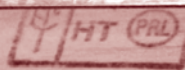


800 CRTG
7.62 MM
A143
EO-06G323-662



800 CRTG
7.62 MM
A 143
EO-06G323-662

Emerging from Obscurity

THE GLOBAL AMMUNITION TRADE

INTRODUCTION

In the Southern Sudanese village of Natinga in June 2007, a dispute between Toposa and Turkana pastoralist warriors degenerated into a firefight that consumed all of their ammunition. Their guns suddenly rendered useless, the rivals chose to sit down together and resolve their differences peacefully.¹ While a weapon can remain in use for decades if it is properly maintained, its utility depends on the continuous production and delivery of ammunition. Rounds of ammunition can only be used once, and they degrade over time, becoming unstable as they age.

The need to take ammunition into account in the design and implementation of measures aimed at preventing death and injury from armed violence appears clear. Nevertheless, the projectiles fired from small arms and light weapons have received much less attention from policy-makers than have the weapons systems themselves. Since they are accorded such a low priority on the international agenda, ammunition transfers are characterized by an acute lack of transparency, which makes research in this area a challenging enterprise.² Reports on arms transfers often either contain very little data on ammunition—such as the United Nations Register of Conventional Arms—or combine data on transfers of ammunition for small arms and light weapons with data on ammunition for major conventional weapons, as is the case with the European Union's yearly report on arms exports ('EU Annual Report') and most national reports. As a consequence, it is extremely difficult to determine what types of ammunition are being transferred and to whom.

This study addresses some of these challenges as part of the Small Arms Survey's ongoing, multi-year reassessment of the value of authorized international transfers of small arms and light weapons, their parts, accessories, and ammunition. The re-evaluation unpacks the previous estimate of USD 4 billion (Small Arms Survey, 2006, pp. 66–67) one element of the trade at a time. The *Small Arms Survey 2009* puts forward an estimate of USD 1.58 billion for the value of documented authorized transfers of firearms in 2006 (Small Arms Survey, 2009, p. 7). Light weapons and parts and accessories will be the next elements to be investigated. This chapter focuses on the ammunition component of the trade, significantly improving upon previous estimates that have analysed solely small arms ammunition data from the UN Commodity Trade Statistics Database (UN Comtrade).³ It supplements those figures with alternative research methods and data sources—particularly public procurement data—which it employs to also arrive at estimates of the global authorized trade in light weapons ammunition and the undocumented authorized trade in small arms ammunition.

Major findings of this chapter include:

- The average annual value of authorized international transfers of ammunition for small arms and light weapons between 2006 and 2009 is estimated at USD 4.3 billion. Of this total, USD 1.8 billion is ammunition for small arms and USD 2.5 billion is for light weapons. These figures do not include man-portable guided missiles or single-shot, disposable rockets.

- The USD 4.3 billion ammunition finding shows that the long-standing estimate of USD 4 billion for the total trade (including weapons, parts, and accessories) considerably undervalues recent activity.
- In 2007, 26 countries had documented exports of ammunition for small arms worth more than USD 10 million.
- The trade in propellant chemicals is worth at least tens, and perhaps hundreds, of millions of US dollars each year.
- The global trade in small arms and light weapons ammunition is considerably less transparent than the trade in the weapons themselves. This is true of both national reporting and reporting required or facilitated by international instruments.
- Governments procure most of their light weapons ammunition from domestic producers when possible. Therefore, international transfers of light weapons ammunition are probably a small percentage of global public procurement.
- Ammunition imported by Western⁴ countries is overwhelmingly sourced from Western companies. Public procurement data from seven Western states indicates that in recent years they have received less than four per cent of their light weapons ammunition (by value) from non-Western firms.
- The 2010 Transparency Barometer identifies Switzerland, the United Kingdom, Germany, the Netherlands, and Serbia as the most transparent of the major small arms and light weapons exporters. The least transparent major exporters are Iran and North Korea, both scoring zero.
- In 2007 the top exporters of small arms and light weapons (those with annual exports of at least USD 100 million), according to available customs data, were (in descending order) the United States, Italy, Germany, Brazil, Austria, Belgium, the United Kingdom, China, Switzerland, Canada, Turkey, and the Russian Federation. The top importers of small arms and light weapons for that year (those with annual imports of at least USD 100 million), according to available customs data, were (in descending order) the United States, the United Kingdom, Canada, France, Germany, and Spain.⁵

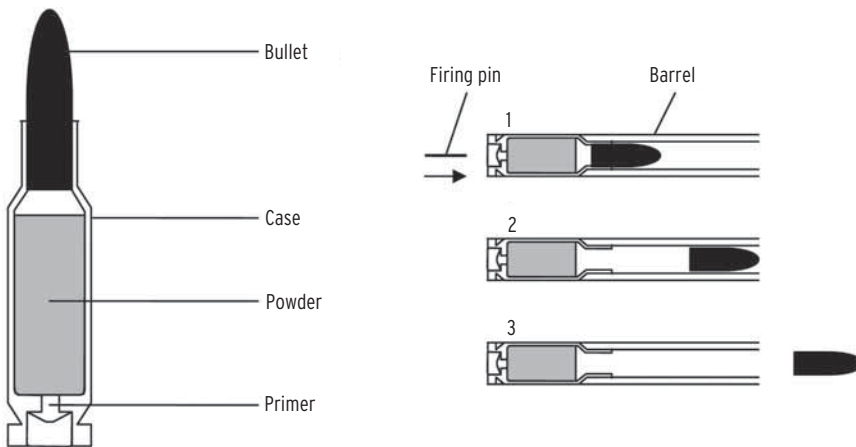
The chapter starts by defining the key terms and concepts used before moving on to an assessment of transparency—or lack thereof—in the trade in ammunition for small arms and light weapons. This section includes the Small Arms Trade Transparency Barometer 2010. The chapter then provides a brief outline of the methods used to calculate a total US dollar value for small arms and light weapons ammunition transfers. It concludes with a more detailed and qualitative analysis of that trade.

FRAMING THE ISSUE: KEY TERMS AND DEFINITIONS

This section summarizes and defines key terms and definitions used in the chapter, starting with the term ‘ammunition’. In its 1999 report, the UN Group of Experts on the Problem of Ammunition and Explosives defines ammunition as ‘the complete round/cartridge or its components, including bullets or projectiles, cartridge cases, primers/caps and propellants that are used in any small arm or light weapon’ (UNGA, 1999, p. 5).⁶ While this description is a good starting point, a more detailed definition is needed for the purposes of this study.

In this chapter, ‘small arms ammunition’ refers to: shotgun shells and their parts, and other complete cartridges—including tracer, blank, training, and less lethal rounds—that are 12.7 mm or smaller in calibre,⁷ and their parts.⁸ Cartridges that are 20 mm or larger in calibre are not included because they are normally fired from cannon, which are not considered small arms or light weapons because of their rapid rate of fire (which precludes transport of sufficient

Figure 1.1 **Anatomy of cartridge-based ammunition**



Source: Pézard and Anders (2006, p. 25)

quantities of ammunition on light vehicles or pack animals for the weapon to be used as intended), and because they are usually mounted on larger platforms such as ships, aircraft, or armoured vehicles.⁹

The term 'light weapons ammunition' refers to the following items:

- mortar bombs up to and including 120 mm;
- some man- and crew-portable rockets;
- grenades (hand and projected);
- recoilless rifle rounds; and
- their parts.

This category includes less lethal, practice, training, smoke, and flash rounds. It does not include man-portable guided missiles, rockets in single-shot, disposable launch tubes,¹⁰ or rockets fired from rails, which, for the purposes of this chapter, are considered 'light weapons' rather than ammunition and will be addressed in a subsequent edition of the *Small Arms Survey*.¹¹

The above list—and the 120 mm upper limit for mortars—is derived from the definition for light weapons in the *Small Arms Survey 2008*, which is based on the maximum weight that can be transported off-road by a typical light vehicle (Small Arms Survey, 2008, pp. 9–10).

The analysis of transfers of small arms ammunition presented in this chapter makes use of UN Comtrade, which houses the world's largest collection of data on international trade, containing more than 1.1 billion records on various commodities, including arms and ammunition.¹² Authorized transfers of ammunition are defined here as cross-border movements of ammunition and their parts that are authorized by the importing, exporting, or transit states. For a detailed discussion of international transfers, see Box 1.1 in the *Small Arms Survey 2009* (Small Arms Survey, 2009, p. 9).

For the purposes of this chapter, public procurement is defined as the purchase of goods or services by public bodies. Additional terms are defined in the online methodology paper for this chapter (see Annexe 1.3).

TRANSPARENCY IN THE TRANSFER AND PROCUREMENT OF AMMUNITION

Transparency in international transfers of ammunition

There have been improvements in transparency of authorized transfers of materials related to small arms and light weapons in recent years. While instruments such as the UN Register of Conventional Weapons, the EU Annual Report, and national reports on arms exports have contributed to this positive trend, no intergovernmental reports and very few national sources (see Table 1.1) publish specific, disaggregated information on transfers of ammunition for small arms and light weapons.

UN Comtrade, which has long been a principal source of data on weapons transfers, contains plentiful—though not complete—data on the import and export of shotgun cartridges, other cartridge-based ammunition for small arms, and their parts.¹³ Comtrade data is not useful, however, for analysing transfers of non-cartridge-based light weapons ammunition. Data on grenades, mortar bombs, shoulder-launched rockets, and rounds for recoilless rifles are covered by customs category 930690, which also includes a miscellany of other types of ammunition, such as ballistic missiles, torpedoes, flying bombs, depth charges, and harpoons (WCO, n.d.). Since it is impossible to disaggregate data on the various items, UN Comtrade is of limited utility as a source of information on light weapons ammunition transfers.

Very few sources publish disaggregated information on transfers of light weapons ammunition. Other prominent reporting instruments provide little additional useful data. Ammunition transfers are not included in the template provided to states for reporting to the UN Register of Conventional Arms. The EU Annual Report on arms exports uses a categorization scheme based on the Wassenaar Arrangement's Munitions List, aggregating data on 'bombs, torpedoes, rockets, missiles, other explosive devices and charges and related equipment and accessories' into a single category, with ammunition for small arms and some light weapons, and shells for major conventional weapons, falling into a second (CoEU, 2008). As a result, specific information on transfers of ammunition for small arms and light weapons cannot be identified. Though the quantity and specificity of data in national arms export reports vary from country to country (see Table 1.1), almost all reports are similar to the international instruments mentioned above in that they either exclude data on ammunition transfers or aggregate this data in such a way that it is impossible to distinguish transfers relating to small arms and light weapons from transfers of other items. Like the EU, many governments use categories based on the Wassenaar Munitions List.¹⁴ Many others do not produce reports at all.

