0.054
	(0.284)	(0.511)	(0.775)
Week-Year FE	✓	✓	✓
Percentile of Wave Height	>**50**	>**75**	>**90**
Pre SAR Period Statistics			
Mean Total Attempt	120	120	120
Mean Frac. Unsafe Boat	.07	.07	.07
Observations	1612	1612	1612

Note: The sample consists of daily observations from 7 May 2013 to 4 October 2017. SAR coefficients are estimated relative to a baseline in which Hermes operations (single boat type regime) were in place (164 days). Post SAR dummy is equal to one for all observations after October 18, 2013 (the beginning of the intense SAR when multiple boat types were used). Crossing attempts sum crossings and deaths in transit. The variable **1**[Bad weather] is equal to one if the significant wave height is higher than median one (column 1), is in the top quartile (column 2) or in the top decile (column 3). Frac. Unsafe Boat measures the share of attempted crossings using inflatable boats aggregated at the week-year level. All regressions control for week-by-year fixed effects. Regressions are estimated using Poisson quasi-maximum likelihood models. Standard errors are heteroscedasticity- and autocorrelation-robust using Newey-West with a bandwidth equal to 28 days.

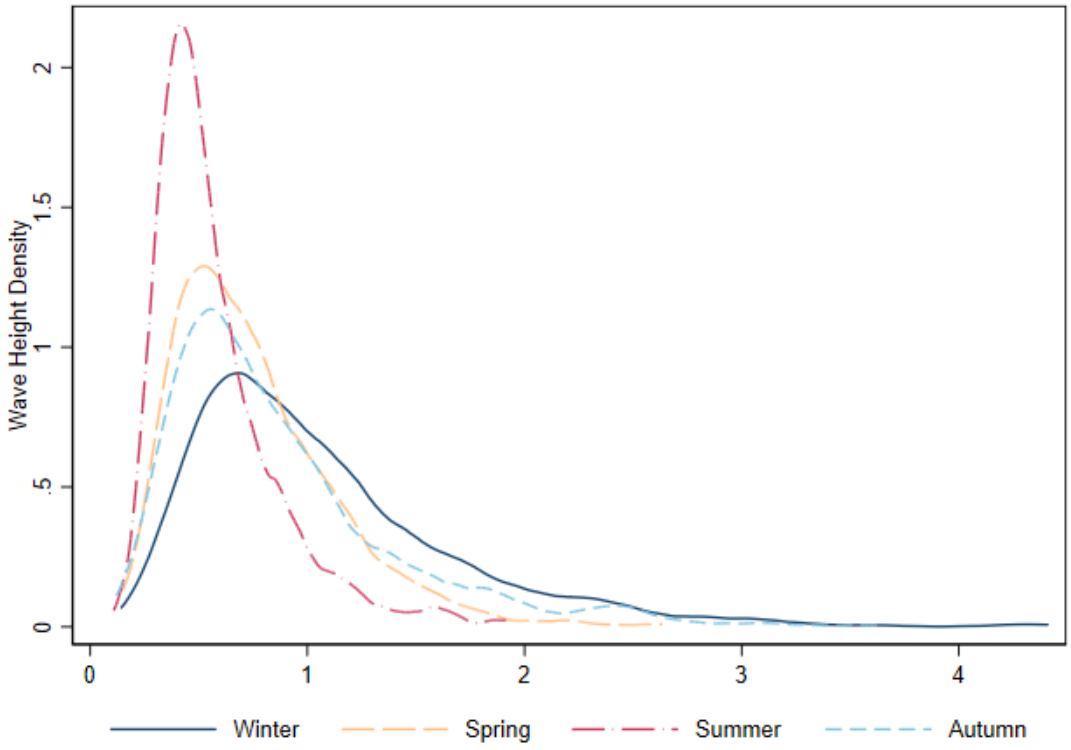
Table C.9—: Fraction of Migrants by Boat Types: Robustness

Panel A: Fraction of Attempted Crossings	(1) Inflatable	(2) Inflatable + Unknown	(3) Inflatable + Unknown + Other	(4) Fishing	(5) Motor
			Fractional Probit model (marginal effects)		
Mare Nostrum	0.078	-0.046	0.057	0.041	-0.090
	(0.064)	(0.043)	(0.049)	(0.039)	(0.031)
Triton I	0.302	0.068	0.203	0.058	-0.245
	(0.096)	(0.066)	(0.063)	(0.059)	(0.057)
Triton II	0.544	0.419	0.426	-0.162	-0.314
	(0.045)	(0.030)	(0.029)	(0.029)	(0.028)
Pre MN Mean Outcome	.11	.38	.42	.22	.36
Observations	768	768	768	768	768

