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Italian small arms exports: between incentives and international sanctions

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Abstract

This paper empirically investigates the determinants of Italian Small Arms and Light Weapons (hereafter SALW) exports to 143 polities from 1990 to 2017. We focus in particular on three aspects: (1) the economic drivers of SALW exports by means of a standard gravity equation of trade; (2) the internal characteristics of the importer country, namely the degree of militarization and the attitude to violence exerted by government against citizens; (3) the impact of international constraints on SALW trade by highlighting in particular EU and UN embargoes. We estimate the empirical models for total exports but also distinguishing between the two sub-categories of military and sporting SALW. Findings highlight that (1) there is a complementarity between Italian exports and the importer's military expenditure; (2) there is a correlation between Italian exports of SALW and both a disregard for physical integrity and a potential for military influence over the government in the importing country; (3) international embargoes reduce substantially Italian SALW exports; (4) UN and EU embargoes seem to have a different impact; (5) There is no evidence of sanctions-busting. In broader terms, this study highlights that unlike the standard patterns observed for civilian goods, political and military factors matter substantially for the international trade of SALW.

Keywords Small Arms · Arms trade · Gravity model

JEL Classification F14 · F51 · H56

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1 Introduction

This paper empirically investigates the determinants of Italian Small Arms and Light Weapons (hereafter SALW) exports to 143 polities from 1990 to 2017. According to the definition provided by UN (1997, pp. 11–12) this category of weapons includes small and portable arms as well as explosives, landmines and ammunition. There are several serious issues related to their proliferation. SALW are used extensively in civil conflicts (Benson & Ramsay, 2016; Krause & Mutimer, 2005) and they have been linked with human rights violations and civil population repression (de Soysa et al., 2010). In addition, SALW are also associated with violent crime, homicide and suicide by firearms (Andrés & Hempstead, 2011; Cook & Ludwig, 2000; Duggan, 2001; Lang, 2013; Siegel et al., 2013).

In fact, Italy is a major actor in the international trade of SALW, being the second largest world exporter of total SALW after the US and the largest exporter of sporting SALW. We focus in particular on three aspects: (1) first, we investigate the economic drivers of SALW exports by means of a standard gravity equation of trade; (2) secondly, we look at internal characteristics of the importer country, namely the degree of militarization and the attitude to violence exerted by government against citizens; (3) third, we focus on the impact of international constraints on SALW trade by highlighting in particular EU and UN embargoes. We may consider the first two points as determinants of the demand for Italian SALW whereas the latter can be considered as proxy of constraints and obstacles. With regard to the first point, we employ an augmented gravity framework on a panel data, reporting exports from Italy to 143 polities from 1990 to 2017. In particular, we estimate the models for total exports but also distinguishing between the two sub-categories of military and sporting SALW. In all estimations we also control for bilateral trade costs and multilateral resistance terms (MRTs).

With regard to the second point, we investigate whether there is a complementarity with internal militarization and attitude to violence against people of importer countries. In this respect, in the light of the existing evidence on the correlation between SALW exports and human rights violations, we expect that militarization as well as governmental attitude to violence increase demand of Italian SALW. Findings also point out evidence of complementarity between Italian exports and the importer's military expenditure. In fact, Italian exports increase towards countries that increase military spending. More interestingly, there is a correlation between Italian exports of SALW and both a disregard for physical integrity and a potential for military influence over the government in the importing country.

With regard to the latter point, we investigate to which extent embargoes decrease Italian exports of SALW. Results indicate that international embargoes reduce substantially Italian SALW exports. More interestingly, UN and EU embargoes seem to have a different impact. In brief, UN sanctions have a greater impact on Italian exports than EU sanctions. Then, we investigate the existence of two different sanction-busting mechanisms. On the one hand, since SALW can be easily shipped through porous borders and thus diverted to sanctioned countries

from neighbor countries (Erickson, 2013), we initially test if there is an increase of exports to countries that border with sanctioned countries. Results do not point to the existence of trade diversion through neighboring countries. In the case of SALW a second instrument of avoidance could be related to a more favorable labeling, namely the label 'Sporting arms' (Small Arms Survey, 2004, 2009). This is likely because many embargoes do not explicitly include or exclude this category. An increase of sporting SALW exports to the target country could be interpreted evidence of sanction-busting. Also in this case, results do not suggest the existence of sanctions-busting by means of such labelling. The aforementioned results appear to be robust even after several checks we have run. In broader terms, this study highlights that demand and constraints of SALW do not follow the standard patterns of civilian goods. In fact, political and international factors matter substantially.

The paper is organized as follows. Section 2 describes the existing literature. Section 3 shows some stylized facts about international trade in SALW, focusing on the role played by Italy. This section describes the evolution and main recipients of Italian exports of these weapons during the period 1991–2017. Section 4 introduces the data and methodology used, while Sect. 5 sets out the main results. Section 6 presents several robustness checks. Conclusions summarize and highlight results in detail.

2 Literature

This paper is grounded on literature about international trade in Major Conventional Weapons (hereafter MCW) and Small Arms and Light Weapons (SALW). The literature points out that the arms trade cannot be fully explained by economic incentives but largely by political, military and other non-economic factors. In fact, on the demand side, security and policy issues appear to be the main determinants for arms imports. Also, on the supply side, arms are to be exported towards allies in order to strengthen security linkages.

Akerman and Seim (2014) and Martinez-Zarzoso and Johannsena (2019) both point out that political factors determine patterns of arms trade even if such evidence weakens after the Cold War. Another important factor determining the supply side of the arms trade is the exporter's dependence on raw materials. Bove et al. (2018) claim that oil dependence is an important determinant of the volume of trade in MCW because oil-dependent economies are more willing to export arms to oil-rich countries even in the absence of a direct bilateral oil-for-weapons exchange. In fact, oil-dependent exporters aim to preserve the political stability of the recipient and, in return, to stabilise the oil trade. Yang (2020) also points out that the presence of raw materials in the importing country is an important driver of Chinese exports of MCW during the period 2000–2014. Domestic politics also have an impact on arms trade. Imports of both MCW and SALW are associated with the outbreak of conflicts (Pamp et al., 2018) and their intensity (Mehrl & Thurner, 2020), as well as with violations of human rights (De Soysa et al., 2010). Analysing the export decisions of 4 major suppliers of MCW (France, Germany, the UK and the US)

over the period 1992–2004, Perkins and Neumayer (2010) show that these countries did not exclude autocratic countries or those abusing human rights from their arms trade. Studying US exports of MCW to developing countries over the period 1981–2001, Blanton (2005) finds that democratic conditions in the importer positively impact on both the likelihood of receiving the transfer of arms as well as on its volume. However, since public opinion may be sensitive to the negative effects of the arms trade, ethical arms trade policies may be rewarded by the electorate. Using data from the top 20 major exporters from 1975 to 2004, Comola (2012) finds that incumbents running for re-election negatively influence arms exports. Focusing on German exports of MCW over the period 1953–2013, Schultze et al., (2017) show that despite the existence of norms promoting ethical arms trade policies, Germany still exports to countries with extensive human rights violations or those embroiled in military conflicts and civil wars. However, the authors also find that Germany fully complied with multilateral arms embargoes. In fact, another relevant strand of literature related to this paper is that on economic sanctions. Since the end of the Cold War, embargoes have been frequently used by the international community as a response to civil conflicts and humanitarian crises and to prevent the flow of weapons to war-torn regions or autocratic regimes. In general, several studies focus on the likelihood of sanction-busting mechanisms (Early, 2015; Caruso, 2003). With respect to arms trade, previous empirical studies found evidence of effectiveness of arms embargoes (Baronchelli et al., 2022; Brzoska, 2008; Martinez-Zarzoso & Johannsen, 2019; Schulze et al., 2017). That is, international embargoes appear to decrease arms trade substantially.