Some additional information was acquired through extensive outreach to industry representatives and government officials, but most queries yielded little or no additional data.¹⁵ Governments consistently responded that the requested information was not known at the level of specificity required for this study, or that the information could not be released for reasons of national security.

Transparency in national procurement of ammunition

Transparency in public procurement has become a norm in many countries. It is advocated in order to ensure fair competition among contractors and as an anti-corruption measure. Transparency, along with 'non-discrimination', is a cornerstone principle of the Agreement on Government Procurement of the World Trade Organization (WTO). Articles IX, XVII, and XVIII of the agreement stipulate the publication of tenders and contract award notices (WTO, 1994). Similar initiatives have been pursued by other international organizations. The EU, for example, requires

Table 1.1 Data on ammunition transfers in national and international arms export reports¹⁶

| Country | Identifies importing country | Specifies quantity or value | Separates ammunition from other exports | Separates small arms and light weapons ammunition from other ammunition | Specifies calibre | Specifies ammunition type (e.g. hand grenade) |
|---------------------------------------|------------------------------|-----------------------------|---|---|-------------------|---|
| Australia | N | Value | N | N | N | N |
| Austria | Y | Value | Y | N | N | N |
| Belarus | N | Neither | N | N | N | N |
| Belgium | Y | Value | Y | SAA=Y LWA=N | N | N |
| Bosnia and Herzegovina | Y | Value | Y | N | N | N |
| Bulgaria | Y | Value | Y | N | N | N |
| Canada | Y | Value | Y | N | N | N |
| Czech Republic | Y | Value | Y | N | N | N |
| Denmark | Y | Value | Y | N | N | N |
| Estonia | Y | Both | Y | N | N | N |
| Finland | Y | Both | Y | N | N | N |
| France | Y | Value | Y | N | N | N |
| Germany | Y | SAA=Both LWA=Value | Y | SAA=Y LWA=Inconsistent | N | Inconsistent |
| Ireland | Y | Neither | Y | N | N | N |
| Italy | Y | Inconsistent | Y | Inconsistent | Inconsistent | Inconsistent |
| Former Yugoslav Republic of Macedonia | Y | Both | Y | Y | Y | Y |
| Montenegro | Y | Both | Y | Y | Y | Y |
| Netherlands | Y | Value | Y | N | N | N |
| Norway | Y | Value | Y | N | N | N |
| Portugal | N | Neither | N | N | N | N |
| Romania | Y | Value | Y | Y | N | Y |
| Serbia | Y | Both | Inconsistent | Inconsistent | N | Inconsistent |
| Slovakia | Y | Value | Y | N | N | N |
| Slovenia | Y | Both | Y | SAA=Y LWA=Inconsistent | N | Inconsistent |



| | | | | | | |
|------------------|---|----------|---|---------------------------|--------------|----------------|
| South Africa | Y | Value | N | N | N | N |
| Spain | Y | Value | Y | SAA=Inconsistent LWA=N | N | N |
| Sweden | Y | Value | Y | SAA=N LWA=Y | Inconsistent | SAA=N LWA=Y |
| Switzerland | Y | Value | Y | N | N | N |
| Ukraine | Y | Quantity | N | N | N | N |
| United Kingdom | Y | Value | Y | Inconsistent | N | Inconsistent |
| United States | Y | Both | Y | N | N | N |
| EU Annual Report | Y | Value | Y | N | N | N |

Notes: Y=yes; N=no; SAA=small arms ammunition; LWA=light weapons ammunition.

public bodies to publish both tenders and contract award notices. However, both the WTO and the EU have general exemptions for arms and other equipment purchased for national defence, including ammunition.¹⁷

Nonetheless, governments are encouraged to publish details of arms procurement, and some do so voluntarily. One voluntary regime is under the auspices of the Code of Conduct on Defence Procurement of the European Defence Agency (EDA), which encourages transparency in arms procurement by member states. Governments may publish details on public procurement in two ways: through national bulletins or databases, or through multilateral public procurement websites. The two multilateral procurement sites used in this study are the EDA Defence Contracts Opportunities bulletin board and the EU's Tenders Electronic Daily (TED) database. Commercial databases of tender opportunities were also examined, but they did not offer comprehensive information on ammunition procurement.

Publicly available information on national procurement of ammunition varies significantly. Some countries, such as Australia, place large numbers of ammunition contracts by the armed forces and other branches of government in national online databases. In other cases, the information is much less comprehensive, often excluding defence materiel. Some countries have reported highly incomplete data on ammunition to the EDA and TED databases—only a handful or a single contract over a number of years—and other countries have not reported ammunition acquisitions at all. In addition, as the provision of information is voluntary and subject to national security exemptions, it is impossible to know with any certainty whether a particular country has provided a complete record of its ammunition procurement.

There are further problems with some of the transparency mechanisms outlined in this section. The EDA database only covers military procurement, and so excludes ammunition purchases by law enforcement agencies. Furthermore, both the EDA and TED databases have thresholds—EUR 1 million for the EDA and EUR 203,000 for TED—below which contracts are not required to be posted. A comparison between postings on these databases and national publications with no minimum threshold suggests that some ammunition contracts fall below these values. Another problem with reporting on arms procurement is one that can also be found in other areas of arms reporting: reports submitted by countries under different mechanisms do not always concur with each other, suggesting information supplied is not always comprehensive. Furthermore, data from government procurement clearly does not cover the

trade in parts and finished rounds conducted before their sale to governments—either as part of the production process or between dealers. Finally, some governments have not maintained online archives of national procurement bulletins that have only been published digitally, sometimes limiting the availability of data to a single month.

THE 2010 TRANSPARENCY BAROMETER

The Small Arms Trade Transparency Barometer was introduced in the *Small Arms Survey 2004* in order to assess countries' transparency in reporting on their small arms and light weapons exports. Points are awarded for timeliness, access and consistency, clarity, comprehensiveness, and inclusion of data on deliveries as well as for reporting on licences granted and refused. The Barometer examines countries claiming—or believed—to have exported USD 10 million or more of small arms and light weapons, including their parts, accessories, and ammunition, during at least one calendar year between 2001 and 2008.

As its name indicates, the Barometer is designed to measure—and promote—transparency. While it can also be used to highlight trends in national reporting, it does not assess the accuracy of the data states provide.

The Barometer has undergone several significant changes since its introduction. Lazarevic (2010a) presents a history of the evolution of the Transparency Barometer and retroactively applies the new scoring system, introduced in 2008, to the years 2001–06. It also includes the scoring for 2007 and 2008.

As a rule, the 2010 Barometer assesses national transparency in small arms export activity for 2008, based on reporting in 2009. The three main sources are: (1) national arms export reports;¹⁸ (2) the UN Register of Conventional Arms; and (3) UN Comtrade (see Table 1.2).

This edition assesses 48 countries' reporting practices: the 45 countries covered in the 2009 Barometer plus newcomers India, Montenegro, and the United Arab Emirates—all believed to have exported roughly USD 10 million worth of relevant materiel in 2007 or 2008.¹⁹ Additional countries may feature in future Barometers, when and if more information about their international transfers becomes available. Discussions of transparency also need to focus on the policies of countries that have little or no domestic production, but important surplus stockpiles. Examples include Albania (see Box 1.1) and arguably Angola. Documenting surpluses and examining how they are managed and disposed of is also important to broader considerations of responsible arms transfer practices.

This year's Transparency Barometer identifies Switzerland, the United Kingdom, and Germany as the three most transparent countries. The least transparent are Iran and North Korea, both scoring zero. Spain increased its score by 1.5 points and replaced the United States in this year's top ten. The average score rose slightly since last year (from 11.4 to 11.5). Israel's score underwent the greatest increase in both absolute and percentage terms, rising 4 points (or 67 per cent) since last year thanks to better reporting to UN Comtrade. It is followed by Bulgaria, which, despite not publishing a national arms export report for 2008, increased its score by 3 points (or 40 per cent) by including background information on its international small arms and light weapons transfers in reporting to the UN Register. Slovakia experienced the largest decline (15 per cent), falling to 12.5 points. For the second year under the new scoring system, more than half the countries reviewed received fewer than half the maximum number of points attainable (i.e. fewer than 12.5 of 25), suggesting that, despite some progress, states can do much more to improve their reporting.²⁰

Switzerland, the United Kingdom, and Germany are the three most transparent countries.

Box 1.1 Procurement pitfalls: the AEY scandal

The wars in Afghanistan and Iraq have had many unanticipated effects, including on international trade in small arms and light weapons ammunition. The large quantities of ammunition hastily procured for use in these conflicts has (temporarily) vaulted inexperienced and poorly vetted brokers to the top of the arms contracting food chain and transformed surplus stockpiles of ageing ammunition into valuable commodities. This combination is problematic on several levels, as illustrated by the multi-million-dollar procurement scandal involving the US company AEY and millions of rounds of aging Chinese rifle ammunition.

In January 2007, AEY, which had received its first US Defense Department contract only three years earlier, won a USD 298 million contract to supply ammunition to the Afghan Security Forces, which were equipped primarily with Warsaw Pact weapons. AEY's president, 21-year-old Efraim Diveroli, and his small team immediately began scouring the globe for deals, eventually purchasing 100 million surplus 7.62 x 39 mm rifle rounds from the Albanian government.

Shortly after agreeing to purchase the ammunition, an AEY representative discovered that a significant portion of the ammunition consisted of Chinese-made rounds, the procurement of which is banned by US law. AEY reportedly instructed an Albanian associate to remove the ammunition from its original packaging and to eliminate any other evidence of its origins. The ammunition was then repackaged and shipped to Afghanistan. US officials later described some of the ammunition from AEY as corroded and 'unserviceable' (COGR, 2008, p. 21). News of the scandal broke in March 2008 and two months later the US Army terminated AEY's contract (COGR, 2008). In August 2009, Diveroli pled guilty to making false statements to the US government regarding the ammunition.

The gaps in oversight that failed to prevent the acquisition of millions of rounds of ageing ammunition can also create opportunities for arms trafficking. The most notable shortcoming in the AEY case was the Defense Department's failure to utilize the State Department's extensive watch list of ineligible and suspicious parties. Had the Defense Department official who awarded the contract to AEY checked with the

State Department first, she would have discovered that 'AEY and its president, AEY's middleman, and AEY's supplier' were on the list (COGR, 2008, p. 2). While AEY had no apparent interest in diverting the ammunition to third parties, the Defense Department's failure to check the State Department watch list could have been exploited by arms traffickers with such intentions.