Panel B: Count of Attempted Crossings	(1) Inflatable	(2) Inflatable + Unknown	(3) Inflatable + Unknown + Other	(4) Fishing	(5) Motor
			PPML		
Mare Nostrum	0.465	0.104	0.736	0.961	-0.733
	(0.512)	(0.374)	(0.341)	(0.267)	(0.320)
Triton I	1.286	0.588	1.167	1.970	-2.179
	(0.533)	(0.395)	(0.358)	(0.547)	(0.620)
Triton II	2.198	1.748	1.681	-0.341	-2.624
	(0.415)	(0.270)	(0.280)	(0.301)	(0.594)
Pre MN Mean Outcome	14.1	36.94	41.44	28.37	50.53
Observations	1612	1612	1612	1383	1397

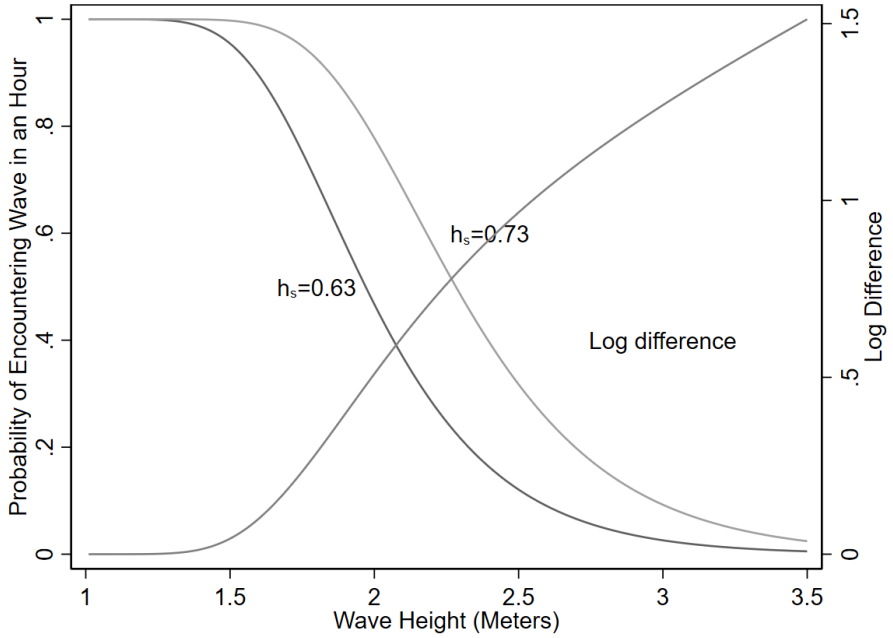
Note: The sample consists of daily observations from 7 May 2013 to 4 October 2017. SAR coefficients are estimated relative to a baseline in which Hermes operations were in place (164 days). More intense SAR (i.e. Mare Nostrum (MN), Triton I and II) dummies are equal to one over the periods defined in Table 1. In Panel A we estimate a fractional Probit model of the share of attempted crossings using different types of boats for each column. The 768 observations correspond to days with at least one crossing. In Panel B the depend variables are the number of attempted crossings using specific types of boats. The sample consists of 1,612 observations (1,383 and 1,397 for fishing and motor boats due to the fixed effects). All regressions control seasonality by adding 52 weeks of the year fixed effects. Cluster standard errors at the weekly level.

