A Yemeni man sells AK-47 assault rifles outside his shop in a village in the Haraz Mountains, 2004. © Christian Gahre

What Price the Kalashnikov?

THE ECONOMICS OF SMALL ARMS

8

INTRODUCTION

Since its inception, the Small Arms Survey has compiled information on various aspects of small arms and light weapons, including total weapons numbers, the value of overall trade, and the specific impacts of weapons misuse. There is one indicator, however, that has not yet been systematically collected—price. Prices communicate information: they contain detail on valuation and scarcity. Since weapons are generally durable goods, there is an active secondary market that makes weapons prices observable. Documenting and analysing global price variations of a representative class of weapon (the Kalashnikov) can help identify key drivers of changes in the small arms market. By identifying factors that influence the market, policy-makers can better determine which policy instruments may be used to curb small arms proliferation.

Researchers and journalists have produced a significant amount of survey and case study work on the small arms trade. Insight can be provided by compiling this wealth of survey data—along with that garnered from close investigation of single cases—into a format suitable for statistical analysis. Drawing on archives of journalistic accounts and field reports, a dataset has been constructed that allows for a preliminary statistical analysis of a representative segment of the small arms market—that for Kalashnikov assault rifles.

Collecting and coding data on weapons prices across countries is not a simple task. Which exact weapon should be observed? What condition was the weapon in? Where was the weapon bought? Who was buying the weapon? These are some of the many issues involved with collecting price data. This chapter does not provide an exhaustive or definitive record of global weapons prices. Instead, it represents a first attempt at documenting Kalashnikov prices and offers a basis for further efforts to deepen our understanding of the small arms market.

In order to understand this market, it is necessary to view it as a function of the incentives and constraints faced by buyers, suppliers, and regulators. This chapter introduces a basic demand-and-supply model of the small arms market and then, using the model, applies statistical analysis to the newly compiled price data. As with other commodities, the trade in weapons responds to the forces of demand and supply. Although the trade in weapons is generally subject to official restrictions, trade on illicit markets is nevertheless flourishing. The demand side of the market is modelled by adapting the means and motivation framework of Brauer and Muggah (2006). On the supply side, the two key components are conceived as intrinsic supply costs and the regulatory costs of restricting trade.

In addition to using price data to examine the properties of the small arms market, the data can also be used to investigate the relationship between weapons and civil war. This chapter summarizes the results of including weapons price as a variable in models of civil war risk. The key findings of the chapter are:

- The more effective a country's regulations are, the higher weapons prices will be.
- Countries with more porous borders tend to have lower weapons prices. This is especially the case in Africa, where porous borders allow the supply of weapons to meet potential demand more readily.

- Contrary to popular perception, when controlling for other factors, the collapse of the Soviet Union does not appear to have had a significant impact on weapons prices.
- Increases in the military spending of neighbouring countries tend to reduce weapons prices in a particular country, apparently because of resulting proliferation.
- Weapons prices do not appear to be associated with homicide rates, economic downturns, or young male demographics.
- Cheaper weapons prices lead to an increased risk of civil war, independently of other conflict risk factors.
- Excess weapons in post-conflict environments keep prices low and contribute to the risk of conflict throughout the region for some time after the conflict has ended.

Cheaper weapons prices lead to an increased risk of civil war.

This initial compilation and analysis of price data is intended to provide a stimulus and framework for further quantitative research on small arms issues. Albeit imperfect, the existing dataset serves as a useful starting point for such efforts. The chapter begins by presenting this dataset, then introduces and applies a demand-and-supply model designed to tease out salient features of the small arms market. The chapter's last section explores the relationship of this market to the risk of conflict.

COLLECTING WEAPONS PRICE DATA

The subject of analysis: the Kalashnikov

Collecting price data across different countries and across time requires a consistent subject of analysis. In the case of small arms, there is a clear choice: the Kalashnikov assault rifle.[1] Of the estimated 875 million firearms worldwide (CIVILIAN FIREARMS), approximately 50–100 million belong to the Kalashnikov family (Small Arms Survey, 2004; Shilin and Cutshaw, 2000). The popularity of the Kalashnikov is accentuated by the view that it was often used to remove colonial rulers in Africa and Asia. Indeed, an image of the rifle still appears on the Mozambique national flag, and 'Kalash', an abbreviation of Kalashnikov, is a common boys' name in some African countries (Burrows, 2006, p. 11). The Kalashnikov as a weapon has been the subject of a number of book-length treatments by enthusiasts and critical observers, e.g. Long (1988) and Kahaner (2006).

The pervasiveness of this weapon may be explained in large part by its simplicity. The AK-47 was initially designed for ease of operation and repair by glove-wearing Soviet soldiers in arctic conditions. Its relatively small size and simplicity means that it can also be operated by child soldiers in the African desert. Kalashnikovs are a weapon of choice for armed forces and non-state actors alike. They are to be found in the arsenals of armed and special forces of more than 80 countries (Jane's Information Group, 2003). In practically every theatre of insurgency or guerrilla combat, a Kalashnikov will be found.