To its credit, the Defense Department has taken several steps to prevent similar problems in the future. Most notably, it now conducts on-site inspections of all foreign arms sources before ammunition is shipped, and it requires prospective prime contractors to submit broker licence requests to the State Department. The requests must include a list of all of the contractor's suppliers, permitting a thorough vetting of sub-contractors by US officials.²¹

Still unaddressed, however, is the apparent contradiction between policies aimed at persuading countries to destroy their surplus stocks and procurement strategies that provide a financial incentive to hold onto their stocks. Assuming that AEY ultimately purchased all 100 million rounds, the Albanian government will have earned approximately USD 2 million on ammunition that likely would have been destroyed as part of the NATO stockpile destruction programme.²² Ironically, the United States is one of the largest contributors to the programme, which has destroyed 8,700 tons of surplus ammunition, including 104 million rounds of 7.62 mm rifle ammunition (Chivers, 2008). Critics fear that procurement of surplus ammunition will discourage countries such as Albania with dangerously large surplus stockpiles from participating in destruction programmes in the hope that they can sell the munitions instead.



Ammunition shipped by the United States to the Afghan National Army. © US Army/AP Photo

Table 1.2 Small Arms Trade Transparency Barometer 2010, covering major exporters*

| | Total (25 max) | Export report (year covered) ** / EU Annual Report **** | UN Comtrade ** | UN Register ** | Timeliness (1.5 max) | Access and consistency (2 max) | Clarity (5 max) | Comprehensiveness (6-5 max) | Deliveries (4 max) | Licences granted (4 max) | Licences refused (2 max) |
|--|----------------------|---|----------------------|----------------------|-------------------------|--------------------------------------|--------------------|--------------------------------|-----------------------|--------------------------------|--------------------------------|
| Switzerland | 21.00 | x (08) | x | x | 1.50 | 1.50 | 4.00 | 5.25 | 3.00 | 4.00 | 1.75 |
| United Kingdom | 18.50 | x (08)/EU Report | x | x | 1.50 | 2.00 | 4.00 | 4.75 | 3.00 | 2.50 | 0.75 |
| Germany ¹ | 17.75 | x (07)/EU Report | x | x | 1.50 | 1.50 | 3.25 | 3.50 | 3.00 | 3.00 | 2.00 |
| Netherlands | 17.00 | x (08)/EU Report | x | x | 1.50 | 2.00 | 3.00 | 4.50 | 3.00 | 2.00 | 1.00 |
| Serbia ² | 17.00 | x (07) | x | x (07) | 1.50 | 1.00 | 3.25 | 3.25 | 3.50 | 2.50 | 2.00 |
| Denmark | 16.50 | x (07/08)/EU Report | x | x | 1.50 | 1.50 | 3.25 | 4.25 | 3.00 | 2.00 | 1.00 |
| Norway | 16.50 | x (08/09) | x | x | 1.50 | 1.50 | 4.00 | 4.00 | 3.00 | 2.50 | 0.00 |
| Romania | 16.50 | x (08)/EU Report | - | x | 1.50 | 1.50 | 2.50 | 3.00 | 3.00 | 3.00 | 2.00 |
| Spain | 16.50 | x (08)/EU Report | x | x | 1.50 | 1.50 | 2.50 | 3.75 | 4.00 | 2.00 | 1.25 |
| Sweden | 16.50 | x (08/09) / EU Report | x | x | 1.50 | 2.00 | 3.50 | 4.25 | 3.00 | 2.00 | 0.25 |
| United States ³ | 16.25 | x (07/08) | x | x | 1.50 | 1.50 | 2.75 | 4.50 | 3.00 | 3.00 | 0.00 |
| Italy | 15.75 | x (08)/EU Report | x | x | 1.50 | 1.50 | 3.50 | 4.50 | 3.00 | 1.50 | 0.25 |
| Belgium ⁴ | 14.75 | x (07)/EU Report | x | x | 1.50 | 2.00 | 2.50 | 3.50 | 3.00 | 2.00 | 0.25 |
| France | 14.50 | x (08)/EU Report | x | x | 1.50 | 1.50 | 4.00 | 2.75 | 3.00 | 1.50 | 0.25 |
| Finland ⁵ | 14.25 | x (08)/EU Report | x | x | 1.50 | 1.50 | 3.00 | 3.25 | 3.00 | 2.00 | 0.00 |
| Poland ⁶ | 14.00 | EU Report | x | x | 1.50 | 1.00 | 2.00 | 3.75 | 4.00 | 1.50 | 0.25 |
| Czech Republic | 13.50 | x (08)/EU Report | x | x | 1.50 | 1.50 | 2.25 | 3.50 | 3.00 | 1.50 | 0.25 |
| Montenegro ⁷ | 13.25 | x (08) | - | x | 1.50 | 1.00 | 2.75 | 3.50 | 1.50 | 3.00 | 0.00 |
| Portugal ⁸ | 13.25 | x (06)/EU Report | x | x | 1.50 | 1.50 | 2.75 | 2.25 | 3.00 | 2.00 | 0.25 |
| Bosnia and Herzegovina ⁹ | 13.00 | x (07) | x (07) | x | 1.50 | 0.50 | 2.50 | 2.50 | 3.00 | 1.50 | 1.50 |
| Slovakia | 12.50 | x (08)/EU Report | x | x | 1.50 | 1.50 | 2.00 | 2.25 | 2.00 | 2.00 | 1.25 |
| Canada ¹⁰ | 12.25 | x (06) | x | x | 1.50 | 1.50 | 2.25 | 4.00 | 3.00 | 0.00 | 0.00 |



* Major exporters are countries that export—or are believed to export—at least USD 10 million worth of small arms, light weapons, their parts, accessories, and ammunition annually. The 2010 Barometer includes all countries that qualified as a major exporter at least once during the 2001-08 period.

** X indicates that a report was issued.

*** The Barometer assesses information provided in the EU's *Eleventh Annual Report* (CoEU, 2009), reflecting military exports by EU member states in 2008.

Scoring system

The scoring system for the 2010 Barometer has remained the same as in 2009, providing comprehensive, nuanced, and consistent thresholds for the various categories. The Barometer's seven categories assess: timeliness, access, and consistency in reporting (categories i-ii), clarity and comprehensiveness (iii-iv), and the level of detail provided on actual deliveries, licences granted, and licences denied (v-vii). For more detailed information on the scoring guidelines, see the Small Arms Survey website.

Explanatory notes

Note A: The Barometer is based on each country's most recent arms export report, made publicly available between 1 January 2008 and 31 December 2009.

Note B: The Barometer takes into account national reporting to the UN Register from 1 January 2008 to 12 January 2010 as well as information states have submitted to UN Comtrade for their 2008 exports up until 12 January 2010.

Note C: The fact that the Barometer is based on three sources—national arms export reports, reporting to the UN Register, and UN customs data—works to the advantage of states that publish data in all three outlets. Points achieved from each of the three sources are added up. The same information is not credited twice, however.

Country-specific notes

- 1) Germany published a national arms export report in 2009 that was limited to data from 2007.
- 2) Serbia published a national arms export report in 2009 that was limited to data from 2007. The country, separated from Montenegro as of 3 June 2006, is evaluated on a 24-point scale as it cannot earn all the points potentially available under 'Access and consistency', which includes two criteria that are based on three consecutive years of reporting.
- 3) The US report is divided into several documents. For the purposes of the Barometer, the 'US annual report' refers to the State Department report pursuant to section 655 on direct commercial sales, as well as the report on foreign military sales that is prepared by the Department of Defense.
- 4) The Belgian regional government in Wallonia did not publish a national arms export report for 2008 by the cut-off date. Belgium is therefore evaluated on the basis of its national report for 2007.
- 5) Finland issued two national reports in 2009, one for its 2007 activities and another for its 2008 activities. Only the report for 2008 was evaluated.
- 6) Montenegro, separated from Serbia as of 3 June 2006, is evaluated on a 24-point scale as it cannot earn all the points potentially available under 'Access and consistency', which includes two criteria that are based on three consecutive years of reporting.
- 7) Poland is one of three EU member states under review that do not produce a national report; however, it does contribute information to the EU Annual Report.
- 8) Portugal did not issue a national report for its arms export activities in 2007 or 2008 by the cut-off date. Portugal is therefore evaluated on the basis of its national report for 2006.
- 9) Bosnia and Herzegovina made available a national arms export report in 2009 that was limited to data for 2007.
- 10) Canada published a national arms export report in 2009 that was limited to data for 2006.
- 11) Austria did not publish a national arms export report for 2008 by the cut-off date. Austria is therefore evaluated on the basis of its national report for 2007.
- 12) Bulgaria did not publish a national arms export report for 2008 by the cut-off date. Bulgaria is therefore evaluated on the basis of its national report for 2007.
- 13) Hungary is one of three EU member states under review that do not produce a national report; however, it does contribute information to the EU Annual Report.
- 14) Cyprus is one of three EU member states under review that do not produce a national report; however, it does contribute information to the EU Annual Report.
- 15) Saudi Arabia did not submit data to UN Comtrade for its 2008 activities. It is therefore evaluated on the basis of its submission for 2007.
- 16) Taiwan's score has been evaluated on the basis of data it submits to UN Comtrade, as published by the International Trade Centre (ITC) in its TradeMap database.
- 17) South Africa does not define the abbreviations it uses in its national report for military categories 'A', 'B', 'C', and 'D'. Efforts to obtain clarification of these categories from the South African authorities were unsuccessful.

Source

Lazarevic (2010b)

ESTIMATING INTERNATIONAL AMMUNITION TRANSFERS

This section explains briefly how the estimated value of USD 4.3 billion for annual transfers of ammunition for small arms and light weapons was calculated. Table 1.3 breaks down the estimate into its small arms and light weapons, and documented and undocumented components. The following sub-sections detail the methods used to generate these figures.

Table 1.3 Estimated values of documented and undocumented authorized ammunition transfers (USD millions)

| | Small arms ammunition | Light weapons ammunition | Total |
|--------------|--|--------------------------|--------------|
| Documented | 960 (small-calibre cartridges and parts) 641 (shotgun shells and parts) | 302 | 1,903 |
| Undocumented | 169 | 2,194 | 2,363 |
| Total | 1,770 | 2,496 | 4,266 |

Estimating transfers of small arms ammunition

The documented trade in small-calibre ammunition was calculated using the method employed by the Norwegian Initiative on Small Arms Transfers (NISAT) and published in previous editions of the *Small Arms Survey*. As in previous years, both import and export data from UN Comtrade were examined, and a cumulative figure was developed for each country. This method can be used to develop estimates of country-specific exports based on data supplied by importers; it can also help to fill in gaps resulting from non-reporting by exporters.²³

The undocumented trade in small-calibre cartridges was assessed using a method similar to that employed for light weapons ammunition (see below). Countries were grouped according to: estimates of the number of firearms owned by civilians and members of the armed forces; gross national income per capita; and production of ammunition. Using available trade data, average imports for each group were calculated, and these were applied to countries that had not reported any data. This method generated an estimate of total imports, from which documented imports were subtracted to produce the estimate of undocumented imports.