Figure C.5. : Density of Wave Height in Tripoli by Season



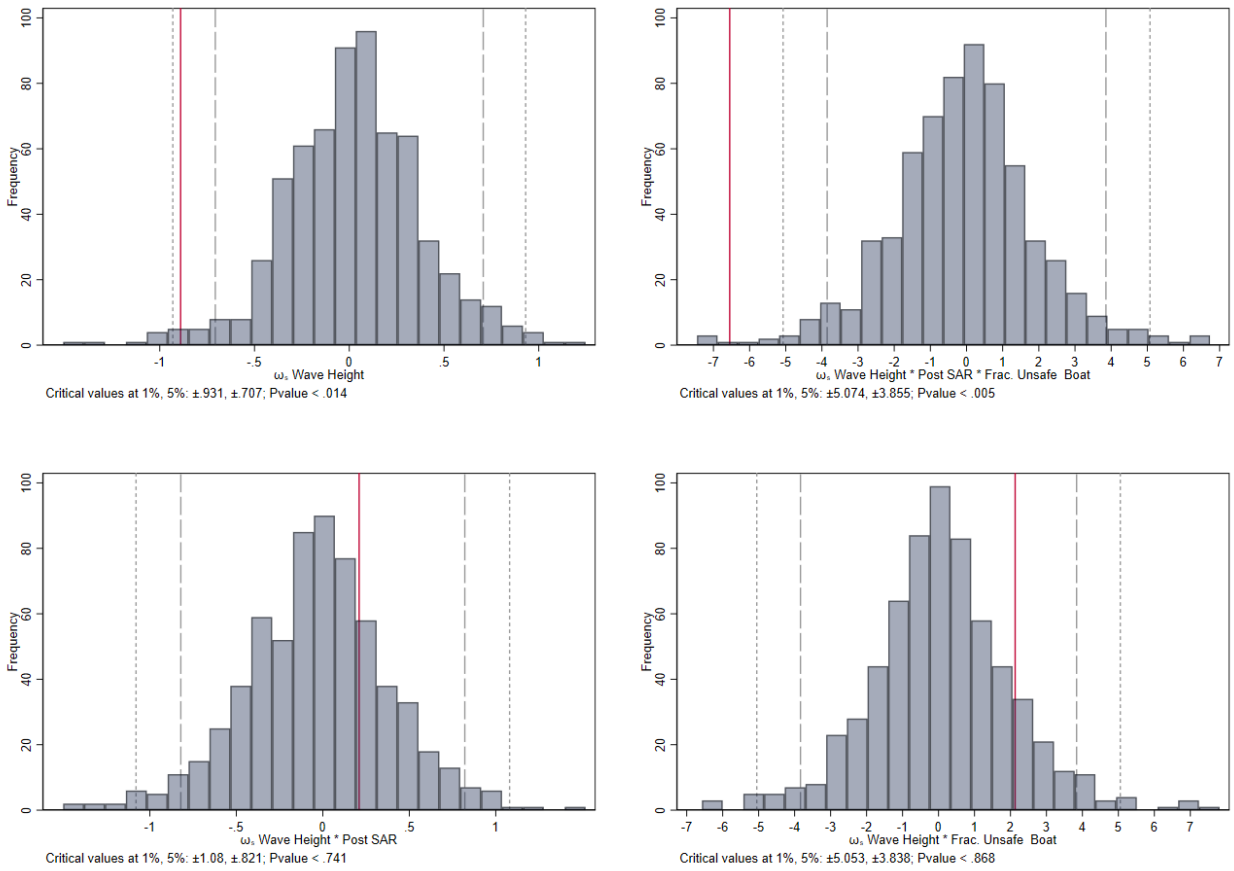
Note: We gather the data on significant wave height from the European Centre for Medium-Range Weather Forecasts (ECMWF). The density functions show the wave conditions by seasons in Tripoli.