3 The Italian arms industry and its exports

Italy is a major producer of small arms. According to the data drawn from the AIDA databank, in 2019 there were 85 active small arms producers in Italy.[1] Most firms are SMEs. Only 9% of these firms have more than 100 employees while 67% of them employ less than 25 people. However, the Italian arms industry is a leading player in the international trade of SALW. Table 1 illustrates the top ten exporting countries of SALW over three periods: 1991–2000, 2001–2010, 2011–2017. The highest exporter is the US, whose exports account for about half of world trade. Italy is the second highest exporter; however, its share of the total is considerably lower than the US, with Italian exports of less than 10%.

These figures are different when distinguishing between military and sporting SALW. Tables 2 and 3 report the top ten world exporters of military and sporting SALW, respectively. As far as military SALW exports are concerned, the US plays the dominant role. US exports account for about half of the total exports. The US share, nonetheless, has decreased since the 2000s. There have also been changes in the other relevant players in the trade. Over the period 1991–2010, France was the

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[1] On military industry in Italy see Caruso (2019), Caruso and Locatelli (2013) and Caruso and Addesa (2012).

Table 1 Top 10 exporters of SALW

	1991–2000			2001–2010			2011–2017	
	US$	%		US$	%		US$	%
US	35,120	56	US	29,970	42	US	30,570	45
Italy	3776	6	Italy	5447	8	Italy	4146	6
Germany	2601	4	France	4065	6	Germany	3151	5
France	2389	4	Germany	3405	5	Korea; South	2765	4
Russia	1593	3	Norway	3278	5	Norway	2306	3
Japan	1475	2	Canada	2267	3	Russia	2303	3
Switzerland	1348	2	Switzerland	2024	3	Brazil	2268	3
Brazil	1310	2	Brazil	1964	3	Canada	1680	2
UK	1152	2	Korea; South	1507	2	Israel	1626	2
Belgium	959	2	Israel	1320	2	Switzerland	1398	2

Source: own elaborations from NISAT (Norwegian Initiative on Small Arms Transfers); data are expressed in millions 2010 constant dollars; ratio are calculated on total world trade in SALW

second world exporter of military SALW, but the volume of its exports decreased significantly between 2011 and 2017. In this period, the Republic of Korea (ROK) has become the second world exporter. Italy is also a leading exporter of military SALW and its share in the trade is about 5%. However, when observing the figures on international trade in sporting SALW over the period 1991–2017, Italy is in fact the top exporter. The Italian export share of the total of sporting SALW is more than 20%, reaching a peak of 28% during the period 2001–2010. The US is also a major exporter but its exports account for about 10% of the total trade of sporting SALW, even though its share increased to 14% during the period 2011–2017.

Figure 1 shows the evolution of Italian exports of total SALW, military and sporting SALW over the period 1990–2017. During the 1990s Italian exports decreased, to rise again in the 2000s. The decline in Italian exports was steeper for military SALW. Furthermore, exports of military SALW increased constantly until 2010, decreasing from that point on.

Finally, Tables 4, 5 and 6 report the most important recipients of Italian SALW over the three periods: 1991–2000, 2001–2010, 2011–2017. The US is the main importer of Italian SALW. The share of US imports has constantly increased reaching 39% in the period 2011–2017. The US is Italy's principal partner for trade in both military and sporting SALW. However, the share of US imports on total Italian exports is larger for sporting SALW. Almost half of Italian trade in sporting weapons is directed towards the US market. The US is also the largest world importer of SALW.

Among the other significant destinations of Italian exports, there are also many European countries such as Germany, France, Spain, Greece and Norway. France, in particular, is a relevant destination for Italian exports of SALW, accounting for about 9% of Italian exports. It is noteworthy, however, that there are also a few non-European countries among Italy's trade partners. These countries are mainly recipients of Italian military SALW.

Table 2 Top 10 exporters of military SALW

	1991–2000			2001–2010			2011–2017	
	US$	%		US$	%		US$	%
US	34,504	61	US	29,073	47	US	33,274	49
France	2327	4	France	4002	7	ROK	3003	4
Italy	2279	4	Norway	3276	5	Italy	2820	4
Germany	2150	4	Italy	2804	5	Germany	2805	4
Russia	1445	3	Germany	2580	4	Norway	2734	4
Switzerland	1314	2	Canada	2086	3	Russia	2137	3
UK	948	2	Switzerland	1994	3	Israel	1810	3
Israel	893	2	ROK	1504	2	Switzerland	1709	2
Canada	817	1	Israel	1313	2	Canada	1698	2

Source: own elaborations from NISAT; data are expressed in millions 2010 constant dollars; ratio are calculated on total world trade in military SALW

Table 3 Top 10 exporters of sporting SALW

	1991–2000			2001–2010			2011–2017	
	US$	%		US$	%		US$	%
Italy	1497	25	Italy	2643	28	Italy	1820	22
Brazil	885	15	Brazil	1023	11	US	1121	14
Japan	667	11	US	900	10	Brazil	850	10
US	620	10	Germany	825	9	Turkey	741	9
Germany	451	7	Japan	555	6	Germany	685	8
Belgium	302	5	Belgium	491	5	Japan	360	4
Portugal	243	4	Turkey	422	5	Belgium	338	4
UK	204	3	Portugal	340	4	Finland	323	4
China	169	3	Russia	337	4	Canada	249	3
Russia	147	2	UK	291	3	Russia	226	3

Source: own elaborations from NISAT; data are expressed in millions 2010 constant dollars; ratios are calculated on total world trade in sporting SALW

4 Data and the empirical model

In what follows we analyse the drivers of Italian SALW exports. We employ the gravity model of international trade as the basis for our estimating equation. The gravity model, first introduced by Isard (1954) and Tinbergen (1962), has become a standard approach in the literature for estimating the factors influencing trade flows (Head & Mayer, 2014; Yotov et al., 2016). Following Berger et al. (2013) and Fuchs and Klann (2013), our estimating equation specifically analyzes exports from Italy to its partners. Formally,
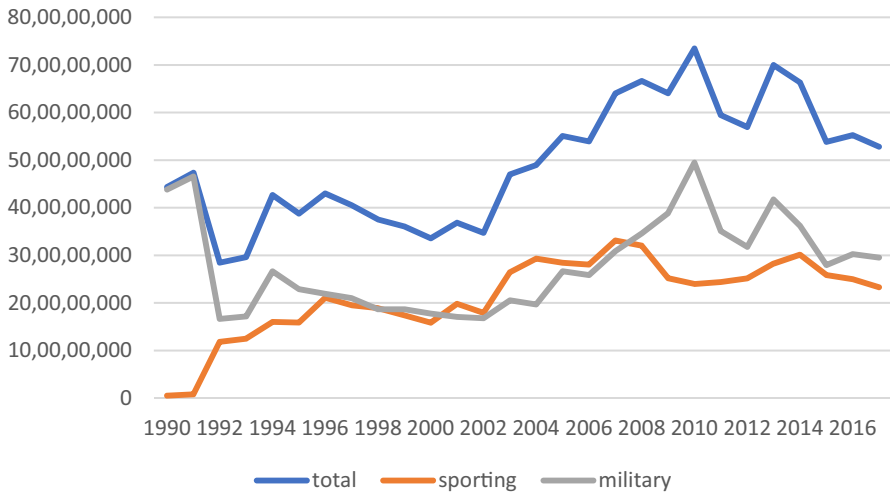
Fig. 1 Italian exports of SALW (1990–2017). Source: own elaborations from NISAT

Table 4 Top 10 partners of Italy

	1991–2000		2001–2010			2011–2017		
	US$	%		US$	%		US$	%
US	1104	29	US	1744	32	US	1606	39
France	345	9	UK	589	11	UK	323	8
Germany	294	8	France	440	8	France	312	8
UK	263	7	Spain	312	6	Germany	199	5
Spain	189	5	Germany	224	4	Spain	151	4
Turkey	144	4	Russia	166	3	Russia	137	3
Greece	130	3	Malaysia	150	3	Turkey	112	3
Portugal	124	3	Greece	137	3	Canada	86	2
Belgium	82	2	Turkey	109	2	Belgium	68	2
Japan	81	2	Belgium	82	2	Australia	61	1