The Kalashnikov's ubiquity is generally attributed to its functional characteristics, ease of operation, robustness (i.e. ability to endure mistreatment), and negligible failure rate (Burrows, 2006, p. 3). The weapon's weaknesses—it is less accurate, less safe for users, and has a smaller range than equivalently calibrated weapons—are usually overlooked, or considered to be less important than the benefits of its simplicity and efficiency in other areas. Other assault rifles are almost as simple to manage, yet they have not experienced the soaring popularity of the Kalashnikov.

Figure 8.1 **Key members of the Kalashnikov family**

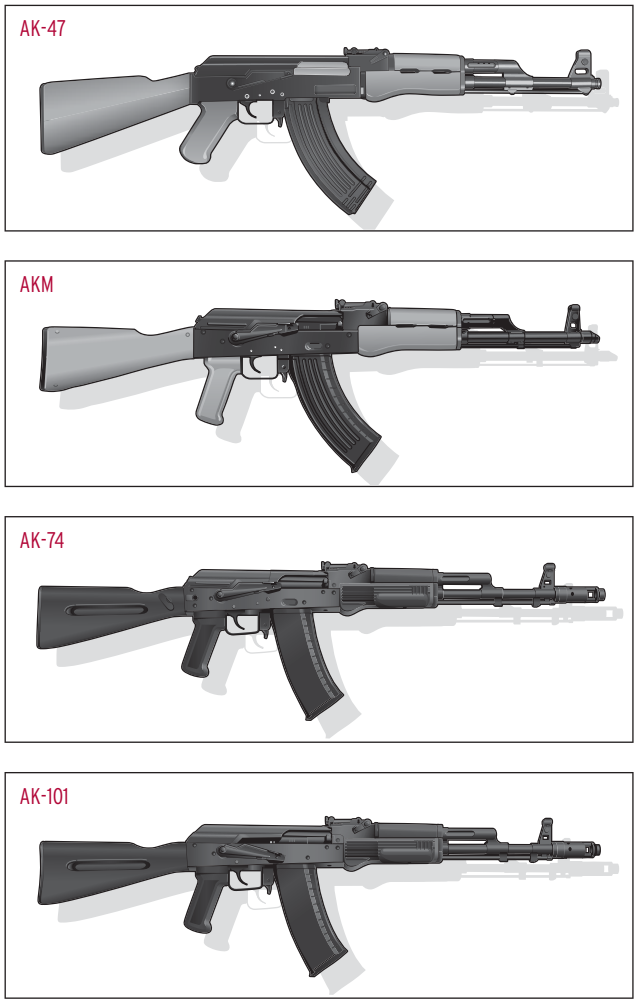


Illustration: Daly Design

Economic historians may answer this puzzle of popularity with reference to a concept called *path dependence,* which says that an equivalent or even inferior product can persist when a small but early advantage becomes large over time and builds up a legacy that makes switching costly (David, 1985). In the case of the AK-47, that early advantage was arguably that, as a Soviet innovation, it was not subject to copyright (LICENSED PRODUCTION). Furthermore, large caches of these weapons were readily distributed to regimes and rebels sympathetic to the Soviet Union, thereby giving the Kalashnikov a foothold advantage in the emerging post-Second World War market for assault rifles.

Whatever the exact causes, it remains a fact that for the last half-century the Kalashnikov has enjoyed a dominant role in the market for assault rifles. Since the essential characteristics of the original AK-47 are similar to the subsequent variants of the Kalashnikov, one can be reasonably confident that the prices observed across time and countries are determined predominantly by market conditions rather than fundamental changes in the nature of the product itself. The assumption of homogeneity in Kalashnikov derivatives for the purposes of statistical analysis may, of course, be challenged and is discussed in Box 8.1.

Data collection and sources

The Kalashnikov price data has been compiled from a range of field research, journalistic reports, and industry interviews. Prices are calculated in US dollars for Kalashnikov purchases made by non-governmental entities. Five-year intervals are used to track price variations over time: 1986–90, 1991–95, 1996–2000, and 2001–05. The coding of price observations for such things as location, weapon type, and source of observation reflects at least some of the large variation in the nature of the reported transactions and price quotes. There are, however, some important aspects that have not been coded, e.g. whether the observed transaction or price quote was between groups or individuals; or whether the status of the transaction was legal, covert, or illicit. A future, more complete dataset would account for these additional factors.

Box 8.1 Kalashnikov varieties: similarities and differences

There are in excess of 30 varieties of Kalashnikov assault rifle built around the original specification designed by Mikhail Kalashnikov in 1947.[2] The basic similarity among Kalashnikov-derived weapons is that they have a similar basic shape, as shown in Figure 8.1, with the distinctive banana-shaped clip for the ammunition. Other key characteristics of Kalashnikovs are that, within the assault rifle class, they are generally more compact in size, and have full capability for selective fire, smaller cartridges, and commensurately shorter ranges of fire (Poyer, 2004, p. 1).