Figure C.6. : Probability of Encountering Large Waves



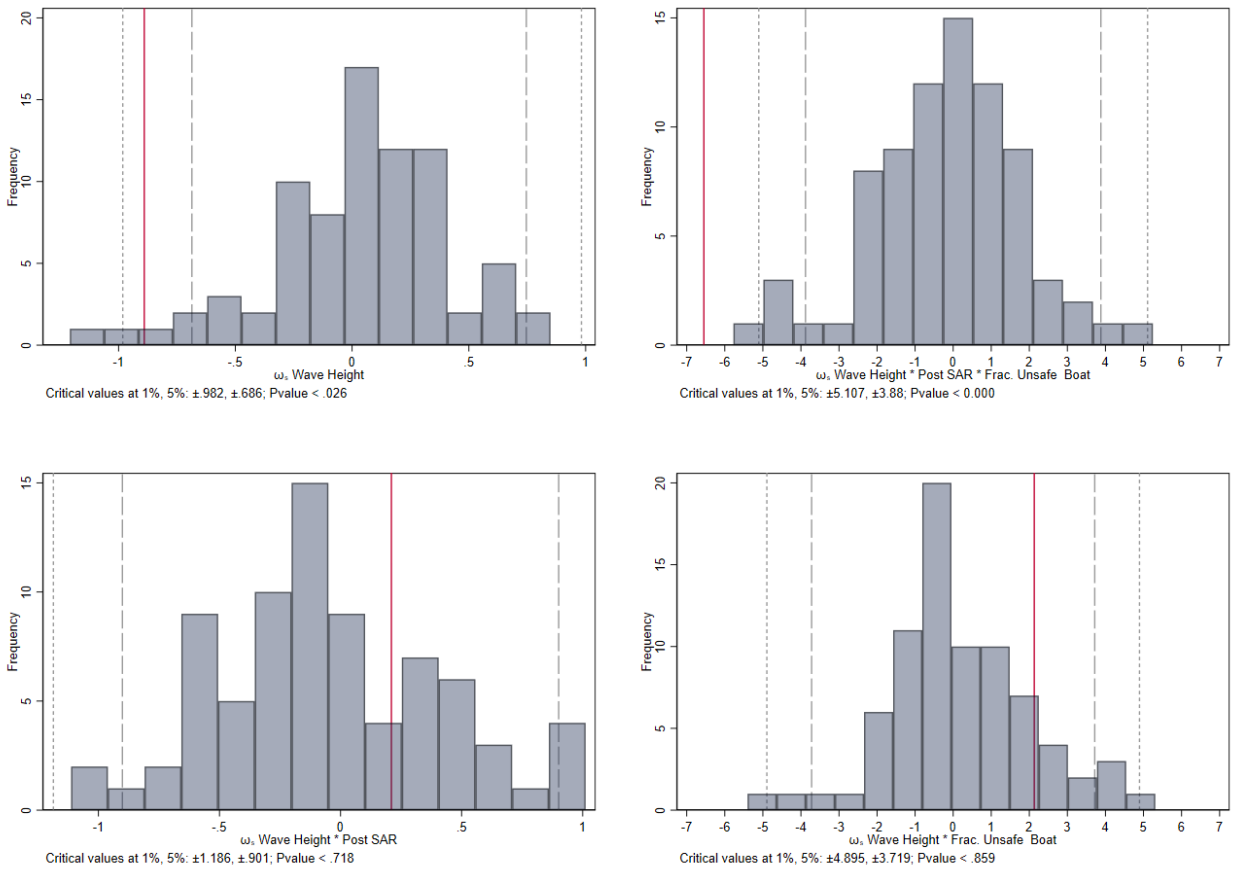
Note: The figure shows the probability of encountering waves up to "Wave Height" when the significant wave height is either 0.63 or 0.73 meters, as well as the corresponding relative difference.