Source: own elaborations on data from NISAT; data are expressed in millions 2010 constant dollars; ratio are calculated on total Italian exports in SALW

$$x_{jt}^{IT} = \frac{Y_t^{IT} Y_{jt}}{Y_t} \left[\frac{\tau_{jt}^{IT}}{P_t^{IT} P_{jt}} \right]^{1-\sigma} \tag{1}$$

where x_{jt}^{IT} indicates Italian exports to country j in year t; Y_t^{IT} is Italy's total GDP in year t; Y_{jt} is country *j*' s total GDP in year t; Y_{jt} is world GDP in year t; τ_{jt}^{IT} is bilateral trade costs between Italy and country j; P_t^{IT} indicates the multilateral resistance term

Table 5 Top 10 partners of Italy (military SALW)

	1991–2000			2001–2010			2011–2017	
	US$	%		US$	%		US$	%
US	440	19	US	492	18	US	735	32
UK	204	9	UK	363	13	UK	186	8
France	196	9	France	211	8	France	172	7
Germany	190	8	Spain	166	6	Germany	139	6
Turkey	136	6	Malaysia	148	5	Spain	116	5
Spain	99	4	Germany	135	5	Turkey	90	4
Belgium	72	3	Turkey	100	4	Belgium	62	3
Egypt	66	3	Belgium	69	2	UAE	52	2
Portugal	58	3	Greece	68	2	Algeria	39	2
Greece	58	3	Chile	50	2	Greece	31	1

Source: own elaborations on data from NISAT; data are expressed in millions 2010 constant dollars; ratio are calculated on total Italian exports in military SALW

Table 6 Top 10 partners of Italy (sporting SALW)

	1991–2000			2001–2010			2011–2017	
	US$	%		US$	%		US$	%
US	664	44	US	1251	47	US	871	48
France	149	10	France	229	9	France	140	8
Germany	104	7	UK	226	9	UK	137	8
Spain	91	6	Spain	146	6	Russia	108	6
Greece	72	5	Russia	124	5	Canada	64	4
Portugal	66	4	Germany	89	3	Germany	60	3
UK	59	4	Greece	69	3	Australia	39	2
Sweden	32	2	Canada	37	1	Spain	35	2
Japan	31	2	Norway	35	1	Sweden	22	1
Australia	22	1	Australia	28	1	Turkey	22	1

Source: own elaborations on data from NISAT; data are expressed in millions 2010 constant dollars; ratio are calculated on total Italian exports in sporting SALW

for Italy and P_{jt} denotes multilateral resistance terms across all the destination markets.

We augment Eq. (1) by including variables related to SALW trade and therefore, taking the natural logs, the baseline equation has the following form:

$$lnSALW_{jt}^{IT} = \alpha_j + \alpha_t + \beta X_{jt} + \delta lnY_{jt} + \theta \tau_{jt}^{IT} - \theta \left[lnP_{jt} + lnP_t^{IT} \right] + \varepsilon_{jt} \qquad (2)$$

The dependent variable $lnSALW_{ijt}$ is the natural log of the exports of SALW from Italy to country j at time t. In particular, our dependent variable is the value of

Table 7 Descriptive statistics

	Source	N	Mean	SD	Min	Max
SALW exports	NISAT	3207	12.534	2.752	− 0.061	19.452
Military expenditure (ln)	World Bank	2707	21.046	2.106	14.722	27.274
Military dimension index	V-dem	4783	0.052	0.222	0	1
Physical violence index	V-dem	5253	0.33	0.29	0.011	0.982
UN Embargo	SIPRI	6804	0.04	0.196	0	1
% of border in [1/3, 2/3] under UN embargo	CIA factbook	6440	0.041	0.198	0	1
% of border > 2/3 under UN embargo	CIA factbook	6440	0.006	0.076	0	1
EU Embargo	SIPRI	6804	0.057	0.232	0	1
% of border in [1/3, 2/3] under EU embargo	CIA factbook	6440	0.077	0.266	0	1
% of border > 2/3 under EU embargo	CIA factbook	6440	0.03	0.171	0	1
Embargo	SIPRI	6804	0.069	0.254	0	1
% of border in [1/3, 2/3] under embargo	CIA factbook	6440	0.093	0.29	0	1
% of border > 2/3 under embargo	CIA factbook	6440	0.035	0.183	0	1
Civil conflict	CSP	6804	0.052	0.222	0	1
% of border in [1/3, 2/3] at war	CIA factbook	6440	0.058	0.233	0	1
% of border > 2/3 under at war	CIA factbook	6440	0.016	0.125	0	1
GDP per capita (ln)	World Bank		8.422	1.511	5.102	11.626
Common currency	CEPII	6216	0.062	0.242	0	1
Free trade agreement	CEPII	5772	0.261	0.439	0	1

Italian exports of SALW (total, sporting and military SALW alternatively) to 143 destinations over the period 1990 to 2017. The data are drawn from the NISAT (Norwegian Initiative on Small Arms Transfers) which record bilateral transfers of SALW among 250 countries and territories based on different sources. Exports are deflated at constant 2010 US$ by using the CPI deflator.[2] lnY_{jt} is the natural log of country j's GDP. Italy's GDP as well as world GDP are absorbed by the time fixed effects. τ_{jt}^{IT} is a vector of time-variant gravity variables which approximates trade costs. It includes two dummies, indicating if i and j have a common currency or have regional trade agreements (RTAs). α_j are destination fixed effects controlling for time-invariant bilateral factors. α_t represents year-fixed effects and ε_{jt} the error term. Data on the importer's GDP per capita (constant 2010 US$) are drawn from World Bank while bilateral variables are gathered from the CEPII database (Head et al., 2010).

The vector X_{jt} includes a set of time-varying importer's characteristics. Descriptive statistics of independent variables are in Table 7. We first include the level of military expenditures to capture the complementary relationship with arms trade. Data on military expenditures are collected from World Bank and then deflated at constant 2010 US$. To proxy countries institutional characteristics, we draw two

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[2] The formula used to deflate SALW transfers is SALW2010 = (SALWt*CPI2010)/CPIt. CPI is drawn from http://www.multpl.com/cpi/table.

variables from the V-dem indicators (Coppedge et al., 2021). The *military dimension index* measures the degree to which the appointment and dismissal of the chief executive is influenced by military force or the threat of military intervention. It is measured on a scale from 0 to 1, with higher values indicating greater military involvement. Reasonably, since existing literature suggests that regime type and the extent of military influence in policymaking significantly impact the decision to acquire weapons, therefore, we expect a positive coefficient for this variable.

The *physical violence index* captures the attitude to violence and physical abuse by government agents. It is bounded between 0 and 1, but with respect to the original index, we have rescaled so to have high respect for physical integrity denoted by 0 and the lowest respect for physical integrity denoted by 1. As noted above, SALW are often utilized by police and paramilitary forces to instill fear and suppress the population (De Soysa, 2010). Thus, we expect that as violence committed by government agents in country j increases, Italian exports to that country will also increase.

To capture the presence of arms embargoes, we create a dummy variable indicating whether the destination country (country *j*) is subject to an arms embargo at time *t*. Additionally, we create two other dummy variables to represent embargoes imposed solely by the UN or the EU. Information on multilateral arms embargoes is sourced from SIPRI, which provides a comprehensive list of arms embargoes enforced by the UN, EU, and other country groups.