The term AK-47 is often mistakenly used to describe Kalashnikovs in general, when in fact it is only one specific type. Even the AK-47 itself has a number of sub-types that reflect different production methods and weapons weights based on the types of materials used (Shilin and Cutshaw, 2000). Despite a series of modifications over the last 60 years, the basic AK-47 is still a popular weapon in its own right. A new Romanian-made AK-47 can be purchased online from Atlantic Firearms (2006) for USD 439.[3] A bulk contract of 1,000 or more Russian-made weapons can be purchased for approximately USD 180 each (Agentsvo Voyenkykh Novostey, 2005). Norinco Chinese-made Kalashnikov replicas sell from USD 600 online in the United States, while the estimated cost of producing an AK-47 replica in China stands at approximately USD 40 per unit.[4]

One misconception in explaining the popularity of Kalashnikovs is that it uses a common type of ammunition. In fact, Kalashnikov derivatives use different types of ammunition. The AK-47 and AKM fire the 7.62 x 39 mm cartridge, while the AK-74 fires the 5.45 x 39 mm cartridge. Subsequent AK versions (e.g. AK-101, AK-103) are chambered for various calibres, depending on which type of ammunition the purchaser can most readyily access (Shilin and Cutshaw, 2000).

The dataset makes extensive use of the *Small Arms Black Market File Archive,* maintained by the Norwegian Initiative on Small Arms Transfers (NISAT, 2006). The *Archive* contains over 9,000 documents relating to illicit small arms trade. Articles with references to quoted prices or reported transactions involving AK-47 or equivalent Kalashnikov derivative assault rifles were extracted and the information converted into the data format using the coding rules outlined in Annexe 1.

References to assault rifle prices were also extracted from previous Small Arms Survey working papers, field reports, and yearbook chapters. In addition, the dataset benefitted from interviews with arms industry experts and regulators who have had considerable experience with arms markets throughout Africa and Asia. Of particular note is Brian Johnson Thomas, an investigative journalist with Amnesty International. Johnson Thomas has been following the illicit arms trade from factory to fight for the last 15 years and has recorded the going prices for assault rifles in a range of locations at different times. The frequency distribution of data sources for price observations is as follows: NISAT *Small Arms Black Market File Archive* (58 per cent); Small Arms Survey (17 per cent); US Bureau of Alcohol, Tobacco, Firearms and Explosives (16 per cent); Johnson Thomas (6 per cent); and other sources (3 per cent).

Summary of Kalashnikov price data

The full table of price data used in the statistical analysis is shown in Annexe 2. Table 8.1 summarizes the key features of this data. Country coverage is reasonably broad: 115 out of a possible 208 countries have at least one observation, and there are a total of 326 independent country-period observations (out of a possible 742[5]). Table 8.2 indicates that there are relatively more observations for more recent periods. For the first period, 1986–90, there are only 45 unique country observations, whereas for the fourth period, 2001–05, there are 100. This is probably due to more thorough information dissemination facilitated by the Internet, and the recent increase in attention given to the small arms trade by the media, activists, and policy-makers. There is also an uneven distribution of price observations across countries: there are relatively more weapons price observations for countries that have experienced civil war and countries situated in areas where a war has occurred.

Table 8.1 **Descriptive statistics for Kalashnikov prices, 1986–2005**

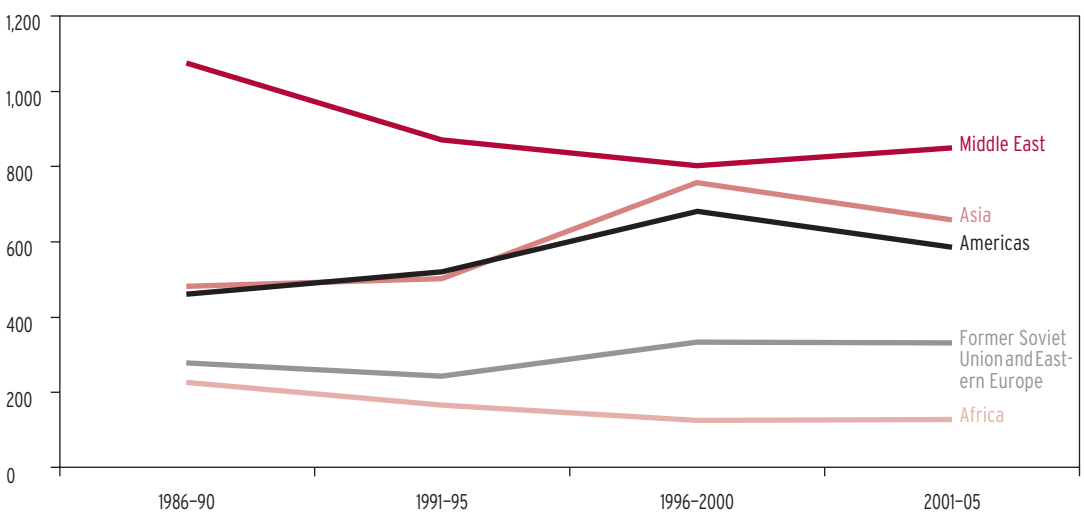
Region	Min. (USD)	Max. (USD)	Average (USD)	Std. dev. (USD)	No. of obs.	Unique countries	Total possible countries
Asia	40	6,000	631	810	81	27	48
Africa	12	500	156	95	80	24	47
Middle East	150	3,000	869	1,030	29	27	31
Former Soviet Union & Eastern Europe	50	1,200	303	189	55	20	42
Americas	25	2,400	520	367	47	6	26
Western Europe	225	1,500	927	960	34	11	14
	Lowest price = 12	**Highest price = 6,000**	**Overall avg. = 471***	**Overall std. dev. = 605**	**Total = 326**	**Total = 115**	**Grand total = 208**

Notes:
Std. dev. = standard deviation.
obs. = observations.
* This is a weighted average: a region is weighted according to how many observations it has, and the figure given is the average for all the observations in the sample.