Figure C.7. : Randomization Inference Using Former Wave Conditions



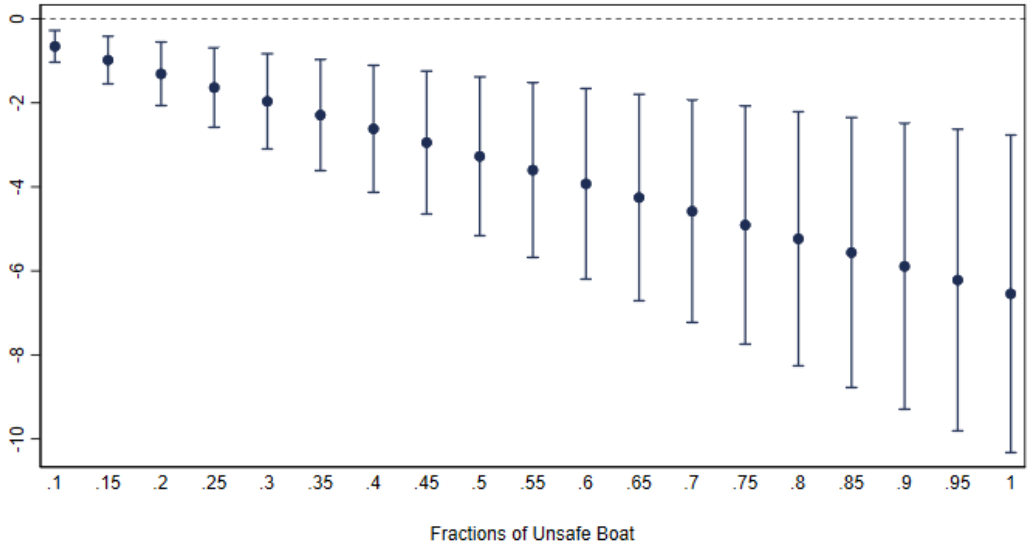
Note: The sample consists of daily observations from 7 May 2013 to 4 October 2017. SAR coefficients are estimated relative to a baseline in which Hermes operations (single boat type regime) were in place (164 days). Post SAR dummy is equal to one for all observations after October 18, 2013 (the beginning of the intense SAR when multiple types of boats were used). Crossing attempts sum crossings and deaths in transit. Significant wave height in Tripoli (Libya) is measured in meters. We estimate Equation 3 644 times, using wave height at time $t - k$ instead of time t, with k ranging from 28 to 672 days. Frac. Unsafe Boat measures the share of attempted crossings using unsafe boats aggregated at the week-year level, i.e. the share of crossing attempts using "inflatable" rubber boats over the total. All regressions control for week-by-year fixed effects. Left-top panel shows the placebo for the coefficients of the wave height, right-top panel the triple interaction terms between Frac. Unsafe Boat, post Mare Nostrum period and the wave height in Tripoli. Left-bottom panel shows the placebo for the coefficients of the interaction between wave height in Tripoli and Post SAR, right-bottom panel the double interaction terms between Frac. Unsafe Boat and the wave height in Tripoli. Regressions are estimated using Poisson quasi-maximum likelihood models. The solid red line indicates the estimated coefficients, while the dotted and dashed line indicate the 1% and 5% critical values (computed based on the estimated standard deviation).

Figure C.8. : Randomization Inference Using Future Waves



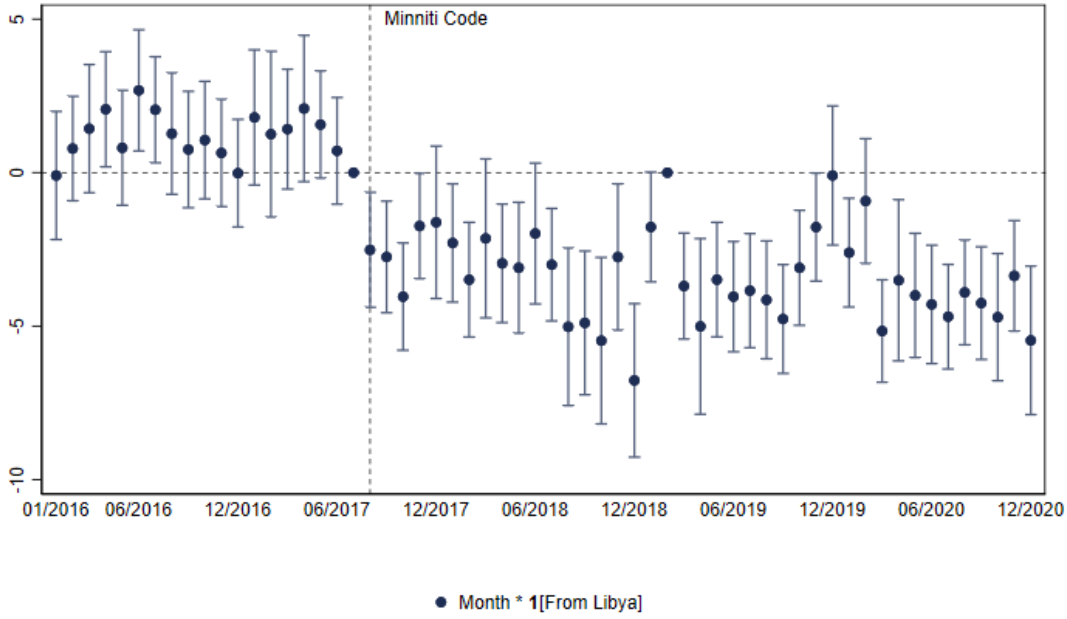
Note: The sample consists of daily observations from 7 May 2013 to 4 October 2017. SAR coefficients are estimated relative to a baseline in which Hermes operations (single boat type regime) were in place (164 days). Post SAR dummy is equal to one for all observations after October 18, 2013 (the beginning of the intense SAR when multiple types of boats were used). Crossing attempts sum crossings and deaths in transit. Significant wave height in Tripoli (Libya) is measured in meters. We estimate Equation 3 80 times, using wave height at time $t+k$ instead of time t, with k ranging from 7 to 87 days. Frac. Unsafe Boat measures the share of attempted crossings using unsafe boats aggregated at the week-year level, i.e. the share of crossing attempts using "inflatable" rubber boats over the total. All regressions control for week-by-year fixed effects. Left-top panel shows the placebo for the coefficients of the wave height, right-top panel the triple interaction terms between Frac. Unsafe Boat, post Mare Nostrum period and the wave height in Tripoli. Left-bottom panel shows the placebo for the coefficients of the interaction between wave height in Tripoli and Post SAR, right-bottom panel the double interaction terms between Frac. Unsafe Boat and the wave height in Tripoli. Regressions are estimated using Poisson quasi-maximum likelihood models. The solid red line indicates the estimated coefficients, while the dotted and dashed line indicate the 1% and 5% critical values (computed based on the estimated standard deviation).