To consider the emergence of sanctions-busting through trade diversion, following Bove et al. (2021) we include two dummy variables that capture the degree of border sharing between the destination country and countries under arms embargoes, (distinguishing between total, EU, and UN embargoes). To construct these variables, we first computed the proportion of the destination country's border shared with these target countries. This is calculated as the total length of the destination country's border shared with target countries divided by the total length of the destination country's border. For instance, Azerbaijan with a total border length of 2468 km and a 689 km shared border with Iran (under embargo since 2006) would receive a value of 0.2. We, then, classify the destination countries into three groups based on the proportion of their borders shared with countries under arms embargoes: less than one-third, between one-third and two-thirds, and more than two-thirds (total, EU, and UN). Information on country neighbors and the length of their borders is gathered from the CIA Factbook. A positive association between Italian exports to country j and a larger proportion of country j's border shared with neighboring countries under embargo at time t suggests the possibility of illegal trafficking from the importer to the embargoed country. The presence of larger shared borders between two states may provide increased opportunities for smuggling.

As previously mentioned, civil conflicts and small-scale wars are often characterized by the use of small arms and light weapons, making them a significant factor in explaining the demand for SALW. Then we created a dummy variable indicating whether the destination country experienced civil violence and/or a civil war in a given year. Information on civil conflict is from the Center for Systemic Peace (CSP), Major Episodes of Political Violence, 1946–2018 (Marshall, 2020). To further account for SALW demand, we also consider the extent to which country j

shares its borders with countries engaged in a civil conflict. Then, we also created three additional dummy variables to capture the extent of border sharing between the destination country and neighboring countries experiencing civil unrest: less than one-third, between one-third and two-thirds, and more than two-thirds. These dummy variables classify the border sharing into three groups: less than one-third, between one-third and two-thirds, and more than two-thirds.

To control for multilateral resistance terms (MRTs), we follow Baier and Bergstrand (2009), who derive theory-consistent MRTs from a first-order Taylor series expansion of the Anderson and Van Wincoop (2003) gravity equation. This approach is frequently used in literature as in Agostino and Trivieri (2014), Atalay et al. (2019) and it is also used for one exporter applications of the gravity model as in Berger et al. (2013). Following this latter study, MRTs are calculated as follows:

$$MRTs_{ijt} = \sum_{k=1}^{N_k} \left(\theta_{kt} x_{ik} \right) + \sum_{m=1}^{N_m} \left(\theta_{mt} x_{jm} \right) \sum_{k=1}^{N_k} \sum_{m=1}^{N_m} \left(\theta_{kt} \theta_{mt} x_{km} \right) \tag{3}$$

where the indices k and m are the commercial partners of exporter i and importer j, respectively; x_{ij} represents the observed controls for bilateral trade costs[3]; θ_{kt} and θ_{mt} indicate the share of exporter and importer GDP out of worldwide GDP (with subscript w standing for world) i.e., respectively, $\theta_{kt} = \frac{GDP_k}{GDP_w}$ and $\theta_{mt} = \frac{GDP_m}{GDP_w}$.[4]

5 Results

5.1 Baseline results

Table 8 presents the baseline results. The main results we may claim are: (1) there is positive association between the Italian SALW exports and military expenditures of importer country; (2) There is a positive association between the Italian SALW exports and the attitude to violence and lack of respect of physical integrity; (3) there is a positive association between the Italian SALW exports and the potential influence of military forces on the government. In addition, another relevant result is the negative association between the imposition of a multilateral arms embargo and Italian exports to the target country (Tables 9, 10, 11, 12).

In terms of magnitude, the findings point out that an increase of 1% in the level of the importing country's military expenditure is associated with an increase of 0.6% in Italian exports to that country. Moreover, the results suggest that as violations of citizens' physical integrity in the importing country increase by 0.01, Italian SALW exports demonstrate a moderate increase of approximately 2%. Similarly, we

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[3] Namely, MR indexes are calculated using the weighted distance between capitals, contiguity, common language, colonial heritage, common religion, common currency, regional trade agreement, and differences in democracy between exporter and importer.

[4] GDP weights are used in several papers (Agarwal and Wang, 2018; Andersson, 2016; Crivelli and Gröschl, 2016; Ramasamy and Yeung, 2019).

Table 8 Determinants of Italian SALW exports: baseline results

| | Total SALW exports | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Military expenditures	0.608***	0.600***	0.655***	0.646***	0.669***	0.661***
	(0.172)	(0.171)	(0.169)	(0.169)	(0.166)	(0.165)
Military dimension index	0.943	0.958	1.136*	1.158*	1.104*	1.123*
	(0.608)	(0.630)	(0.608)	(0.627)	(0.603)	(0.623)
Physical violence index	1.444**	1.462**	1.141*	1.158*	1.238**	1.257**
	(0.599)	(0.595)	(0.663)	(0.664)	(0.611)	(0.610)
UN Embargo	− 1.570***	− 1.593***				
	(0.357)	(0.361)				
% of border in [1/3, 2/3] under UN embargo	− 0.475	− 0.492				
	(0.454)	(0.453)				
% of border > 2/3 under UN embargo	− 0.966**	− 0.842*				
	(0.398)	(0.457)				
EU Embargo			− 0.959**	− 0.962**		
			(0.421)	(0.415)		
% of border in [1/3, 2/3] under EU embargo			0.169	0.182		
			(0.245)	(0.245)		
% of border > 2/3 under EU embargo			− 0.342	− 0.284		
			(0.468)	(0.482)		
Embargo					− 1.079***	− 1.089***
					(0.377)	(0.376)
% of border in [1/3, 2/3] under embargo					0.322	0.345
					(0.241)	(0.242)
% of border > 2/3 under embargo					− 0.266	− 0.215
					(0.390)	(0.398)

Table 8 (continued)

	Total SALW exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Civil conflict	0.210	0.201	0.247	0.240	0.270	0.265
	(0.257)	(0.258)	(0.255)	(0.255)	(0.254)	(0.254)
% of border in [1/3, 2/3] at war	− 0.323	− 0.334	− 0.354	− 0.360	− 0.358	− 0.365
	(0.298)	(0.300)	(0.288)	(0.289)	(0.292)	(0.293)
% of border > 2/3 under at war	− 0.182	− 0.175	− 0.115	− 0.108	− 0.115	− 0.106
	(0.184)	(0.194)	(0.165)	(0.173)	(0.163)	(0.171)
GDP per capita	0.346	0.310	0.371	0.339	0.363	0.326
	(0.429)	(0.426)	(0.434)	(0.430)	(0.433)	(0.429)
Importer FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
MRT	N	Y	N	Y	N	Y
Gravity controls	Y	Y	Y	Y	Y	Y
Observations	2441	2441	2441	2441	2441	2441
R2 within	0.109	0.112	0.103	0.106	0.108	0.111
R2 overall	0.522	0.087	0.520	0.086	0.516	0.087
R2 betweenness	0.638	0.161	0.630	0.158	0.623	0.144

Robust standard errors in parentheses are clustered at the importer level. Constant not reported

Gravity controls are time-variant and they include common currency and RTAs (see Table 7) ***p < 0.01, **p < 0.05, *p < 0.1

Table 9 Determinants of Italian SALW exports: sporting SALW

	Sporting SALW exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Military expenditures	0.379**	0.396**	0.417***	0.458***	0.416***	0.459***
	(0.151)	(0.154)	(0.136)	(0.137)	(0.137)	(0.138)
Military dimension index	− 1.449*	− 1.469*	− 1.342	− 1.414	− 1.351	− 1.427*
	(0.833)	(0.817)	(0.859)	(0.859)	(0.858)	(0.858)
Physical violence index	− 0.415	− 0.355	− 0.527	− 0.467	− 0.525	− 0.460
	(0.654)	(0.649)	(0.635)	(0.630)	(0.632)	(0.627)
UN Embargo	− 0.673***	− 0.718***				
	(0.257)	(0.262)				
% of border in [1/3, 2/3] under UN embargo	− 0.249	− 0.203				
	(0.330)	(0.308)				
% of border > 2/3 under UN embargo	− 0.924***	− 0.869***				
	(0.255)	(0.326)				
EU Embargo			− 0.628**	− 0.654***		
			(0.247)	(0.247)		
% of border in [1/3, 2/3] under EU embargo			0.155	0.136		
			(0.176)	(0.179)		
% of border > 2/3 under EU embargo			− 0.579*	− 0.574*		
			(0.323)	(0.328)		
Embargo					− 0.606**	− 0.632***
					(0.243)	(0.241)
% of border in [1/3, 2/3] under embargo					0.142	0.126
					(0.178)	(0.182)
% of border > 2/3 under embargo					− 0.497*	− 0.494
					(0.297)	(0.301)