An assessment of the undocumented trade in shotgun shells and parts is not required due to the higher level of reporting in these categories and the lack of significant military markets for them (some of which are much less transparent). Since some countries do not report their exports and imports to UN Comtrade, this study relies on data from countries known to be major importers and exporters to fill the gap and ensure sufficient coverage to adequately capture the global trade. Some countries—such as Brazil, China, Cyprus, and Saudi Arabia—report on their exports even though they withhold information on exports of small-calibre cartridges. Presumably this is because shotgun shells are mostly used by civilian sports shooters rather than the military or law enforcement, and so this type of ammunition does not attract the national security concerns associated with small-calibre ammunition employed by the armed forces. In addition, existing import data for shotgun shells and parts is much more likely to cover the major markets because these reports come from countries with the highest numbers of sports shooters (by contrast, some important military markets for small-calibre cartridges are not adequately covered in the trade data).

Estimating transfers of light weapons ammunition

The absence of disaggregated data on light weapons ammunition in UN Comtrade, national reports, and the UN Register called for a radically different approach to calculating a global US dollar value estimate of light weapons ammunition transfers than the one used for small arms ammunition transfers. To overcome the near-total absence of usable transfers data, the estimate focuses on the more plentiful, though still manifestly incomplete, data on government *procurement* of light weapons ammunition. In spite of the problems outlined above, a sufficient number of countries do publish extensive records of public procurement, including contract award notices, which list the value of the items

procured and the identity of the contractor. Working on the assumption that the civilian market for light weapons ammunition is negligible, public procurement records can be used to build up a fairly complete picture of the light weapons ammunition trade in a particular country. The location of the manufacturer often reveals whether the items in the contract were procured domestically or imported.

This approach to estimating the value of global transfers of light weapons ammunition has numerous weaknesses. The most significant limitation is the highly incomplete list of countries that make public their procurement of defence materiel. Despite this obstacle, however, through electronic databases, procurement bulletins, requests under freedom of information laws, and responses from government and industry contacts to queries submitted by the Small Arms Survey,²⁴ the authors were able to compile what they believe to be fairly complete data on government procurement (including imports) of light weapons ammunition in 11 countries: Australia, France, Ireland, Italy, Latvia, Slovakia, South Africa, Sweden, the United Kingdom, the United States, and another African state.²⁵

Data from the 11 countries listed above documents annual imports of light weapons ammunition worth USD 302 million. Because of the large number of countries for which data could not be obtained, however, this documented figure is representative of only a fraction of the total global trade. In order to account for the significant undocumented trade, the authors extrapolated from a ten-country sample (the 11 countries except for Sweden)²⁶ to generate values for imports by similar countries for which little or no data could be obtained. To account for key differences between the countries for which values were extrapolated, countries were assessed according to four criteria that are believed to affect the value of a state's annual imports of light weapons ammunition: its annual military spending per member of its armed forces, the size of its armed forces, whether (and to what extent) the country is involved in armed conflict, and its capacity to produce light weapons ammunition domestically. Every country in the world was categorized according to the first two criteria. The two sets of countries were then divided into three bands: high, medium, and low military spending per service person, and large, medium, and small armed force size.²⁷ All countries were then grouped according to these bands, creating nine categories of states: high military expenditure and large

Table 1.4 Parameters for annual light weapons ammunition procurement country categories

| Country category | Thresholds | |
|------------------|--|------------------|
| | Military expenditure (USD) per active service person | Armed force size |
| High-large | > 100,000 | > 1,000,000 |
| High-medium | > 100,000 | 27,000-1,000,000 |
| High-small | > 100,000 | < 27,000 |
| Medium-large | 20,000-100,000 | > 1,000,000 |
| Medium-medium | 20,000-100,000 | 27,000-1,000,000 |
| Medium-small | 20,000-100,000 | < 27,000 |
| Low-large | < 20,000 | > 1,000,000 |
| Low-medium | < 20,000 | 27,000-1,000,000 |
| Low-small | < 20,000 | < 27,000 |

armed forces, high military expenditure and medium-sized armed forces, and so on down to low military expenditure and small armed forces (see Table 1.4).

The groupings within the nine categories were determined on the basis of two assumptions. First, that between categories there are qualitative differences in government procurement of light weapons ammunition between countries; that is, it is not possible to extrapolate the ammunition procurement value for a low–small country from data on a high–large country.²⁸ Second, that within those categories, light weapons ammunition public procurement doctrine is comparable for purposes of extrapolation, and scalable according to differences in armed force size. In other words, as long as the differences in countries' armed force size and conflict status are taken into account, one can estimate a value for light weapons ammunition procurement for one low–small country based on data from another low–small country.

Documented small arms ammunition transfers in 2007 were worth USD 1.6 billion.

Each of the nine country categories were then populated with an estimate of average annual light weapons procurement per active service person. Where possible, this was calculated from data on actual government procurement. For several categories, however, the estimate is based on values from other categories and input from a range of experts. The authors then multiplied the size of the armed forces of each state by the average annual light weapons procurement per service person of the corresponding band. This process yielded an estimate of average light weapons ammunition procurement for each country in the world.²⁹

Each estimate was then revised upwards or downwards based on the state's conflict status and its capacity for domestic production of light weapons ammunition.³⁰ The modifiers used for these calculations were generated through analysis of the impact of these factors within the ten-country dataset. The sum of these revised estimates (excluding countries for which the authors had data) provided a total estimate for undocumented imports of light weapons ammunition of USD 2.2 billion. By adding this estimate to the value of the documented trade (USD 302 million), the authors arrived at an estimate for the annual authorized transfers of light weapons ammunition of USD 2.5 billion. This estimate is based on data from 2006–09 and represents a typical value rather than an accounting of a single, specific year. For a fuller explanation of how this figure was calculated, please refer to Annexe 1.3.

ANALYSIS OF AMMUNITION TRANSFERS IN 2007

This section looks behind the values set out above, analysing in detail the data used in this study to identify prominent importers and exporters, assess markets, and discuss the implications of developing technologies for ammunition transfers. The first sub-section deals with small arms ammunition and the second with ammunition for light weapons.

Analysis of small arms ammunition transfers, 2007

According to data submitted to UN Comtrade, the value of documented small arms ammunition transfers in 2007 was USD 1.6 billion. This figure reflects transfers of small-calibre cartridges and parts worth USD 960 million, and shotgun shells and parts worth USD 641 million. In addition, using the methodology outlined above, the undocumented trade in small-calibre cartridges is estimated to be worth an additional USD 169 million.

The customs categories used to analyse the documented trade in small arms ammunition cover both finished rounds and parts, but do not include propellant chemicals. Data on propellants is recorded under a separate customs code, which covers products ranging from black powder to smokeless powders and ammonium perchlorate. The global documented market in propellants reported to UN Comtrade was worth USD 442 million in 2007, with the



A worker manufactures .14 calibre cartridges at an ammunition supplier in Miami, April 2009. © Joe Raedle/Getty Images

United States being the largest exporter and importer. However, the trade in propellants is not included in the US dollar value estimates because the data includes propellants for items that are outside the scope of this study, including major conventional weapons and equipment other than arms. Nevertheless, it is safe to assume that the trade in propellants for small arms and light weapons ammunition makes up a significant proportion of the overall trade, meaning that the above estimate for transfers of small arms ammunition and parts underestimates the actual trade by tens, and possibly hundreds, of millions of dollars.

Aside for some exotic products, small arms ammunition is self-contained and cartridge-based.³¹ The basic components are: cartridge case, primer, propellant, and projectile. A given calibre can be employed in many types of weapon and will vary according to the country as well as manufacturer, and whether it is intended for military or civilian use. The most commonly used calibres worldwide include the following NATO and former Warsaw Pact standard cartridges, along with armour-piercing, incendiary, tracer, blank, training, and less lethal variants (Bevan and Pézard, 2006, pp. 24–25).

Rifle, carbine, and machine gun:

- 5.45 x 39 mm Warsaw Pact
- 5.56 x 45 mm NATO or .223 Remington
- 7.62 x 39 mm Warsaw Pact

- 7.62 x 51 mm NATO
- 7.62 x 54R mm Warsaw Pact
- 12.7 x 99 mm NATO (.50 calibre)
- 12.7 x 108 mm Warsaw Pact

Pistol and sub-machine gun:

- 9 x 17 mm Warsaw Pact or .380 ACP (Automatic Colt Pistol)
- 9 x 19 mm or 9 mm Parabellum, NATO, or Luger
- 7.62 x 25 mm Warsaw Pact

Shotgun:

- 12-gauge (18.53 mm)

In 2007, 53 countries had exports worth more than USD 1 million.

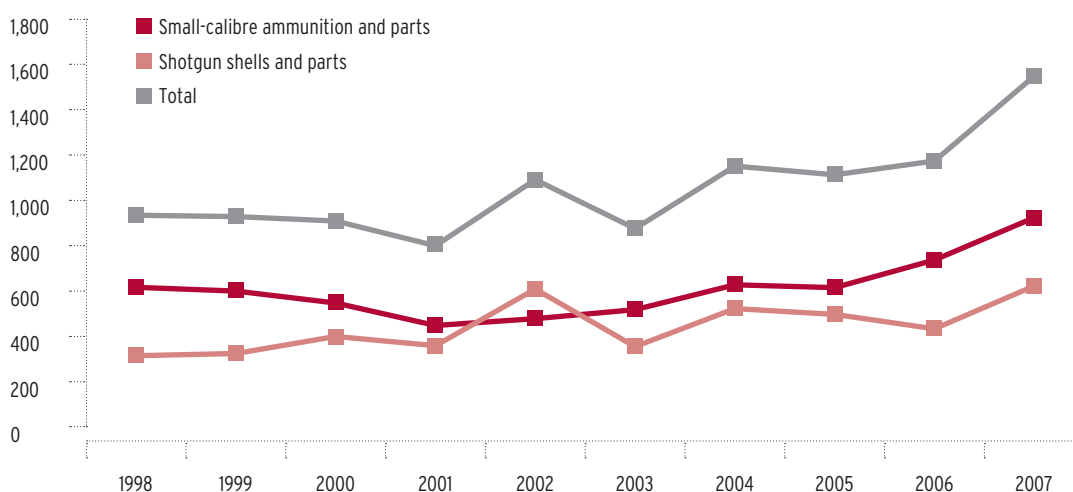
Almost all small arms ammunition is mass-manufactured by modern, commercial companies that have the industrial capacity to produce well over one million cartridges per day and that actively compete for customers worldwide. Market leaders have developed flexible production lines to manage domestic and foreign multiple-contract ammunition requirements from militaries, law enforcement agencies, and sports shooters. Two additional features of this market are noteworthy: the general absence of licensed production agreements and the growing market demand for NATO-standardized cartridges. One of the world's largest military ammunition producers is the US-based Alliant Techsystems (ATK). ATK operates the US government's Lake City Army Ammunition Plant in Missouri, which has the capacity to produce four million rounds a day and has achieved company record annual outputs of more than 1.3 billion rounds (ATK, n.d.a).