Figure C.9. : Crossing Attempts to Crossing Conditions along Fraction of Unsafe Boats



Note: The sample consists of daily observations from 7 May 2013 to 4 October 2017. SAR coefficients are estimated relative to a baseline in which Hermes operations (single boat type regime) were in place (164 days). Post SAR dummy is equal to one for all observations after October 18, 2013 (the beginning of the intense SAR when multiple types of boats were used). Crossing attempts sum crossings and deaths in transit. Significant wave height in Tripoli (Libya) is measured in meters. Frac. Unsafe Boat measures the share of attempted crossings using unsafe boats aggregated at the week-year level. We use the unsafe boats defined as the share of crossing attempts using "inflatable" rubber boats over the total. We provide the estimate of semi-elasticity along different fractions of unsafe boat. All regressions control for week-by-year fixed effects. Regressions are estimated using Poisson quasi-maximum likelihood models. Standard errors are heteroscedasticity- and autocorrelation-robust using Newey-West with a bandwidth equal to 28 days (5% confidence interval).

Figure C.10. : Event Study around the Minniti Code



Note: The sample consists of daily observations from 1 January 2016 to 31 December 2020. SAR dummy is equal to one for all observations before August 7, 2017, when multiple boat types were used more frequently. This corresponds to pre-*Minniti* periods, i.e. before the Code of Conduct was enacted restricting *de-facto* the use of unsafe boats. The Libyan route is considered as treated unit. Time indicate the month of the year. Crossing attempts sum crossings and deaths. All regressions control for week-by-year fixed effects. In February 2019 no crossing attempts occurred so no coefficient is estimated (it is absorbed by week-by-year fixed effects). Regressions estimated using Poisson quasi-maximum likelihood models. Figure shows the dynamic effect of the main result in Table 4, i.e. the interaction between $Wave\,Height * From\,Libya * Frac.\,Inflatable\,Boat * SAR$. Each coefficient represents the interaction between the dummy-month of the year and the treatment, i.e. if the crossings attempts come from Libya. Baseline period is July, 2017. Standard errors are cluster at the week of the year level. (5% confidence interval).

Appendix D: NGO Operations

In addition to official operations by the EU government, several humanitarian operations were conducted by NGOs during our sample period; however these were much smaller in scope and intensity than official operations. The most active NGO, Malta-based Migrant Offshore Aid Station (MOAS), deployed fishing vessels and two drones (MOAS, 2014, 2015, 2016, 2017). MOAS offered an example that was later been imitated by other NGOs. In 2015, the Brussels and Barcelona branches of Médecins Sans Frontiéres (MSF) developed their own SAR capabilities using their own vessels; German NGO Sea-Watch also purchased a vessel to search for migrant boats in distress in 2015. In February 2016, SOS Mediterranee chartered a 77 meter ship to conduct operations in partnership with the Amsterdam branch of MSF (see Table D.1).