Table 8.2 **Global average Kalashnikov price and number of observations, 1986–2005**

Five-year period	1986–90	1991–95	1996–2000	2001–05
All countries	USD 402	USD 393	USD 538	USD 495
Observations per period	45	78	103	100

Figure 8.2 **Regional Kalashnikov prices (USD), 1986–2005***



* No data was available for Western Europe for the period 1986–90, so this region was omitted entirely from the figure.

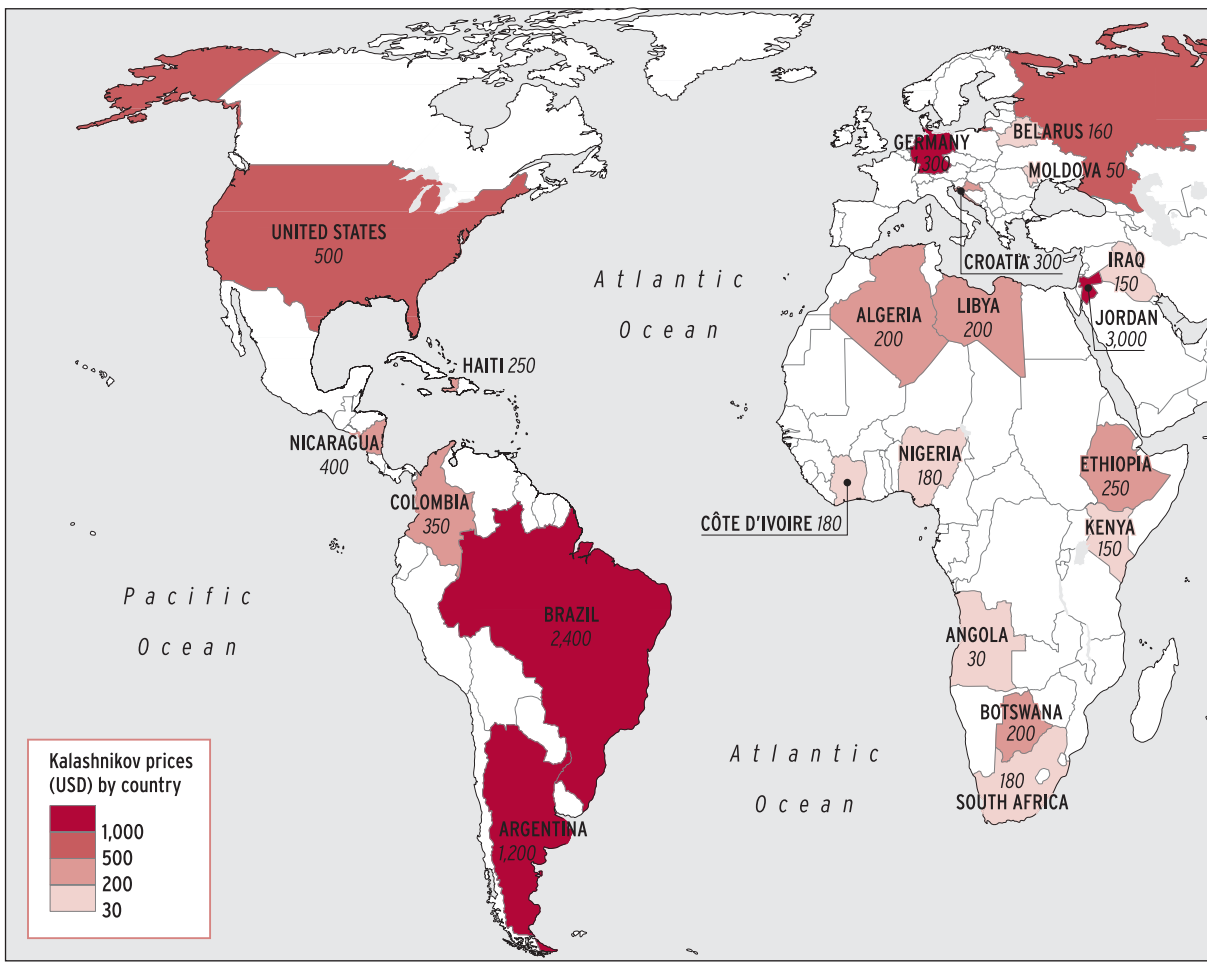
DEMAND AND SUPPLY IN THE SMALL ARMS MARKET

Constructing a model of the small arms market

Despite being a key component in violence and conflict, small arms have only recently begun to receive rigorous analytical attention. So far, research has been mostly case study-driven, making it difficult to draw general empirical lessons. By collecting cross-country time-series data on assault rifle prices and constructing an economic model to represent small arms demand and supply, it is possible to expose some of the quantitative features of the Kalashnikov market.