Small arms ammunition production takes place in every populated continent of the globe.³² Particularly noteworthy is the identification of manufacturing in 11 African states (Berman, 2007), on a continent not normally associated with arms production. Such widespread production, and a secondary market in surplus ammunition, translates into a large number of exporters. In 2007, according to UN Comtrade, 24 countries had exports of small arms ammunition worth more than 1 per cent of global exports of small arms ammunition; 26 had exports worth more than USD 10 million; and 53 countries had exports worth more than USD 1 million.

The remainder of this section analyses the international trade in small-calibre cartridges and shotgun shells, as reported to UN Comtrade. For the purposes of this chapter, the term 'small-calibre cartridges' is used to refer to ammunition for pistols, rifles, and various types of machine gun that are 12.7 mm calibre or below. The analysis below is based on data from UN Comtrade because, as mentioned earlier in the chapter, other data sources do not provide specific information on the transfer of small arms ammunition.

As noted in the *Small Arms Survey 2009*, one of the most striking trends in transfers of small arms and light weapons over the past ten years has been an increase in the value of the documented international trade in small arms ammunition (Small Arms Survey, 2009, pp. 13–17). As shown in Figure 1.2, after adjusting for inflation, the value of the trade in small-calibre cartridges in constant 2006 US dollars increased by 50 per cent over the ten-year period, and shotgun shells by 96 per cent. While it is beyond the scope of this chapter to present a complete explanation for this rise, it is safe to assume that the military operations in Iraq and Afghanistan are partly responsible for the increase in the trade in small-calibre cartridges. Conversely, growing civilian demand was the most likely cause of the increase in the trade in shotgun shells.

Figure 1.2 Value of the trade in small-calibre cartridges and shotgun shells, 2000–07 (USD millions)



Note: The values have been adjusted for inflation and are expressed in constant 2006 US dollars.³³

Source: NISAT's analysis of UN Comtrade

The following sections disaggregate the USD 1.6 billion value of the documented authorized trade in ammunition for small arms by examining the main exporters and importers of small-calibre ammunition and parts, shotgun shells, and parts of shotgun shells (the discrepancy between that value and what is shown in Figure 1.2 is due to adjustment for inflation). The United States is by far the largest importer of small-calibre ammunition and shotgun shells. That it is not the largest importer of parts of shotgun shells suggests that these materials are being exported to manufacturers who export completed shotgun shells—to the US and other markets. The data may well reflect several stages in the production chain as components and commodities are sourced internationally and then manufactured into finished products, which are then exported to the main markets. In Tables 1.5 to 1.10 the calculation of the top five trade partners used a threshold to exclude any insignificant exporters or importers. If a country accounted for one per cent or less of transfers, it was deemed insignificant and was not included in the list of the top five exporters or importers.

Small-calibre cartridges

The main markets for small-calibre cartridges are the following three sectors: the military, law enforcement, and civilian sports shooters. In countries that are not at war, military and law enforcement procurement is mainly for training and to replenish ageing or obsolete stockpiles. In many countries, the number of authorized civilian firearm owners significantly exceeds personnel employed in the military and law enforcement.

The value of the documented international imports of small-calibre cartridges and parts in 2007 was USD 960 million. The United States dominated the trade with some 23 per cent of global exports; no other country had more than ten per cent. The Russian Federation did not report any data to Comtrade on its small-calibre cartridge exports in 2007 and so it may deserve a higher ranking in the list of top ten exporters.³⁴ In addition, China, South Africa, Israel,³⁵ and Ukraine, all known from press articles and interviews to be important exporters, did not report either, and so it is possible that they also belong in the top ten list. Table 1.5 lists the top ten exporters of small-calibre cartridges.³⁶

Table 1.5 Top ten exporters of small-calibre cartridges and parts

| Exporter | Value in USD millions | Per cent of global exports | Top five export markets (in descending order) |
|--------------------|-----------------------|----------------------------|--|
| United States | 214.6 | 23 | Canada, Israel, Australia, Spain, South Korea |
| Germany | 85.1 | 9 | Switzerland, France, Netherlands, UK, Austria |
| South Korea | 62.0 | 7 | US, Australia, Indonesia, Thailand |
| Canada | 59.2 | 6 | US, UK, Oman, Denmark |
| Switzerland | 52.9 | 6 | Netherlands, Germany, Poland, Denmark, Spain |
| Norway | 48.8 | 5 | Poland, Czech Republic, Austria, Australia, Thailand |
| Russian Federation | 44.5 | 5 | US, Germany, Kazakhstan, New Zealand, Finland |
| Taiwan | 34.4 | 4 | US |
| Brazil | 29.7 | 3 | US, Germany, Argentina, Latvia, Spain |
| Spain | 29.4 | 3 | US, Kenya, UK, Poland, Portugal |

Source: NISAT's analysis of UN Comtrade

The US is by far the largest importer of small-calibre cartridge ammunition, accounting for 29 per cent of global imports. No other country had imports accounting for more than five per cent of the global total. Table 1.6 lists the top ten importers of small-calibre cartridge ammunition.

Table 1.6 Top ten importers of small-calibre cartridges and parts

| Importer | Value in USD millions | Percent of global imports | Top five sources of imports (in descending order) |
|----------------|-----------------------|---------------------------|---|
| United States | 277.9 | 29 | South Korea, Russian Federation, Canada, Taiwan, Brazil |
| Poland | 45.7 | 5 | Norway, Switzerland, Czech Republic, Spain, Germany |
| Australia | 45.3 | 5 | US, an unspecified country, South Korea, Norway, United Arab Emirates |
| Germany | 42.4 | 4 | US, Switzerland, Czech Republic, Sweden, Brazil |
| Canada | 40.6 | 4 | US, UK, Sweden, Germany, France |
| United Kingdom | 33.7 | 4 | US, Canada, Germany, Spain, Bosnia and Herzegovina |
| Israel | 32.3 | 3 | US, Bosnia and Herzegovina, Turkey |
| Netherlands | 31.6 | 3 | Switzerland, Germany, Canada, UK, France |
| Switzerland | 28.1 | 3 | Germany, Canada, Bosnia and Herzegovina, UK, Italy |
| Spain | 26.0 | 3 | US, Switzerland, Germany, Italy, Sweden |

Source: NISAT's analysis of UN Comtrade

Shotgun shells

The value of documented imports of shotgun shells and parts during 2007 was USD 641 million. While shotguns are used by law enforcement and the military, in most countries the civilian sporting markets are much larger. The data provided by Comtrade is disaggregated into complete shells and parts, which include lead shot and cartridge wads,

Table 1.7 Main exporters of shotgun shells, 2007

| Exporter | Value in USD millions | Per cent of global exports | Top five export markets (in descending order) |
|----------------|-----------------------|----------------------------|---|
| Brazil | 74.2 | 20 | US, UK, Colombia, Belgium, Netherlands |
| Italy | 72.5 | 19 | Spain, UK, Turkey, France, US |
| Spain | 40.2 | 11 | UK, Ghana, Turkey, Portugal, Guinea |
| United States | 26.6 | 7 | Canada, Australia, Colombia, Taiwan, Belgium |
| Singapore | 21.8 | 6 | Nigeria, Sri Lanka |
| China | 20.1 | 5 | Saudi Arabia, Singapore, Kenya, Bangladesh, Botswana |
| United Kingdom | 18.9 | 5 | Denmark, Ireland, Spain, US, Netherlands |
| France | 17.3 | 5 | Germany, Spain, Japan, UK, US |
| Germany | 11.8 | 3 | Saudi Arabia, France, US, UK, Italy |
| Turkey | 11.5 | 3 | United Arab Emirates, Lebanon, Yemen, Georgia, Israel |

Source: NISAT's analysis of UN Comtrade

Table 1.8 Main importers of shotgun shells, 2007

| Importer | Value in USD millions | Per cent of global imports | Top five sources of imports (in descending order) |
|----------------|-----------------------|----------------------------|--|
| United States | 31.3 | 8 | Brazil, Italy, France, UK, Germany |
| United Kingdom | 30.4 | 8 | Brazil, Italy, Spain, Cyprus, France |
| Nigeria | 21.6 | 6 | Singapore |
| France | 19.5 | 5 | Italy, United Arab Emirates, Germany, Belgium, Spain |
| Spain | 17.0 | 4 | Italy, France, UK, Belgium, Brazil |
| Saudi Arabia | 17.0 | 4 | China, Germany, Bosnia and Herzegovina, South Africa, France |
| Belgium | 15.0 | 4 | Brazil, Italy, US, UK, France |
| Singapore | 13.2 | 3 | China, Brazil, South Africa, Indonesia, UK |
| Turkey | 12.5 | 3 | Italy, Spain, Cyprus, UK, US |
| Canada | 12.1 | 3 | US, Brazil, UK, Serbia, Italy |
| Colombia | 12.0 | 3 | Brazil, US |

Source: NISAT's analysis of UN Comtrade

bases, cases, cups, and linings.³⁷ There is more comprehensive reporting on shotgun shells and their parts than small-calibre cartridges. For example, China reports on transfers of shotgun shells but not on small-calibre cartridges.

In 2007, documented imports of shotgun shells (excluding parts) were worth USD 379 million. The top three exporters—Brazil, Italy, and Spain—account for half of all identified exports. Table 1.7 lists the main exporters of shotgun shells in 2007.

The United States was the largest importer of shotgun shells, but it did not hold the dominant position it held in small-calibre cartridges—or in other categories of small arms and light weapons (Small Arms Survey, 2009, pp. 32–47). Table 1.8 lists the main importers of shotgun shells in 2007.