Table 9 (continued)

	Sporting SALW exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Civil conflict	0.432*	0.450*	0.516**	0.509**	0.505**	0.499*
	(0.251)	(0.250)	(0.253)	(0.255)	(0.254)	(0.257)
% of border in [1/3, 2/3] at war	− 0.322	− 0.251	− 0.257	− 0.266	− 0.265	− 0.273
	(0.311)	(0.314)	(0.305)	(0.305)	(0.304)	(0.304)
% of border > 2/3 under at war	− 0.012	0.065	0.116	0.117	0.109	0.110
	(0.221)	(0.206)	(0.204)	(0.194)	(0.202)	(0.193)
GDP per capita	0.829	0.772	0.768	0.724	0.801	0.755
	(0.520)	(0.509)	(0.495)	(0.487)	(0.503)	(0.495)
Importer FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
MRT	N	Y	N	Y	N	Y
Gravity controls	Y	Y	Y	Y	Y	Y
Observations	1,967	1,996	1,996	1,996	1,996	1,996
R2 within	0.269	0.336	0.336	0.340	0.335	0.339
R2 overall	0.538	0.141	0.543	0.150	0.542	0.149
R2 betweenness	0.630	0.269	0.629	0.284	0.630	0.282

Robust standard errors in parentheses are clustered at the importer level. Constant not reported

Gravity controls are time-variant and they include common currency and RTAs (see Table 7). ***p < 0.01, **p < 0.05, *p < 0.1

Table 10 Determinants of Italian SALW exports: military SALW

	Military SALW exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Military expenditures	0.702***	0.629***	0.668***	0.659***	0.684***	0.675***
	(0.208)	(0.193)	(0.192)	(0.191)	(0.188)	(0.186)
Military dimension index	1.229*	1.208*	1.387**	1.414**	1.355**	1.379**
	(0.651)	(0.671)	(0.637)	(0.649)	(0.626)	(0.640)
Physical violence index	2.297***	2.025***	1.675**	1.694**	1.772***	1.793***
	(0.552)	(0.557)	(0.663)	(0.655)	(0.592)	(0.581)
UN Embargo	− 2.015***	− 1.895***				
	(0.515)	(0.537)				
% of border in [1/3, 2/3] under UN embargo	− 0.605	− 0.635				
	(0.589)	(0.632)				
% of border > 2/3 under UN embargo	− 0.764*	− 0.766				
	(0.413)	(0.567)				
EU Embargo			− 0.815*	− 0.828*		
			(0.453)	(0.447)		
% of border in [1/3, 2/3] under EU embargo			0.105	0.104		
			(0.337)	(0.340)		
% of border > 2/3 under EU embargo			− 0.483	− 0.439		
			(0.491)	(0.518)		
Embargo					− 1.016**	− 1.033**
					(0.423)	(0.421)
% of border in [1/3, 2/3] under embargo					0.292	0.303
					(0.329)	(0.332)
% of border > 2/3 under embargo					− 0.313	− 0.274
					(0.451)	(0.474)
Civil conflict	0.165	0.229	0.313	0.301	0.324	0.314
	(0.325)	(0.324)	(0.319)	(0.321)	(0.316)	(0.318)
% of border in [1/3, 2/3] at war	− 0.227	− 0.162	− 0.183	− 0.173	− 0.170	− 0.160
	(0.301)	(0.280)	(0.285)	(0.281)	(0.289)	(0.285)
% of border > 2/3 under at war	− 0.307	− 0.305	− 0.226	− 0.231	− 0.221	− 0.224
	(0.229)	(0.225)	(0.224)	(0.224)	(0.230)	(0.230)
GDP per capita	0.257	0.177	0.218	0.176	0.177	0.130
	(0.530)	(0.484)	(0.475)	(0.474)	(0.473)	(0.472)
Importer FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
MRT	N	Y	N	Y	N	Y

Table 10 (continued)

	Military SALW exports					
	(1)	(2)	(3)	(4)	(5)	(6)
Gravity controls	Y	Y	Y	Y	Y	Y
Observations	2,166	2,239	2,239	2,239	2,239	2,239
R2 within	0.112	0.110	0.098	0.101	0.102	0.106
R2 overall	0.382	0.042	0.380	0.035	0.366	0.039
R2 betweenness	0.513	0.088	0.499	0.077	0.485	0.091

Robust standard errors in parentheses are clustered at the importer level. Constant not reported

Gravity controls are time-variant and they include common currency and RTAs (see Table 7).
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

observe that a 0.01 increase in the level of military involvement in the government leads to an increase of about 2% in Italian SALW exports.

The findings also demonstrate that with the imposition of an embargo, exports to the target country decrease by 66%. Notably, there is a distinction in the coefficient when analysing UN or EU embargoes separately. In the case of UN embargoes, the coefficient is significant at the 1% level, indicating an 80% reduction in Italian exports to the target country. Conversely, for EU embargoes, the coefficient is significant at the 5% level, indicating a decrease of approximately 62%. These results suggest that UN sanctions have a greater impact on Italian exports than EU sanctions.

Furthermore, if we look at the variables controlling for the proportion of the border that the importer shares with neighbours under embargo, we found no evidence of trade diversion through neighboring countries. On the contrary, the coefficient for the imposition of an UN embargo when the proportion of the border shared is more than 2/3 is negative and significant. This may imply that the imposition of a UN embargo on a country leads to a reduction in trade not only within the target polity but also in the neighbouring areas.

Interestingly, we found no evidence of a correlation between trade in SALW and the importer's GDP. This finding may suggest that the demand for small arms is not primarily influenced by changes in the importer's GDP.

Finally, there is no evidence to suggest that the emergence of a civil conflict in the importing country leads to a change in Italian arms exports.

5.2 Sporting and military SALW

Hereafter, we replicate the baseline estimates, distinguishing between military and sporting SALW. Such distinction matters because even if sporting weapons are intended for hunting and other sports, they may be misused to military purposes. Then, embargoes can often be avoided by dispatching SALW as "sporting arms" (Small Arms Survey, 2004, 2009). This is likely because many embargoes do not explicitly include or exclude this type of weapon. The EU embargo on China, for instance, uses the generic word "arms" when detailing the sanctioned categories. Therefore, several EU members, such as Austria, Finland, Germany, Italy, and