Since price in a market is modelled as a function of demand and supply, it is necessary to identify the key components of both these factors, and then evaluate how they can be measured with available data.[6] The key components of demand in the small arms market are conceived as income and preferences. Brauer and Muggah (2006) describe this in terms of *means* (income, or the ability to buy weapons) and *motivation* (the preference or desire to purchase weapons). It is possible that an individual or group may have the motivation to buy a weapon, but lacks the means with which to do so because either the available income is too low or weapons prices are too high. Conversely, one may have sufficient income to buy a weapon, but have no interest in owning one.

Map 8.1 **A selection of world Kalashnikov prices (USD), 2001–05**



Box 8.2 Economic models and proxy variables

One of economists' main activities is to construct models that represent human choice and interaction. They do this by identifying key variables for a particular situation and hypothesizing a set of logical and quantitative relationships. The most popular economic model is that of demand and supply, which for the present study provides a useful 'off-the-shelf' toolkit to investigate empirically the key determinants of prices for Kalashnikov assault rifles.

Once an economic model is constructed, it needs to be brought to life and tested with data. Often the variables that the model would most likely include cannot be measured directly. In such cases, it may be helpful to use a proxy variable. A proxy variable is a substitute for an underlying reality that cannot be accessed directly. These are legitimate and commonly used modelling tools, provided they map onto the underlying reality in some significant sense. Among other things, this means that any 'errors' (deviations of the proxy from reality) are randomly, not systematically, distributed. Although proxy variables will not be an exact match for the underlying concept, it is usually better to attempt some approximate measure of the concept than omit it from the analysis. Examples found in the chapter include negative income growth as a proxy for the motivation to buy weapons, and the distance from Moscow as a proxy for transport costs.

Glatz and Muggah (2006, p. 150) conceptually unpack weapons demand in considerable detail and propose policy responses to address each sub-component of demand, identifying factors such as personal, social, and economic security, as well as individual and group status. While it is not possible to statistically test each of the concepts individually, certain variables can be used to proxy the major components of the weapons demand model. Table 8.3 notes the observable variables used to proxy each component. The concept of means is proxied by per capita income, and possible proxies for motivation to buy weapons include the average homicide rate, the proportion of young men in the population, lagged income growth, and a civil conflict onset.

On the supply side of the small arms market, the key elements are considered intrinsic supply costs and regulatory costs. Proxy variables intended to capture the height of the regulatory barriers to weapons trade include quantitative measures of government effectiveness, degree of law and order, democratic accountability, and border porousness. Indicators to capture the intrinsic costs involved with supplying weapons include levels of military expenditure and the distance from Moscow to proxy transport costs.

Box 8.3 A single market or many?

Analysing the small-arms market is more complicated than studying conventional, legal markets. Unlike markets for commodities such as oil or gold, where headline market-clearing global prices are available, the market for weapons is considerably more segmented. Does it make any sense therefore to refer to a single small-arms market? Even though a market may be separated by geography or legislative systems, it is seldom possible for a single country's market to be completely isolated from the rest of the world. Trucks, ships, and planes can transport weapons from one country to another and readily overcome geographic boundaries. In the case of illicitly traded weapons, legislation prohibiting weapons trade may simply be viewed as a hurdle to be cleared rather than an impassable obstruction that prevents trade entirely. For these reasons, the singular use of the term 'small-arms market' is generally used, even though on the face of it trade in small arms appears to be made up of hundreds of local markets. In empirically analysing the trade in small arms, one of the key features of interest is what connects these sub-markets. The price data in Annexe 2 shows how localized and variable these sub-markets are, while the statistical analysis (the results of which are given in Annexe 4) aids in identifying which factors drive changes in these local sub-markets and which factors facilitate or impede interaction among them.

Using this basic demand-and-supply model of weapons price determination, it is possible to ascertain which factors are relatively more important in explaining changes in the small arms market. The variables used in the statistical analysis, their expected signs, and statistical significance are summarized in Table 8.3. Annexe 4 outlines the formal results, and Annexe 3 presents the descriptive statistics for all the variables used in the analysis.

The statistical method used to analyse the data is panel regression.[7] Panel regression uses data over time and across countries to explain variation in an observed variable, in this case weapons prices. In the small arms market

Table 8.3 Variables for estimating weapons price determinants

Component	Observable proxy measure	Expected sign	Significance
Income/means	GDP per capita	+	*
Motivation	Lagged income growth	–	
	Prop. of young men in pop.	+	
	Civil war onset	+	
	Homicide rate	+	
Regulatory	Government effectiveness	+	***
	Democratic accountability	+	*
	Law and order	+	
	Border porousness	–	***
Supply costs	Military expenditure–neighbours'	–	***
	Military expenditure–own	–	
	Civil war legacy	–	**
	Post-Soviet collapse	–	
	Transport costs	+	**

Notes:
GDP = gross domestic product.
* Statistically significant at 90 per cent. ** Statistically significant at 95 per cent. *** Statistically significant at 99 per cent.
Those factors unmarked in the 'Significance' column are not statistically significant.