Table 1.9 Main exporters of parts for shotgun shells, 2007

| Exporter | Value in USD millions | Per cent of global exports | Top five export markets (in descending order) |
|---------------|-----------------------|----------------------------|---|
| France | 44.7 | 17 | Italy, UK, Spain, US, Republic of Congo |
| Italy | 37.0 | 14 | Spain, US, France, Russian Federation, UK |
| Spain | 21.8 | 8 | UK, France, Ireland, Portugal, US |
| Greece | 19.5 | 7 | Italy, France, Cyprus |
| Bulgaria | 18.8 | 7 | Yemen, Honduras |
| Turkey | 17.6 | 7 | France, Italy, Spain, Mali, Greece |
| United States | 17.4 | 7 | Malaysia, Canada, Taiwan, Germany, Saudi Arabia |
| Germany | 14.8 | 6 | Russian Federation, US, France, Italy, UK |
| China | 13.9 | 5 | US, Germany, France, Singapore, Sweden |
| Ukraine | 7.8 | 3 | Yemen |

Source: NISAT's analysis of UN Comtrade

Table 1.10 Top ten importers of parts for shotgun shells, 2007

| Importer | Value in USD millions | Per cent of global imports | Top five sources of imports (in descending order) |
|--------------------|-----------------------|----------------------------|---|
| Italy | 37.9 | 14 | Greece, France, Turkey, UK, Germany |
| Yemen | 31.7 | 12 | Bulgaria, Ukraine, Belgium |
| United States | 27.3 | 10 | China, Italy, Peru, France, Taiwan |
| United Kingdom | 26.3 | 10 | France, Spain, Ireland, Italy, Canada |
| France | 24.8 | 9 | Turkey, Spain, Italy, Greece, UK |
| Spain | 15.8 | 6 | Italy, France, Turkey, Germany, China |
| Germany | 7.4 | 3 | Italy, US, France, China, Turkey |
| Russian Federation | 7.4 | 3 | Italy, Germany, France, Spain, Canada |
| Turkey | 4.6 | 2 | Czech Republic, Italy, Spain, Hungary, Germany |
| Ireland | 3.9 | 2 | Spain, UK, Germany |

Source: NISAT's analysis of UN Comtrade

The total value of imports of parts for shotgun shells in 2007 was USD 262 million. The largest exporter was France with 17 per cent of all exports, closely followed by Italy with 14 per cent. All other countries had exports valued at less than ten per cent of the global trade. Table 1.9 lists the main exporters of parts for shotgun shells in 2007.

Italy was the largest importer of parts for shotgun shells, which may be attributed to Italy's position as a prominent exporter of complete rounds. Table 1.10 lists the top ten importers of parts for shotgun shells in 2007.

Undocumented trade

The undocumented trade (i.e. unreported authorized transactions that have not been included in the above section) in small-calibre cartridges and parts is estimated to be worth at least USD 169 million (using the methodology outlined above). The most important countries for which this survey did not have Comtrade data were the four that experienced high-intensity conflict in 2007:³⁸ Afghanistan, Iraq, Sri Lanka, and Somalia. Such combat is likely to have involved very high use of ammunition; these four countries comprised 71 per cent of the total value of the estimated undocumented trade. The estimate of their imports of small arms ammunition was informed by press reports and other documentation in the public domain, available Comtrade data from exporters to these countries, and an assessment of imports by other countries that were formerly involved in high-intensity conflict and reported their imports to Comtrade.

Analysis of light weapons ammunition transfers

Background

As explained above, for the purposes of this chapter the term light weapons ammunition includes mortar bombs up to and including 120 mm in calibre; rounds for recoilless rifles; grenades; and unguided rockets fired



US soldiers sort through ammunition during an accountability procedure at Kandahar Airport, Afghanistan, January 2002. © Rob Curtis/AP Photo

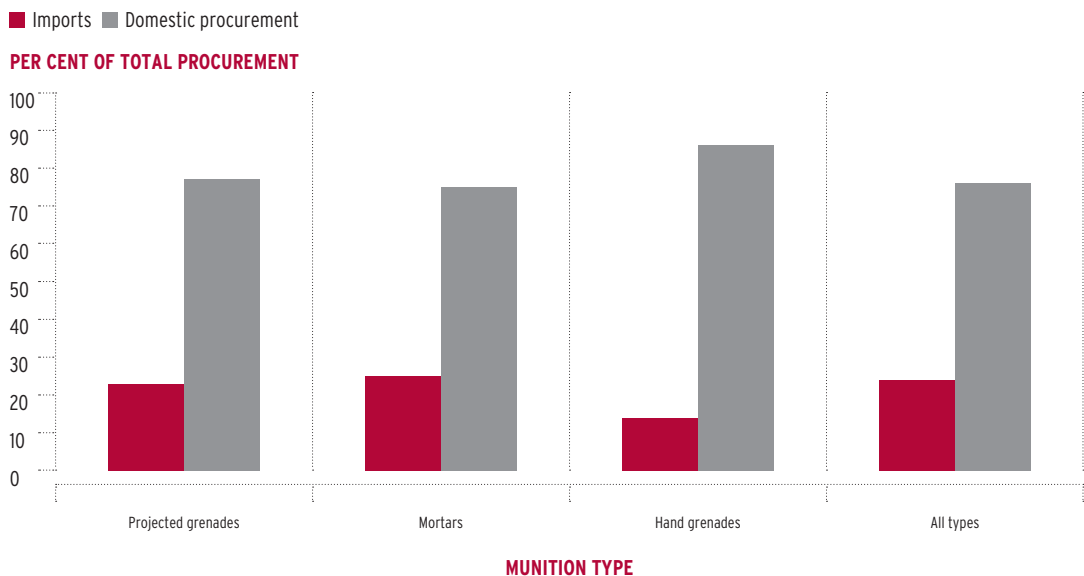
from reusable launchers. These items differ significantly from one another in terms of purpose, size, cost, and sophistication, even within the same category. Mortar bombs are a good example. On one end of the technological spectrum is the 52mm Mk 2/1 HE bomb, which is unguided³⁹ and has a range of just 480 metres (Jones and Ness, 2007, p. 709). On the other end is the Fireball, a 120 mm guided round that, in tests in 2008, landed within 5 metres of a target 6 kilometres away (Richardson, 2008). Mortar bombs serve a variety of purposes, including: attacking personnel, vehicles, and buildings; communicating with and concealing friendly forces; illuminating the battlefield; and setting fires. Grenades also serve a variety of functions and vary significantly in terms of cost and technological sophistication. While uses for recoilless rifles and rockets are more limited, the cost and capabilities of their ammunition also vary significantly from system to system.

Transfers of light weapons ammunition

As explained above, the USD 2.5 billion estimate for annual international transfers in light weapons ammunition was derived from contract award notices and other documents issued by 11 countries. This data, coupled with partial procurement data from several other states, highlights a number of important characteristics of the global market in light weapons ammunition that are relevant to international transfers.

First, states with the capacity to produce their own light weapons ammunition tend to procure the majority from domestic producers. Since this group includes many of the world's largest national markets for light weapons ammunition, the implications for international transfers are significant.⁴⁰ Data on procurement by the countries studied indicates that states with an indigenous capacity to produce hand grenades, projected grenades, or mortars procured, on average, nearly 76 per cent of these items (by value) from domestic contractors. As shown in Figure 1.3, hand grenades were most frequently procured domestically, with approximately 86 per cent of contracts awarded to domestic producers. Exporters of mortar bombs and projected grenades fared somewhat better, winning approximately 25 per cent and 23 per cent, respectively, of the combined value of contracts awarded by producer states (75 per cent domestic procurement of mortar bombs and 77 per cent of projected grenades).

Figure 1.3 **Domestic procurement and imports of light weapons ammunition by type among countries with production capacity**



While these markets are largely dominated by domestic producers, the absolute value of imports, including imports of component parts, is significant nonetheless. The estimated sum of imports of light weapons ammunition by the 11 countries studied averages around USD 302 million annually. It should be noted that these values do not necessarily reflect all foreign components imported by manufacturers for assembly in the client country, the cumulative value of which is probably significant. For example, the unit cost of the German M776 fuse, which is used in the US military’s M930 120 mm illuminating mortar bomb, is approximately USD 200, or roughly 20 per cent of the total cost of the item. The total cost of M776 fuses imported by US manufacturers to fill contracts awarded by the US Army in 2008 alone was more than USD 7 million (US Army, 2009, p. 278).

A second characteristic of the global market in light weapons ammunition underscored by the data is the continued dominance of Western producers of light weapons ammunition in Western markets. In fact, the data indicates that the value of contracts awarded by the United States, Australia, and five European countries⁴¹ to contractors located outside of North America, Australia, and Europe was less than four per cent of the total value of all contracts. Consequently, non-Western firms often contend that they are shut out of key markets,⁴² as illustrated by a 2005 statement by the CEO of the South African defence firm Denel, which manufactures a wide range of ammunition:

[M]uch of global defence spend[ing] is not directly accessible to independent contractors like Denel [. . .]. The US Department of Defense in recent years has awarded contracts almost exclusively to US and NATO companies. These companies supply most other markets, too. Developing nations like India, Brazil and Israel have strong domestic industries to serve their own customer[s], whilst giving intense competition to other independents (DID, 2009).

Figure 1.4 shows the locations of suppliers that won contracts for light weapons ammunition issued by Australia, France, Italy, Latvia, Slovakia, the United Kingdom, and the United States. Singapore Technologies Kinetics (STK) is the only non-Western company to claim more than one per cent of this market, winning 3.4 per cent of the value of all contracts. The market share of the other non-Western firms awarded contracts was minuscule. As illustrated in

Figure 1.4 Market share by country of origin of manufacturers of light weapons ammunition procured by seven Western countries, 2006-09

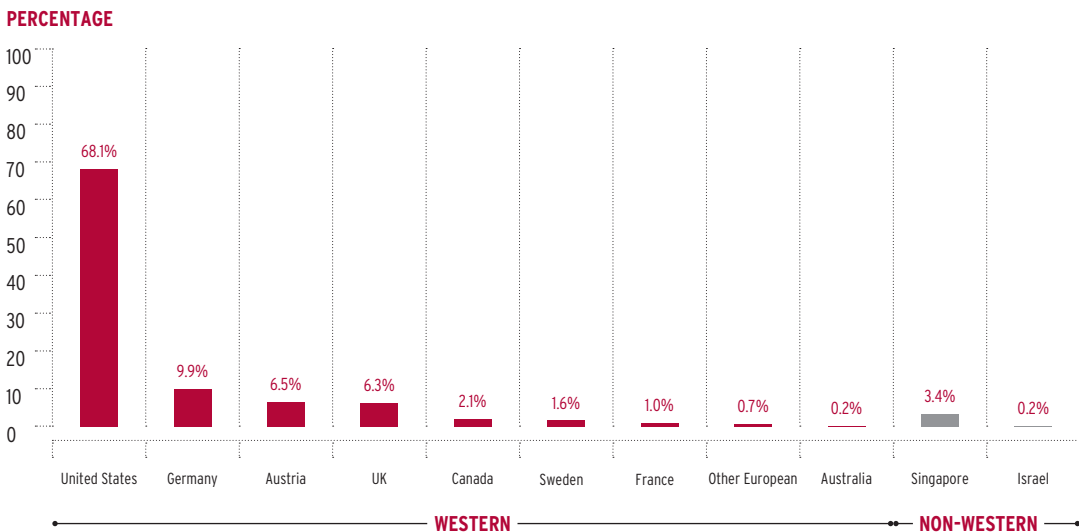


Table 1.11 Procurement and consumption of ammunition by an Italian Army unit, 2007-08