Table 11 Determinants of Italian SALW exports: excluding inaccuracies

	Military SALW trade (no inaccuracies)					
	(1)	(2)	(3)	(4)	(5)	(6)
Military expenditures	0.532***	0.483**	0.581***	0.502***	0.570***	0.520***
	(0.192)	(0.191)	(0.194)	(0.187)	(0.181)	(0.181)
Military dimension index	1.572**	1.587**	1.763***	1.838***	1.786***	1.815***
	(0.618)	(0.632)	(0.644)	(0.600)	(0.586)	(0.597)
Physical violence index	1.955***	1.973***	1.925***	1.689**	1.776***	1.796***
	(0.579)	(0.569)	(0.580)	(0.657)	(0.595)	(0.586)
UN Embargo	− 1.750***	− 1.759***				
	(0.528)	(0.533)				
% of border in [1/3, 2/3] under UN embargo	− 0.557	− 0.607				
	(0.607)	(0.599)				
% of border > 2/3 under UN embargo	− 0.489	− 0.326				
	(0.451)	(0.482)				
EU Embargo			− 0.912**	− 0.844*		
			(0.446)	(0.436)		
% of border in [1/3, 2/3] under EU embargo			− 0.124	− 0.097		
			(0.330)	(0.324)		
% of border > 2/3 under EU embargo			− 0.358	− 0.301		
			(0.486)	(0.487)		
Embargo					− 1.017**	− 1.023**
					(0.417)	(0.414)
% of border in [1/3, 2/3] under embargo					0.088	0.111
					(0.317)	(0.321)
% of border > 2/3 under embargo					− 0.287	− 0.218
					(0.436)	(0.464)
Civil conflict	0.699**	0.685**	0.819**	0.758**	0.772**	0.762**
	(0.304)	(0.297)	(0.330)	(0.298)	(0.302)	(0.295)
% of border in [1/3, 2/3] at war	− 0.141	− 0.150	− 0.185	− 0.156	− 0.132	− 0.132
	(0.276)	(0.268)	(0.296)	(0.270)	(0.281)	(0.274)
% of border > 2/3 under at war	− 0.329	− 0.331	− 0.308	− 0.279	− 0.268	− 0.266
	(0.248)	(0.242)	(0.270)	(0.244)	(0.257)	(0.250)
GDP per capita	0.976*	0.956*	1.026*	0.985*	0.951*	0.931*
	(0.544)	(0.551)	(0.569)	(0.538)	(0.530)	(0.536)
Importer FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
MRT	N	Y	N	Y	N	Y

Table 11 (continued)

	Military SALW trade (no inaccuracies)					
	(1)	(2)	(3)	(4)	(5)	(6)
Gravity controls	Y	Y	Y	Y	Y	Y
Observations	2202	2202	2129	2202	2202	2202
R2 within	0.137	0.144	0.136	0.137	0.134	0.140
R2 overall	0.420	0.059	0.409	0.038	0.418	0.047
R2 betweenness	0.515	0.074	0.490	0.028	0.512	0.058

Robust standard errors in parentheses are clustered at the importer level. Constant not reported

Gravity controls are time-variant and they include common currency and RTAs (see Table 7). ***p < 0.01, **p < 0.05, *p < 0.1

Spain, interpret this as an indirect concession to export arms designed for sporting purposes to China (Small Arms Survey, 2004, Ch. 4).[5] Moreover, the EU Embargo targeting Belarus explicitly allows the export of sporting SALW.[6]

Results show some differences. Firstly, when analysing military SALW exports, the coefficient for the level of military involvement in policy is consistently positive and significant across all specifications. This suggests that an 0.01 increase in the control of the government by the military leads to a 3% increase of Italian exports of military SALW. Secondly, there is a positive and significant association between military SALW exports and changes in the violations of physical integrity in the importing country. This means that as the level of violations of physical integrity increases of 0.01, Italian exports of military SALW also increase of 5%. Such relationship is not significant for sporting SALW.

Lastly, the results demonstrate a complementarity between the importer country's military expenditure and Italian exports of both military and sporting SALW. An increase of 1% in the importer's military expenditure is associated with a 0.4% increase in the export of sporting SALW and a 0.6% increase in the export of military SALW. This finding suggests that there is a positive association between sporting SALW and changes in the level of military expenditure in the importing country as well.

The analysis reveals also some interesting differences related to the impact of embargoes on Italian exports of military and sporting SALW. In the presence of an embargo, Italian exports of both military and sporting SALW to that country decrease. In fact, Italian exporters seem to comply with arms embargoes even when trading sporting SALW. However, there are disparities in the magnitude of the coefficients between the two types of weapons. Specifically, the imposition of an embargo leads to a 47% reduction in Italian exports of sporting SALW, whereas exports of military SALW decline by 64%. When examining UN and EU embargoes

[5] The UK issued a formal communication explaining that its arms exports to China are indeed sporting arms (Small Arms Survey, 2004, Ch. 4, p.128).

[6] https://www.consilium.europa.eu/en/press/press-releases/2020/02/17/belarus-eu-prolongs-arms-/.

Table 12 Determinants of Italian SALW exports: PPML estimates

	Military SALW					
	(1)	(2)	(3)	(4)	(5)	(6)
Military expenditures	0.320*	0.199	0.334*	0.215	0.347*	0.232
	(0.178)	(0.184)	(0.176)	(0.180)	(0.178)	(0.182)
Military dimension index	− 0.271	− 0.463	0.009	0.018	0.083	0.088
	(0.799)	(0.869)	(0.756)	(0.732)	(0.725)	(0.711)
Physical violence index	0.902	0.936	0.278	0.249	0.320	0.307
	(0.807)	(0.823)	(0.826)	(0.860)	(0.848)	(0.893)
UN Embargo	− 1.130**	− 1.201**				
	(0.447)	(0.530)				
% of border in [1/3, 2/3] under UN embargo	− 3.063***	− 3.455***				
	(0.460)	(0.541)				
% of border > 2/3 under UN embargo	− 2.255***	− 2.361**				
	(0.734)	(0.953)				
EU Embargo			0.035	0.020		
			(0.397)	(0.448)		
% of border in [1/3, 2/3] under EU embargo			0.114	0.185		
			(0.168)	(0.162)		
% of border > 2/3 under EU embargo			− 1.179***	− 1.096**		
			(0.446)	(0.470)		
Embargo					− 0.251	− 0.290
					(0.437)	(0.502)
% of border in [1/3, 2/3] under embargo					0.134	0.206
					(0.167)	(0.161)
% of border > 2/3 under embargo					− 1.110***	− 1.026**
					(0.426)	(0.452)

Table 12 (continued)

	Military SALW					
	(1)	(2)	(3)	(4)	(5)	(6)
Civil conflict	0.186	0.227	0.190	0.212	0.194	0.216
	(0.265)	(0.268)	(0.246)	(0.255)	(0.241)	(0.249)
% of border in [1/3, 2/3] at war	− 0.126	− 0.110	− 0.037	− 0.015	− 0.019	0.003
	(0.295)	(0.315)	(0.298)	(0.307)	(0.301)	(0.309)
% of border> 2/3 under at war	− 0.828	− 0.918*	− 0.744	− 0.813	− 0.741	− 0.813
	(0.512)	(0.532)	(0.553)	(0.576)	(0.553)	(0.577)
GDP per capita	− 0.791*	− 0.655	− 0.897*	− 0.799*	− 0.908*	− 0.808*
	(0.477)	(0.470)	(0.470)	(0.447)	(0.474)	(0.452)
Importer FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
MRT	N	Y	N	Y	N	Y
Gravity controls	Y	Y	Y	Y	Y	Y
Observations	3,280	3,280	3,280	3,280	3,280	3,280
Pseudo r2	0.863	0.866	0.855	0.857	0.855	0.857

Robust standard errors in parentheses are clustered at the importer level. Constant not reported

Gravity controls are time-variant and they include common currency and RTAs (see Table 7). ***p < 0.01, **p < 0.05, *p < 0.1

separately, the differences in the impact on military and sporting SALW exports appear to be larger. Under a UN embargo, the volume of military SALW exports to the sanctioned country experiences an 85% reduction, while sporting SALW exports decline by 51%. This further highlights the greater sensitivity of military SALW exports to sanctions. Similarly, when considering an EU embargo, the estimated impact on sporting SALW exports is 48% at a significance level of 1%. In contrast, the coefficient for military SALW is significant only at a 10% level and indicates an impact of 56%.

Finally, the results indicate that the occurrence of a civil conflict in the importing country is correlated with an increase in the volume of imported sporting SALW. Conversely, the coefficient for civil conflict is not significant for military SALW. This finding is in line with reports from international organizations that point to the likely misuse of sporting weapons in conflict scenarios (Small Arms Survey, 2009).