model, it is hypothesized that weapons prices are associated with certain empirical variables reflecting demand and supply factors. If a variable is good at explaining a variation in weapons prices, it is said to be significant. A statistical significance of 90 per cent, for example, means that there is a 90 per cent probability of the weapons price being affected by a change in the explanatory variable, and a 10 per cent chance that there will be no effect at all. The expected sign refers to whether it is initially believed that the weapons prices are positively or negatively associated with a particular variable.[8]

Results for each component

Income

One would expect that the higher income is in terms of per capita GDP, the higher weapons prices will be. This is due to two factors: firstly, that higher income implies a higher ability, or means, to pay for a weapon; and secondly, because official trade barriers lead to the partial non-tradability of weapons. According to international trade models, free trade will tend to equalize commodity prices (Markusen et al., 1995, pp. 36–44). However, non-government weapons trade between countries is subject to considerable regulatory hurdles. It is much more difficult to buy a Kalashnikov from overseas than it is to order a shipment of television sets, for example. To the extent that laws controlling weapons trading are enforced, weapons will take on the attributes of non-tradable goods. In economics, it has been found that the prices of non-tradable goods are determined by domestic factor prices, which are driven by income. In the same way that non-tradable goods such as haircuts are more expensive in London than Nairobi, the level of income reflects a wealth mark-up (or mark-down) on weapons prices.

Motivation

Negative income growth can increase the risk of civil war and violent crime.

Obtaining a satisfactory proxy for the motivation to purchase assault rifles is a difficult task. None of the proxy variables for motivation used in the regression analysis demonstrate a statistically significant relationship with weapons prices. In the first instance, income growth was tested as an indirect measure of the desire to buy weapons. Negative income growth has been found to increase the risk that a country will face an outbreak of civil war (Collier and Hoeffler, 2004; Miguel, Satyanath, and Sergenti, 2004). It has also been found to increase the incidence of violent crime (Fajnzylber, Lederman, and Loayza, 2002). One would expect negative income shocks to lead to an increased motivation to purchase weapons for the purpose of crime or conflict, since weapons are instrumental in undertaking these activities, which have been shown to be more likely to occur in economic downturns.

The fact that there appears to be no relationship between income shocks and weapons prices may be the result of competing effects in the small arms market during economic downturns. While the increased demand for weapons for crime and conflict would tend to drive weapons prices up, there is also an offsetting supply-side effect. Agents on the margin of the legal labour market become unemployed in an economic downturn, and a fraction of those unemployed take on employment in the black market, including the arms trade, which is profitable compared with no work at all. The extra (illicit) employment in the arms trade creates a more competitive arms market and the increase in supply appears to offset the increase in demand. On the basis of these statistical results, it may be hypothesized that the illicit weapons market adapts extremely well to changes in economic conditions, so that the effect of economic shocks on weapons prices is neutralized.

Other variables were tested in an effort to capture the motivation to purchase weapons, such as the proportion of young men in the population, and the average homicide rate as an approximate measure for a country's underlying proclivity towards violence.[9]

Another hypothesized driver of the motivation to purchase assault rifles is civil conflict, which is the setting where such weapons are most likely to be used for their intended purpose. A variable for civil war is included to proxy demand for weapons.[10] The civil war variable was not significant, so it is not possible to identify a clear demand effect on weapons prices during a period of civil conflict,[11] even though one would expect a civil conflict to increase the demand for weapons. As in the case of income shocks, there is the problem that in trying to identify the demand-side effect of civil conflict, there are countervailing supply-side effects that reduce the price, offsetting the upward pressure of demand.

In this preliminary analysis, all proxy measures for motivation proved insignificant for explaining weapons prices. This is not to conclude that motivation is unimportant in determining weapons prices. Rather, it indicates that more refined measures of the preferences for purchasing weapons are required.

Regulatory costs

Most countries have at least some laws designed to control the trade in and possession of small arms. What differs systematically is the ability of countries to enforce these laws. One would expect that the more effective a government is at upholding its laws, the greater will be the cost of traded weapons, legal or otherwise. Regulatory variables are used to capture the effective height of the trade barriers that must be overcome in order to sell a weapon.

Better enforcement of laws and regulations raises the price of weapons.

A number of measures of regulatory effectiveness are employed, and all indicate with varying degrees of significance that better enforcement of laws and regulations raises the price of weapons. The World Bank's government effectiveness variable, which measures the competence of each country's bureaucracy, is positive and significantly correlated with weapons prices.[12] Data from the *International Country Risk Guide* (ICRG) (Political Risk Services Group, 2005) confirms the importance of regulatory capacity as a determinant of weapons price. Democratic accountability measures from the ICRG are statistically significant, suggesting that checks on different levels of government and public services are important in enforcing legislation relating to illicit weapons.

The ICRG's law and order variable is intended to proxy the on-the-ground ability of the police to enforce the law and prosecute weapons violations. This variable was correlated positively with weapons prices, but not as strongly as expected. This may be explained by an offsetting demand effect at very low levels of law and order. Households and groups are acutely aware of internal security forces being ineffective and may attempt to fill a security vacuum with their own weapons acquisition.