| Type | Calibre | Model | Quantity acquired | Quantity consumed 2007 | Quantity consumed 2008 | Stock expiration year | Country of production |
|--------------------------|----------|--|-------------------|------------------------|------------------------|-----------------------|-----------------------|
| Small-calibre cartridges | 9 mm | Parabellum | 590,000 | 280,000 | 310,000 | n/a | Italy |
| | 5.56 mm | Ordnance | 1,030,000 | 610,000 | 520,000 | n/a | Italy |
| | .308 | Subsonic | 6,600 | 1,000 | 4,500 | 2019 | Finland |
| | .308 | Scenar 167 gr (Lapua) | 4,900 | 0 | 1,600 | 2019 | Finland |
| | .308 | Scenar 167 gr (RUAG) | 4,500 | 0 | 3,750 | 2019 | Switzerland |
| | .308 | Scenar 175 gr (RUAG) | 2,900 | 720 | 550 | 2019 | Switzerland |
| | .338 | Lock Base (Lapua) | 3,000 | 1,455 | 1,250 | 2010 | Finland |
| | .338 | Ball (RUAG) | 1,100 | 0 | 75 | 2015 | Switzerland |
| | .338 | Armour-piercing (RUAG) | 1,000 | 540 | 100 | 2016 | Switzerland |
| | .338 | Scenar (Lapua) | 3,000 | 1,720 | 770 | 2010 | Finland |
| | 12.7 mm | Barrett | 800 | 410 | 700 | 2016 | US |
| | 12.7 mm | Armour-piercing incendiary tracer for Browning | 5,500 | 100 (belts) | 130 (belts) | 2012 | US |
| Shotgun shells | 12-gauge | Anti-riot | 3,400 | 120 | 368 | n/a | Italy |
| | 12-gauge | Door-breaching buckshot | 850 | 0 | 90 | n/a | Italy |
| | 12-gauge | Slug round | 9,000 | 260 | 1,164 | n/a | Italy |
| Grenades | 40 mm | 40 x 46 mm HE DP92 | 1,000 | 228 | 313 | 2011 | Germany |
| | 40 mm | 40 x 46 mm smoke | 1,000 | 42 | 0 | 2011 | Germany |
| | 40 mm | 40 x 53 mm high-explosive dual-purpose | 500 | 0 | 385 | 2015 | Germany |
| | 40 mm | 40 x 53 mm impact signature | 520 | 0 | 500 | 2011 | Germany |
| | 40 mm | 40 x 46 mm CS gas | 1,200 | 0 | 10 | 2011 | Germany |
| | 40 mm | 40 x 46 mm training-practice tracer DM 118A2 | 1,500 | 475 | 1,582 | 2009 | Germany |

Note: n/a = not available.

Figure 1.4, the only other non-Western firm to win contracts in 2006–09 was Rafael in Israel, and the value of its contracts totalled less than one per cent of the value of contracts awarded by the seven Western countries.

Data on the procurement and consumption of small arms and light weapons ammunition by the Italian military provides a more detailed look at European procurement, including the dominance of Western ammunition markets by Western companies. Table 1.11 contains data on the allocation and consumption of ammunition by a highly specialized unit of the Italian armed forces. The unit is ‘an operative group of around 30 soldiers who train in Italy for 6 months and are deployed in high-intensity operating theatres for 6 months’ (Persi Paoli, 2009).

Despite the obstacles to penetrating foreign markets, a few companies outside Europe and North America are winning contracts from Western governments and producing innovative products that could increase their market share in Western countries. STK, for example, produces a full range of advanced grenades that have attracted significant attention from the European market. The UK government has awarded nearly USD 100 million in contracts for projected grenades to STK since 2007, and in 2009 STK won a USD 10 million grenade contract from the Swedish government (*ASDNews*, 2009). It also recently won a contract with an unspecified European government for its SPARCS⁴³ surveillance round.⁴⁴ In 2010, the company will be introducing a medium-velocity 40 mm round with a range of 800 metres—double the range of a typical low-velocity round. According to an STK representative, the round can be fired from common under-barrel grenade launchers and will also be more accurate since it flies at a flatter trajectory, making it less susceptible to environmental conditions such as wind.⁴⁵ Similarly, Israel Military Industries and Rafael have won contracts for 120 mm mortar bombs and rifle-launched door-breaching grenades (Simon), respectively.

Few companies
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governments.

A third characteristic of the global market in light weapons ammunition highlighted by the data is the effect of conflict on light weapons ammunition consumption. The value of mortar bomb procurement by the US Army, for example, rose from an average of approximately USD 126 million per year during the three fiscal years prior to the wars in Afghanistan and Iraq (1999–2001) to approximately USD 218 million annually in fiscal years 2005–07. The value of contracts awarded by the Australian military increased even more dramatically. Australian procurement of identified light weapons ammunition from 1997 to 2000 totalled approximately USD 27 million whereas contracts awarded from 2005 to 2008 reached nearly USD 88 million, an increase of more than 300 per cent. One explanation for this increase is that during the latter period Australia had between 850 and 1,750 soldiers deployed in active war zones in Iraq and Afghanistan (IISS, 1997–2009). From 1997 to 2000, Australia had military deployments, but these were as peacekeepers who were not engaged in sustained combat. Interestingly, Australian procurement of recoilless rifle rounds jumped from approximately USD 7 million to USD 43 million between the same two periods.

Detailed data on the procurement and import of light weapons ammunition by governments other than the 11 countries identified above is often difficult to find. Nonetheless, media accounts of recent deals and information gathered from country experts shed some light on ammunition transfers outside of the 11 countries. Research conducted for this chapter suggests that domestic producers also dominate many of the largest national non-Western markets, as evidenced by the near total reliance on domestically produced light weapons ammunition by the Russian military. Sources familiar with the Chinese, Indian, and Pakistani militaries report that they also procure almost all of their light weapons ammunition from domestic producers.⁴⁶

Russian analyst Maxim Pyadushkin argues that the reason for the dominance of domestic sources of light weapons ammunition in the Russian Federation is twofold:

- 1) *it has no foreign-made light weapons in service [in] the Armed Forces and [. . .] paramilitary agencies, and*
- 2) *the local defence industry is still capable [of producing] all types of ammunition for the light weapons used by the Russian military and law enforcement agencies* (Pyadushkin, 2009, p. 3).


Media accounts provide some insight into the (very different) procurement patterns of countries in conflict and those prohibited from importing light weapons ammunition from Western producers. These countries have turned to China and smaller, regional suppliers for their light weapons ammunition. Myanmar, which has been under US and European arms embargoes for nearly 20 years, has turned to non-Western producers, including Vietnam, Pakistan, and possibly China, for light weapons ammunition. In 2001, it purchased 50,000 82 mm mortar bombs from Vietnam for USD 2 million (Karniol, 2001).⁴⁷ China has also supplied large quantities of light weapons ammunition to Sri Lanka, which just recently emerged from a 26-year civil war. The Sri Lankan military reportedly signed an agreement with the Chinese firm Poly Technologies in 2007 for more than 120,000 81 mm and 120 mm mortar bombs, 2,000 rocket-propelled grenades, and other munitions. The mortar bombs alone reportedly cost USD 14 million (Karniol, 2007). Other recent importers of Chinese light weapons ammunition include Nepal's monarchy—the anti-democratic actions of which prompted countries to suspend arms sales to Nepal—and Zimbabwe, which is under several national and multilateral arms embargoes (Sangraula, 2006, p. 4; Davis, 2005; Beresford, 2008).



TECHNOLOGICAL DEVELOPMENTS IN LIGHT WEAPONS AMMUNITION

Recent technological developments in light weapons ammunition range from the mundane⁴⁸ to the truly revolutionary. Some of these developments have the potential to transform not only the battlefield but also the international trade in light weapons ammunition, including the illicit trade.

Technological advances are increasing the range, accuracy, and lethality of projected grenades. The incorporation of micro-adaptive flow control (tiny bursts of air that alter the round's trajectory in flight) could nearly double the effective range of grenades fired from common grenade launchers (Kucera, 2005). Similarly, grenades fired from the Individual Airburst Weapon System will reportedly allow users to consistently hit partially concealed targets up to 500 metres away with a single computer-programmed round (ATK, n.d.b). Other developments are creating entirely new battlefield roles for grenades, such as surveillance. STK's SPARCS round consists of a camera with a parachute that 'captures strategic aerial images during descent and transmits [them] to a receiver, a PDA [personal digital assistant] or laptop on the ground' (Minnick, 2009).



Lebanese soldiers sit on boxes of ammunition in a transport truck driving towards the Palestinian refugee camp of Nahr-al-Bared, Lebanon, June 2007. © David Furst/AFP

Key developments in mortar bomb technology include precision guidance,⁴⁹ extended range (through rocket propulsion or gliding), and warheads that can deliver a variety of payloads, including sub-munitions⁵⁰ (Bonomo et al., 2007, p. 37). Other projects—such as mortar bombs dropped from unmanned aerial vehicles and unmanned aerial vehicles launched from mortar tubes—illustrate the novel mixing of platforms and ammunition that is blurring lines between weapons systems.

Implications for the international trade

The effect of these developments on the international trade could be significant. Greater accuracy and the need for less training could lead to significant reductions in the quantity of imported grenades and mortars, although the higher unit costs of these items means that the total value of the international trade in these items may not decrease dramatically.⁵¹ Exporters of the new ammunition may also see significant increases in their share of the international trade; assuming they perform as advertised, the weapons will have financial as well as military appeal to potential customers. Not only do the new rounds outperform their counterparts militarily and have a smaller logistical footprint, but some may also substitute for more expensive weapons in certain circumstances, with significant cost savings for the importer. Instead of eliminating a sniper ensconced in a building with a guided bomb costing thousands of dollars, troops armed with advanced airburst grenades could ‘[d]o the same thing with a \$25 round’ (Osborn, 2009).⁵²

The lethality and ease of use of these systems may also attract attention from arms traffickers and their clients.⁵³ Some systems are extremely accurate, require minimal training, and can be assembled and fired quickly, minimizing the risk of capture. Someone with minimal training in mortars could accurately direct a salvo of GPS-aided 120 mm mortar bombs filled with sub-munitions at a highly populated area from up to 11 km away (Bonomo et al., 2007, pp. 71–75). Similarly, since the Individual Airburst Weapon System automatically programmes its grenades to explode at the optimal distance from the target, ‘the operator need only follow two steps to hit the target’ (Bonomo et al., 2007, p. 13). Ironically, the advanced technology that makes these weapons and ammunition so lethal may also render them more controllable. A 2007 RAND report identifies several technical controls that, when applied to the guidance and warhead arming systems used in these weapons, would limit the duration and location in which they could be used (Bonomo et al., 2007, pp. 87–96). If widely adopted and combined with strong transfer controls and robust stockpile security, technical controls could curb the illicit trade in next-generation light weapons ammunition.