6 Robustness checks

6.1 Excluding inaccuracies

To further check the robustness of our results, we also address the presence of reported inaccuracies in the data collected from the NISAT.[7] The data reveals that some shipments include not only SALW but also other types of military equipment and devices. For example, when analyzing the export of munitions and explosives from Italy to the US in 2014 (with a value of 143,548 US dollars), the NISAT acknowledges the possibility that the shipment may contain arms not strictly falling under the SALW category. Approximately 17% of the total records may have included conventional weapons and other equipment, while the remaining 83% is exclusively categorized as instances of SALW transfers.

To address this issue, we re-estimate our empirical model using alternative samples which exclude inaccuracies. Differently from military SALW, there are no reported inaccuracies for sporting SALW transfers. Therefore, this section focuses on presenting results concerning military SALW exports. The findings related to the total SALW trade are presented in Table A.2 in the appendix.

Our main results remain robust. First, when the level of the importer's military expenditures increases by 1%, there is a rise of about 0.5% in the exports to that destination. Moreover, as small violations of physical integrity in the importer country increase by 0.01, there is a concurrent increase in exports of SALW by 3%. We also find that a 0.01 rise in the level of military involvement in the importing country leads to an 5% increase in exports of this weapons and changes. Additionally, the imposition of an embargo in the destination country reduces exports to that country by 64% (57% in the case of an EU embargo and 83% in the case of a UN embargo).

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[7] Original data report information about the value and the type of different SALW shipments from country i to country j in year t. Data were aggregated to obtain the value of SALW exports from country i to country j in year t.

Furthermore, we also address another type of inaccuracies. NISAT does not provide data on zero flows. Imputing missing zero values, however, poses two issues. First, unlike other tradable commodities, arms transfers between states can often go unreported. Some countries may choose to conceal their arms exports or imports for political and security reasons. Secondly, SALW arms transfers are inherently unpredictable and do not occur on a regular basis. After a country receives a large shipment of weapons, it may cease imports for several years. Therefore, while we acknowledge that the absence of data on zero flows introduces bias into our analysis, we believe that focusing on positive flows is the most appropriate strategy. Nevertheless, to ensure robustness, we create an alternative dependent variable where missing values are treated as zeros. We impute missing zero values by assuming that the absence of information on arms trade between two countries is evidence of no transfer.

To ensure comprehensive analysis, we additionally re-estimate the empirical model, using SALW export data that includes imputed zero flows as the dependent variable. To handle zero values, we employ the PPML estimator, which is the standard methodology (Silva & Tenreyro, 2006). The results for total SALW and sporting SALW exports are robust, and they are reported in tables A.3 and A.4 in the appendix. In contrast, the findings for military SALW exports indicate that there is no significant association with the importer's military expenditures, violations of physical integrity, or the level of military involvement in the importing country. The imposition of a UN embargo in the destination country has a negative and significant impact on exports to that country.

These findings suggest that inaccuracies in computing zero values may have a greater impact on military SALW trade. It is reasonable to assume that military SALW transfers are more likely to be concealed by nations, and the imputation of zeroes may introduce more noise.

6.2 Excluding the USA

To further check the robustness of our results, we replicate our baseline estimates excluding the US from our sample.[8] As shown in Sect. 3, this country is the most important Italian partner, and Italian exports toward this nation are a relevant part of total Italian exports. Therefore, we exclude the USA from our sample to avoid our estimates being driven by these outliers. Results, however, are robust. Tables 13, 14 and 15 report the estimated coefficients when excluding from the sample Italian exports to the USA for Total SALW, military SALW and sporting SALW respectively.

The statistical significance of the coefficients, as well as their magnitude, are similar to baseline results. First, we find confirmation of the positive association

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[8] We replicate the analysis excluding also EU countries which are among the most relevant Italian partners. We also re-estimate our model using lagged explanatory variables acknowledging that some factors may require time to influence bilateral arms trade and to address issues of reverse causality. Results are reported in the appendix.

Table 13 Determinants of Italian SALW exports: excluding Italian exports to the US

| | Total SALW | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Military expenditures	0.610***	0.603***	0.657***	0.649***	0.671***	0.664***
	(0.172)	(0.172)	(0.170)	(0.170)	(0.166)	(0.166)
Military dimension index	0.941	0.956	1.133*	1.155*	1.101*	1.120*
	(0.608)	(0.630)	(0.608)	(0.627)	(0.602)	(0.623)
Physical violence index	1.442**	1.459**	1.138*	1.155*	1.236**	1.254**
	(0.601)	(0.597)	(0.665)	(0.666)	(0.613)	(0.613)
UN Embargo	− 1.569***	− 1.592***				
	(0.357)	(0.361)				
% of border in [1/3, 2/3] under UN embargo	− 0.474	− 0.490				
	(0.454)	(0.453)				
% of border > 2/3 under UN embargo	− 0.964**	− 0.839*				
	(0.398)	(0.457)				
EU Embargo			− 0.958**	− 0.961**		
			(0.421)	(0.415)		
% of border in [1/3, 2/3] under EU embargo			0.170	0.183		
			(0.245)	(0.245)		
% of border > 2/3 under EU embargo			− 0.340	− 0.282		
			(0.468)	(0.482)		
Embargo					− 1.079***	− 1.089***
					(0.377)	(0.376)
% of border in [1/3, 2/3] under embargo					0.323	0.347
					(0.241)	(0.242)
% of border > 2/3 under embargo					− 0.264	− 0.212
					(0.390)	(0.398)

Table 13 (continued)

| | Total SALW | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Civil conflict	0.210	0.201	0.247	0.240	0.270	0.265
	(0.257)	(0.258)	(0.255)	(0.256)	(0.254)	(0.255)
% of border in [1/3, 2/3] at war	− 0.323	− 0.334	− 0.353	− 0.360	− 0.357	− 0.366
	(0.298)	(0.300)	(0.288)	(0.290)	(0.292)	(0.293)
% of border > 2/3 under at war	− 0.182	− 0.174	− 0.115	− 0.108	− 0.115	− 0.106
	(0.184)	(0.194)	(0.165)	(0.173)	(0.162)	(0.171)
GDP per capita	0.346	0.311	0.371	0.340	0.363	0.327
	(0.430)	(0.428)	(0.435)	(0.431)	(0.435)	(0.431)
Importer FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
MRT	N	Y	N	Y	N	Y
Gravity controls	Y	Y	Y	Y	Y	Y
Observations	2,415	2,415	2,415	2,415	2,415	2,415
R2 within	0.109	0.112	0.103	0.106	0.108	0.111
R2 overall	0.500	0.102	0.497	0.100	0.493	0.102
R2 betweenness	0.623	0.178	0.613	0.174	0.606	0.159

Robust standard errors in parentheses are clustered at the importer level. Constant not reported

Gravity controls are time-variant and they include common currency and RTAs (see Table 7). *** p < 0.01, ** p < 0.05, * p < 0.1

Table 14 Determinants of Italian SALW exports: excluding Italian exports to the US (sporting SALW)

	Sporting SALW					
	(1)	(2)	(3)	(4)	(5)	(6)
Military expenditures	0.354**	0.400**	0.417***	0.461***	0.417***	0.462***
	(0.151)	(0.154)	(0.136)	(0.137)	(0.137)	(0.138)
Military dimension index	− 1.412*	− 1.486*	− 1.351	− 1.432*	− 1.361	− 1.444*
	(0.824)	(0.815)	(0.857)	(0.856)	(0.856)	(0.856)
Physical violence index	− 0.436	− 0.378	− 0.551	− 0.488	− 0.549	− 0.482
	(0.659)	(0.652)	(0.639)	(0.633)	(0.635)	(0.630)
UN Embargo	− 0.677***	− 0.719***				
	(0.258)	(0.264)				
% of border in [1/3, 2/3] under UN embargo	− 0.229	− 0.194				
	(0.311)	(0.308)				
% of border > 2/3 under UN embargo	− 0.879***	− 0.859***				
	(0.281)	(0.326)				
EU Embargo			− 0.628**	− 0.653***		
			(0.247)	(0.248)		
% of border in [1/3, 2/3] under EU embargo			0.157	0.138		
			(0.175)	(0.179)		
% of border > 2/3 under EU embargo			− 0.575*	− 0.568*		
			(0.322)	(0.326)		
Embargo					− 0.605**	− 0.631**
					(0.244)	(0.242)
% of border in [1/3, 2/3] under embargo					0.145	0.129
					(0.177)	(0.182)
% of border > 2/3 under embargo					− 0.494*	− 0.489
					(0.295)	(0.300)