The regulatory costs variables are principally concerned with the effective height of the trade barriers that need to be overcome in order to trade a Kalashnikov. The regulatory variables considered so far account for the relative ease of *within*-country trade for weapons. Arguably, though, *between*-country trade barriers are at least as important. The ideal measure of between-country barriers would be some measure of the porousness of a country's borders. Since no data on border porousness currently exists, it is proposed to use a control variable for African countries. Africa provides a natural reference point, because its countries possess more neighbours on average than the rest of the world (3.4 per country versus 2.1), and its borders are generally perceived as being more porous than the rest of the world (CIA, 2005).[13]

Even controlling for income, regulatory effectiveness, war legacy, and supply cost variables, being located in an African country makes purchasing an assault rifle around USD 200 cheaper than the world average. It is postulated that this staggering Africa discount on top of the variables already mentioned is driven predominantly by porous borders. Since its borders are more porous than elsewhere, the trade in assault rifles across the African continent

approaches a deregulated market in which prices converge, and there are only negligible trade barriers that arms supply must overcome to meet demand. The demand profile for weapons across the African continent changes over time with changes in military/insurgency activity, as localized tensions rise and recede. Relatively more porous borders enable larger supplies of weapons to meet whichever countries currently have high weapons demand, thereby tending to smooth and lower prices.

Intrinsic supply costs

The intrinsic supply costs variable in the model of the small arms market is designed to capture the non-regulatory costs associated with the supply of arms. A range of proxy variables are used to represent the key factors that affect supply costs.

The supply cost variable that proves most robust is neighbours' average military expenditure. This variable measures the average of neighbouring countries' annual government military expenditure as a share of GDP. It is intended to capture the relative availability of foreign sources of weapons. The statistical analysis indicates a strong negative correlation between neighbours' average military expenditure and weapons prices. This effect is theorized to be caused by weapons finding their way into circulation via spillovers and leakages.

Spillovers arise where some fraction of a country's military expenditure is allocated (covertly or otherwise) to supplying arms directly to anti-government forces in rival neighbouring countries. The exact reasons for governments supplying foreign rebel forces are not considered here, but one may conjecture that such supply involves strategic decisions designed to destabilize or divert the attention of a threatening neighbour's regime. The leakage effect arises not from a conscious effort by neighbours, but from misappropriation of official weapons stocks by arms dealers and rebels. Such acquisition is typically facilitated by unauthorized sales by defence force personnel (corruption) or the forcible seizure of weapons stocks during combat or raids on government arsenals.

Own-country military expenditure was not a satisfactory explanator of weapons price. This is surprising, as some governments deliberately distribute weapons to their own people to defend the country against hostile neighbours. Governments sometimes also provide weapons to loyal militias to ward off domestic anti-government rebels, as did the Sri Lankan government during the Indian Peace Keeping Force's conflict with the main Tamil rebel group, the Liberation Tigers of Tamil Eelam, from 1987 to 1989 (Narayan Swamy, 2002). Furthermore, there are numerous instances of forcible seizures and looting of domestic inventories, including the notorious cases of Albania in March 1997 (*Economist,* 1997a) and more recently in Iraq (Small Arms Survey, 2004, pp. 44–50; Human Rights Watch, 2004).

A country's civil war legacy is strongly correlated with weapons prices.

The supply cost variable, which seeks to proxy the stock of weapons in circulation, is a country's civil war legacy. The legacy variable is constructed using population-weighted cumulative civil war battle deaths since 1960 (Gleditsch et al., 2002). Since small arms cause a significant proportion of battle deaths, their number may be considered a suitable proxy for the quantity of functioning weapons in a country. A discount rate of 5 per cent is applied to reflect the fact that a war 30 years ago, for example, matters proportionately less for the stock of Kalashnikovs on the ground than an equivalent-sized battle last year. This discount rate captures the depreciation of Kalashnikovs over time and is consistent with a weapon's life expectancy of up to 50 years. The civil war legacy variable is population-weighted to account for the residual stock of conflict weapons relative to the population size.

As an approximation of the number of active weapons in circulation, the civil war legacy variable is reasonably robust. The analysis indicates that civil war legacy is strongly correlated with weapons prices. This conforms with basic price theory, which predicts that, all else being equal, the relatively more plentiful a commodity is, the cheaper it will be.

The arms dealer Yuri Orlov (Nicolas Cage) presents an assault rifle to a client in Lord of War.
© Lions Gate Films/ZUMA Press/supplied by eyevine

It is commonly believed that the collapse of the Soviet Union released enormous stocks of weapons, especially Kalashnikovs, onto the world market. This view has been popularized in a recent Hollywood film, *Lord of War,* in which Nicholas Cage plays a Ukrainian arms dealer who profitably liquidates the former Soviet state's military arsenal. Was the collapse of the Soviet Union a significant supply shock for price levels in the illicit weapons market? Statistical analysis suggests that it was not; or, at the very least, that it was not as important as previously believed (e.g. Musah and Castle, 1998). When controlling for other factors (such as changes in government effectiveness, income, etc.), correlation with the post-Soviet collapse period (1991–95) is not significant.[14]

An explanation for this finding is to be found in the role of secondary markets. Since weapons are durable goods, they can, like shares in a firm, be repeatedly sold from agent to agent. During the cold war, even though the superpowers thought they were giving or selling weapons to their political allies, their weapons were regularly—and profitably—sold on to secondary markets that had no regard for the political affiliation of the initial source of the weapon. There is no reason, in other words, to assume that the end of the cold war yielded a sudden change in patterns of weapons diffusion and proliferation. Two caveats to the finding of insignificance in relation to the Soviet collapse must be acknowledged. Firstly, there is only one observation period (1986–90) before the Soviet collapse. Secondly, there are only 45 observations for this pre-collapse period, whereas there are more than 78 for each of the three subsequent periods.