CONCLUSION

This chapter has sought to fill some of the gaps in our understanding of the authorized trade in small arms and light weapons ammunition—an important component of the wider trade in small arms and light weapons and potentially a key means of restricting the fuel of armed violence. To this end, the chapter provides a thorough overview of existing data on ammunition transfers while also estimating the value of transfers that are not reflected in data submitted to UN Comtrade. UN Comtrade data reveals that the annual documented trade in small arms ammunition for 2007 was worth approximately USD 1.6 billion, with small-calibre cartridges and parts accounting for USD 960 million and shotgun shells and parts accounting for USD 641 million. Given the large number of countries reporting on small arms ammunition in 2007, it is likely that these figures reflect most transfers worldwide. Nonetheless, several exporting and importing states do not submit data on transfers of small-calibre cartridges to UN Comtrade. This undocumented trade was estimated to be worth approximately USD 169 million in 2007.

The international trade in light weapons ammunition is significantly less transparent than the trade in small arms ammunition. As explained above, data on transfers of light weapons ammunition in UN Comtrade and in most arms export reports is aggregated with data on other items, rendering it useless for the purposes of this chapter. Therefore, this study uses data from other sources to assess the annual trade in light weapons ammunition, whose value is estimated to be USD 2.5 billion. The combined estimate of USD 4.3 billion for authorized small arms and light weapons ammunition transfers (documented and undocumented) confirms that the previous estimate of USD 4 billion for transfers of all small arms and light weapons, their parts, accessories, and ammunition was a significant underestimate.⁵⁴

This new figure for ammunition transfers remains an estimate due to the continuing lack of detailed import and export data, particularly with regard to light weapons ammunition. However, the barriers to improved understanding of the international trade in small arms and light weapons ammunition transfers are not insurmountable. The use of public procurement data in this study has filled significant gaps in our knowledge, and the authors have presented a method by which this data can be used to extrapolate a more complete picture of global imports. This method can be refined and improved through future research. Even modest improvements in government reporting on ammunition transfers and information sharing between governments, industry, and civil society could yield large dividends in our understanding of how much ammunition is being acquired and by whom. Given the critical role ammunition plays in initiating and sustaining armed violence, is it not time to bring it out of the shadows? ■

LIST OF ABBREVIATIONS

| | |
|-------------|--|
| ATK | Alliant Techsystems |
| EDA | European Defence Agency |
| EU | European Union |
| NISAT | Norwegian Initiative on Small Arms Transfers |
| STK | Singapore Technologies Kinetics |
| TED | Tenders Electronic Daily (database) |
| UN Comtrade | United Nations Commodity Trade Statistics Database |
| WTO | World Trade Organization |

ANNEXES

Online at <http://www.smallarmssurvey.org/yearbook2010.html>

Annexe 1.1 Annual authorized small arms and light weapons exports for major exporters (yearly exports of more than USD 10 million), 2007

This annexe provides UN Comtrade data on transfers of small arms and light weapons from major exporters in 2007.

Annexe 1.2 Annual authorized small arms and light weapons imports for major importers (yearly imports of more than USD 10 million), 2007

This annexe provides UN Comtrade data on transfers of small arms and light weapons from major importers in 2007.

Annexe 1.3 Methodology

This annexe provides a detailed summary of the methodology used in Chapter 1, 'Emerging from Obscurity: The Global Ammunition Trade'.

ENDNOTES

- 1 As reported, on site, to James Bevan, Small Arms Survey, immediately after the firefight.
- 2 Consequently, there have been relatively few studies assessing the authorized trade in ammunition. Glatz (2006) is a rare exception.
- 3 See, for example, Glatz (2006, pp. 70–71), which analyses UN Comtrade to account for approximately USD 700 million in small arms ammunition transfers annually in 1999–2003.
- 4 This chapter uses the term 'Western' to refer to all members of the European Union, Norway, Switzerland, the United States, Canada, and Australia.
- 5 For additional information, see the online annexes to this chapter (major exporter and importer tables for 2007).
- 6 The definition of 'small arms' and 'light weapons' used by the Group of Experts is the same as the commonly used definition in the 1997 *Report of the Panel of Governmental Experts on Small Arms* (UNGA, 1997).
- 7 The overwhelming majority of records reported by UN Comtrade and used in this chapter concern cartridges below 12.7 mm. Yet because international standard customs categories do not have a definitive calibre threshold, it is possible that some 14.5 mm and 20 mm or larger cartridges may be included in the data, particularly cartridges used in (crew-portable) machine guns and a few models of anti-materiel rifles. For the purposes of this chapter, cartridges that are often or solely used in heavy machine guns and anti-materiel rifles—often defined as light weapons—are treated as small arms ammunition because customs data on these items is not disaggregated from ammunition for small arms.
- 8 Parts and components of small arms ammunition include bullets, shot, cartridge bases, cups, linings, wads, and cases. Propellants are considered in passing because transfer data from UN Comtrade does not disaggregate propellants for small arms, light weapons, major conventional weapons, and uses unconnected to weaponry.
- 9 A similar rationale for excluding cannon as a light weapon is provided in Small Arms Survey (2008, p. 10, box 1.2).
- 10 An example is the M72 light anti-armour weapon.
- 11 Also excluded are rockets that are crew-portable but that were designed for use in systems not typically categorized as light weapons.
- 12 For more information on UN Comtrade, including its limitations, see Small Arms Survey (2009, p. 10).
- 13 This data is not without its vagaries and limitations, however, as discussed in Khakee (2005).
- 14 See Annexe 1.3 for a full list of sources.
- 15 The Governments of Ireland (Department of Defence) and Sweden were particularly forthcoming. Both provided detailed information on light weapons ammunition procurement in recent years and promptly responded to multiple queries about the data. Detailed data was also provided by the UK government in response to a freedom of information request.
- 16 See Annexe 1.3 for a full list of sources.
- 17 National defence covers one of the two paragraphs in Article XXIII of the WTO Agreement, which deals with exemptions; the EU regulations on public procurement have a specific exemption for arms, munitions, and war material intended for military purposes (European Union, 1997).
- 18 National arms exports include information EU states have contributed to the EU Annual Report on military exports (CoEU, 2009).
- 19 For the 2010 Barometer, which covers export activity for 2008, major importers and exporters were identified using data for 2007 and 2008.
- 20 For an in-depth analysis, see Lazarevic (2010a).
- 21 Correspondence with US military official, October 2009.
- 22 According to *The New York Times*, the Albanian government received USD 22 per 1,000 rounds of the ageing ammunition (Chivers, 2008). Note that this estimate is from a single source.
- 23 For more information, see Marsh (2005) and Khakee (2005, pp. 98–99).
- 24 See Annexe 1.3 for a full list of sources.
- 25 Data on the unnamed African country was provided on the condition of anonymity. Data on France was taken from Gobinet (2009).
- 26 Data on Sweden was not included because it only reflects imports, not full procurement (i.e. domestic procurement and imports).
- 27 Data on armed force size and military spending was taken from IISS (2009), SIPRI (2009), and CIA (n.d.). See Annexe 1.3 for full bibliographical references.

- 28 Extrapolation is not possible because of reasons such as the shift in the types and quantities of light weapons that would be procured as armed force size increased from one appropriate only for defensive purposes to one that could be used for fighting offensive wars.
- 29 Some countries were omitted from the estimate because of a lack of data on armed force size or military expenditure. It is highly unlikely that these countries account for a significant portion of global transfers. For more information, see Annexe 1.3.
- 30 Conflict status was determined using data from the UCDP/PRIO Armed Conflict Dataset (Gleditsch et al., 2002); Harbom, Melander, and Wallensteen (2008); and *The Military Balance 2009* (IISS, 2009). Production capacity was determined from data in *Jane's Infantry Weapons 2007–2008* (Jones and Ness, 2007) and the *Small Arms Survey 2008* (Small Arms Survey, 2008). Full references are provided in Annexe 1.3.
- 31 The following text on small arms ammunition production is drawn from author communication with Pierre Gobinet, consultant to the Small Arms Survey, August 2009.
- 32 Some facilities may be dormant or closed by their owners.
- 33 This graph differs from Glatz (2006) as Glatz did not use parts of shotgun cartridges (UN Comtrade code 930629).
- 34 Taiwan is not permitted to report to Comtrade under UN regulations. Analysis of its national customs data (see Annexe 1.3) indicates that the figure for exports of small-calibre cartridges presented in this chapter is not likely to be an underestimate.
- 35 Israel did submit data on its small-calibre cartridge transfers to UN Comtrade in 2008, however.
- 36 Apparent discrepancies in Tables 1.5–1.10 concerning the percentage of world trade are due to rounding.
- 37 UN Comtrade category 930629 also includes air gun pellets, though these comprise a small part of the trade.
- 38 These countries were selected because they had more than 1,000 battle deaths in 2007 according to the UCDP/PRIO Armed Conflict Dataset (Gleditsch et al., 2002; Harbom, Melander, and Wallensteen, 2008).
- 39 While even unguided munitions are guided in the sense of physics/ballistics, the terms 'guided' and 'unguided' are frequently used to distinguish weapons/munitions that can have their trajectories amended after launch (the former) from those that cannot (the latter).
- 40 These findings coincide with those of an earlier study in Brauer (2000) concerning conventional weapons production.
- 41 These countries are France, Italy, Latvia, Slovakia, and the United Kingdom.
- 42 For a theoretical explanation, see Brauer (2007).
- 43 SPARCS stands for Soldier Parachute Aerial Reconnaissance Camera System.
- 44 Interview with STK representative, Washington, DC, October 2009.
- 45 Interview with STK representative, Washington, DC, October 2009.
- 46 Author interviews with key informants.
- 47 Many of the bombs were reportedly defective and the entire order was ultimately returned to the manufacturer, according to Jane's Information Group (Karniol, 2001).
- 48 A good example is the replacement of sulphur with sugar in smoke grenades to make them more environmentally friendly and less irritating to troops (Taylor, 2007).
- 49 See Small Arms Survey (2008, p. 27) for more information on guided mortars.
- 50 The Convention on Cluster Munitions bans the use, development, production, transfer, and stockpiling of any munition containing submunitions unless it dispenses flares, chaff, smoke, pyrotechnics, produces 'electrical or electronic effects', or possesses specific characteristics (CCM, 2008).
- 51 Israeli developers of a new 'smart' grenade estimate that it would cost about twice as much as a conventional grenade but would be as effective as five such grenades (*JMR*, 2005).
- 52 Osborn cites US Col. Douglas Tamilio.
- 53 Available evidence suggests that most of the light weapons ammunition entering the black market has been technologically unsophisticated and inexpensive.
- 54 See Small Arms Survey (2009, p. 7).

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