Table 14 (continued)

	Sporting SALW					
	(1)	(2)	(3)	(4)	(5)	(6)
Civil conflict	0.457*	0.453*	0.519***	0.512**	0.508**	0.502*
	(0.248)	(0.250)	(0.253)	(0.255)	(0.254)	(0.257)
% of border in [1/3, 2/3] at war	− 0.239	− 0.253	− 0.257	− 0.266	− 0.265	− 0.274
	(0.313)	(0.313)	(0.304)	(0.304)	(0.304)	(0.304)
% of border>2/3 under at war	0.058	0.064	0.116	0.116	0.108	0.109
	(0.213)	(0.205)	(0.202)	(0.192)	(0.201)	(0.191)
GDP per capita	0.816	0.769	0.763	0.721	0.796	0.752
	(0.518)	(0.510)	(0.496)	(0.487)	(0.504)	(0.495)
Importer FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
MRT	N	Y	N	Y	N	Y
Gravity controls	Y	Y	Y	Y	Y	Y
Observations	1970	1970	1970	1970	1970	1970
R2 within	0.326	0.330	0.330	0.334	0.329	0.333
R2 overall	0.511	0.159	0.517	0.166	0.517	0.165
R2 betweenness	0.604	0.288	0.614	0.300	0.615	0.299

Robust standard errors in parentheses are clustered at the importer level. Constant not reported

Gravity controls are time-variant and they include common currency and RTAs (see Table 7). ***$p<0.01$, **$p<0.05$, *$p<0.1$

Table 15 Determinants of Italian SALW exports: excluding Italian exports to the US (military SALW)

	Military SALW					
	(1)	(2)	(3)	(4)	(5)	(6)
Military expenditures	0.639***	0.633***	0.671***	0.663***	0.686***	0.680***
	(0.195)	(0.193)	(0.192)	(0.192)	(0.188)	(0.187)
Military dimension index	1.190*	1.209*	1.386**	1.415**	1.355**	1.380**
	(0.654)	(0.671)	(0.637)	(0.649)	(0.627)	(0.640)
Physical violence index	2.036***	2.055***	1.704**	1.722***	1.802***	1.822***
	(0.571)	(0.558)	(0.665)	(0.656)	(0.593)	(0.582)
UN Embargo	− 1.875***	− 1.897***				
	(0.536)	(0.540)				
% of border in [1/3, 2/3] under UN embargo	− 0.604	− 0.638				
	(0.636)	(0.633)				
% of border > 2/3 under UN embargo	− 0.874*	− 0.766				
	(0.499)	(0.567)				
EU Embargo			− 0.815*	− 0.828*		
			(0.453)	(0.447)		
% of border in [1/3, 2/3] under EU embargo			0.106	0.105		
			(0.337)	(0.341)		
% of border > 2/3 under EU embargo			− 0.481	− 0.437		
			(0.491)	(0.519)		
Embargo					− 1.017**	− 1.035**
					(0.423)	(0.422)
% of border in [1/3, 2/3] under embargo					0.293	0.303
					(0.329)	(0.333)
% of border > 2/3 under embargo					− 0.311	− 0.271
					(0.452)	(0.474)
Civil conflict	0.241	0.227	0.311	0.300	0.322	0.312
	(0.323)	(0.324)	(0.319)	(0.321)	(0.317)	(0.318)
% of border in [1/3, 2/3] at war	− 0.167	− 0.162	− 0.183	− 0.173	− 0.171	− 0.161
	(0.285)	(0.281)	(0.285)	(0.282)	(0.290)	(0.286)
% of border > 2/3 under at war	− 0.302	− 0.307	− 0.228	− 0.233	− 0.223	− 0.226
	(0.222)	(0.225)	(0.224)	(0.224)	(0.230)	(0.230)
GDP per capita	0.230	0.184	0.224	0.184	0.183	0.137
	(0.485)	(0.486)	(0.477)	(0.476)	(0.475)	(0.473)
Importer FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
MRT	N	Y	N	Y	N	Y

Table 15 (continued)

	Military SALW					
	(1)	(2)	(3)	(4)	(5)	(6)
Gravity controls	Y	Y	Y	Y	Y	Y
Observations	2,213	2,213	2,213	2,213	2,213	2,213
R2 within	0.106	0.110	0.098	0.101	0.101	0.105
R2 overall	0.359	0.050	0.354	0.042	0.340	0.047
R2 betweenness	0.500	0.096	0.479	0.084	0.465	0.101

Robust standard errors in parentheses are clustered at the importer level. Constant not reported

Gravity controls are time-variant and they include common currency and RTAs (see Table 7).
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

between Italian exports of SALW and the importer's military expenditures. Second, we found evidence that a positive and significant association between total and military SALW exports and changes in the violations of physical integrity in the importing country. Additionally, there is a positive association between the level of military involvement in policy and military SALW exports.

Finally, the imposition of an embargo decreases exports towards the target country. The magnitude of the coefficient is higher for UN embargoes than EU embargoes. In the presence of a UN embargo, exports to the target fall by 80% (total SALW), by 85% (military SALW) and by 51% (sporting SALW). On the other hand, when sanctions are imposed by the EU, exports reduce by 62% (56% for military SALW and 48% for sporting SALW).

7 Conclusions

This paper has empirically investigated the determinants of Italian SALW exports from 1990 to 2017. In order to do that, we augmented a standard gravity equation with two set of variables: the first was intended to capture internal characteristics of importer countries. We included a measure of the attitude to violence against people as well as the degree of militarization of the society. the second set of independent variables was intended to capture the impact of international embargoes on SALW flows.

The main results we would claim are: (1) there is a complementarity between military expenditures of importer country and SALW flows. An increase of 1% in the level of the importing country's military expenditure is associated with an increase of 0.6% in Italian SALW exports to that country; (2) SALW exports appear to be associated with human rights violations. There is a positive association between the attitude to violence and lack of respect of physical integrity and the Italian SALW exports. If the index of violation of physical integrity increases by 0.01 SALW exports from Italy increase by 2%; (3) there is a positive association between the Italian SALW exports and the influence of military forces on the government of the importer country. A 0.01 increase in the index capturing the level of military involvement in the government

leads to an increase of about 2% of SALW exports from Italy; (4) multilateral arms embargoes reduce significantly the SALW flows. In the presence of an embargo, SALW exports to the target country decrease by 66%. Interestingly, in the case of UN embargoes, the coefficient indicates a 80% reduction in Italian exports to the target country whereas for EU embargoes, the coefficient highlights a decrease of approximately 62%. In brief, UN embargoes seem to have a greater impact on Italian SALW exports than those imposed by EU.

We have also investigated the emergence of two different sanction-busting mechanisms. First, we tested whether there is an increase of exports countries that border with embargoed countries. Results do not point to the existence of trade diversion through neighboring countries so not suggesting for emerging of sanctions-busting. Secondly, we have split between military and sporting SALW in order to verify whether sanctions-busting could have taken the shape of favorable labelling. In fact, results do not suggest the existence of sanctions-busting through labelling.

In addition, the results are robust after we run several robustness checks. First we have remove inaccuracies from the dataset and the results are confirmed. Secondly, we have excluded US from the sample of countries and the results remain robust.

Finally, this work has shed light on the correlates of Italian SALW exports towards the rest of the world pointing out that demand and constraints of such products do not correspond with standard patterns of civilian goods. In fact, political and international aspects matter substantially.

Declarations

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