Table D.1—: NGO Vessels and Operational Period

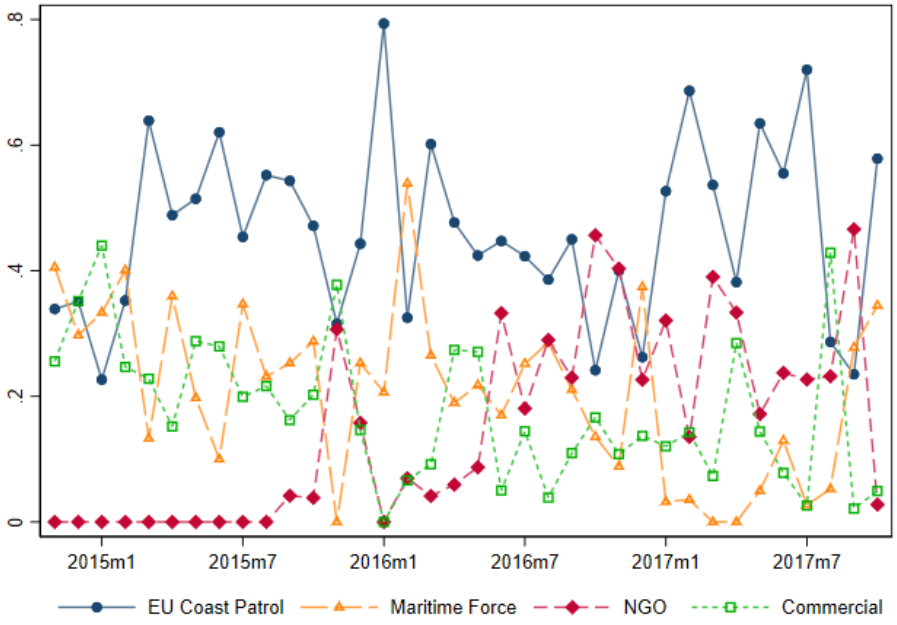
NGO	Country	Flag	Vessel	Operational Period
Jugend Rettet	Germany	The Netherlands	Iuventa	Jul 2016 - Nov 2016
LifeBoat	Germany	Germany	Minden	Jun 2016 - Nov 2016
Médecins Sans Frontières (MSF)	France	Italy	Vos Prudence	Mar 2017 - Oct 2017
Médecins Sans Frontières (MSF)	France	Panama	Dignity I	May 2015 - Dec 2016
Médecins Sans Frontières (MSF)	France	Luxembourg	Bourbon-Argos	May 2015 - Nov 2016
ProActiva Open Arms	Spagna	Panama	Golfo Azzurro	Dec 2016 - Sep 2017
ProActiva Open Arms	Spagna	The United Kingdom	Astral	Jun 2016 - Nov 2016
Save the Children	International Organization	Italy	Vos Hestia	Sep 2016 - Nov 2016
Sea-Watch	Germany	Germany	Sea-Watch	Jun 2015 - Nov 2016
Sea-Watch	Germany	The Netherlands	Sea-Watch 2	Mar 2016 - Nov 2016
Sea-Eye	Germany	The Netherlands	Sea-Eye	Feb 2016 - Nov 2016
SOS Méditerranée	France-Italy-Germany	Gibraltar	Aquarius	Feb 2016 - Dec 2016

Source: The list of NGOs operating in the Mediterranean Sea is available in the Italian Navy report (2017). The table distinguishes between the country and flag of the boat, the vessel type and the operational period.

All of these organizations usually initiate rescues between 10 and 30 nautical miles off the coast of Libya upon authorization of the Italian Maritime Rescue Coordination Centre (MRCC). NGOs follow one of two different operating models. MOAS, MSF, and SOS-Mediterranee conduct extensive SAR operations that involve the rescuing of migrants with larger vessels that can transport them to Italian ports. Smaller NGOs such as Sea-Watch and Pro-Activa focus on rescue and the distribution of life preservers and emergency medical care while waiting for larger ships to transport migrants to Italian port.

In Figure D.1, we see that NGO activity only constituted a substantial portion of all SAR activity starting in June 2016 during *Triton II*. Hence our estimates of responsiveness to crossing conditions during early SAR operational periods are likely to be unaffected by NGO activity.

Figure D.1. : Rescue Activity by Organization 2014-2017



Note: Data provided by the European Border and Coast Guard Agency known as Frontex. The information is disclosed by Frontex for the period from January, 2015 to December, 2017. Each line represents the fraction of monthly crossings that are intercepted by any given organization (EU coast patrol, Maritime force, NGOs and Commercial boats). Their sum is always one.

*

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