Harbingers of the end of the cold war: Berliners sing and dance on top of the Berlin Wall to celebrate the opening of East–West German border in November 1989.
© Thomas Kienzle/AP Photo

While the collapse of the Soviet Union did not in itself appear to generate a significant supply shock for the small arms market, the supply of weapons by the Soviet Union

Box 8.4 Threats to validity

The statistical analysis of Kalashnikov price determination relies for its accuracy on the sample price data (Annexe 2) being broadly representative of the underlying prices in these markets. As with any use of sample data, there may be concerns with just how representative the observed data is.

In addition to variation in the exact type of Kalashnikov observed, which is addressed in Box 8.1, the relative quality of the weapon is also relevant to price determination. Observations were coded according to whether the weapon was new, used, or in need of repair. The vast majority (92 per cent) of the observed weapons were 'used'. It should be noted, however, that within the class of used weapons, it is difficult to ascertain from reports what exact condition the weapons were in, and there may still be considerable variation in quality. Because of this, the quality/condition of the weapon was not included in the statistical analysis (see Annexe 2).

In order to provide broad coverage for sparsely available data, data is recorded in five-year blocks. One problem that arises from this time specification is that a price observed in 1991 in one country is compared with a price in 1995 in other countries, because the observations fall into the same time period (1991–95). A method to address this in the future would be to take five-year rolling averages.

Another consideration is measurement error in the recording of the prices. By drawing on archives of journalistic accounts of Kalashnikov trades, there is a concern that reporters may exaggerate or report extreme prices in press articles. Can we be sure that the observed price is the exact average price of an assault rifle in that country for that period? Almost certainly not. What we can say, however, is that the observed prices are representative of prevailing trading prices. In cases where there are multiple observations for the same country and period, it is possible to verify whether the prices are approximately in the correct range. Although these cases are limited (there are only 22 country-periods for which there are multiple observations) the average difference in prices was less than 30 per cent. This suggests that even if the price included in the data set for analysis was not the exact average price in that country, it is at least in the correct range.

Wherever possible, geography is coded with one of four values, depending on whether the observation was in a city, in a rural area, at a border, or a contracted international transaction. Sixty-four per cent of the price observations were in cities, 26 per cent in rural areas, 5 per cent were observed at country borders, and 5 per cent were international transactions. The geographical codes were not, however, used in the statistical analysis (see Annexe 2). No distinction was made regarding the location of the price observations, because segmenting the available data into geography types prohibitively limits the sample size.

The existing coding is designed to identify at least some of the potential sources of variation in the reported transactions and price quotes. There are, however, some aspects that have not been coded, e.g. whether the transaction or price quote observed was between groups or individuals; or whether the status of the transaction was legal, covert, or illicit. A future, more complete, dataset would account for these additional factors.

and its successor states, throughout the period under examination, does appear influential. The distance a country is from Moscow is adopted as a proxy for the transport costs of getting weapons (in this case the Kalashnikov) from their initial sources in Russia and the Soviet satellite states to the secondary markets on which they are traded.[15] The distance from Moscow variable (Gleditsch and Ward, 2001) is positively correlated with weapons prices, indicating that transport costs do indeed matter in determining the price of weapons.[16]

CHEAP GUNS, MORE WAR?

In low- to medium-intensity modern civil conflict, assault rifles are an indispensable piece of military equipment. Kalashnikov assault rifle prices may therefore be considered a proxy for the costs of acquiring weapons linked to civil war.

An important empirical question, then, is whether the availability of small arms, as proxied by Kalashnikov prices, increases the probability of civil war. Existing quantitative approaches to explain conflict risk (Collier and Hoeffler, 2004; Fearon and Laitin, 2003) have adopted proxies for labour (the level and growth of work-related income, which measure the opportunity cost of belonging to a rebel group) and capital (lootable resources and diaspora funding, which provide operating finance). Adding a measure of the conflict-specific capital input (Kalashnikov prices) may aid the explanatory power of statistical conflict models.

Including weapons price in a modified Collier-Hoeffler (2004) conflict risk model[17] indicates that lower weapons prices are associated with a higher risk of civil war, independently of other known quantitative determinants of civil conflict.[18] A natural question that arises with this result is whether cheap weapons are a cause or consequence of civil conflict; i.e. are weapons cheaper in war-affected countries because of the war, or was conflict made more feasible in part due to relatively cheaper weapons? Various statistical techniques have been used to isolate the specific effect of weapons prices on conflict risk. The application of these methods is outlined in detail in Killicoat (2006). They do not alter the finding outlined above. In as far as it is possible to demonstrate statistically, holding all else constant, the relatively lower weapons prices are, the relatively more at risk a country is of engaging in civil conflict.[19]

The general robustness of the result permits evaluation of the average marginal effects of weapons prices on conflict. Controlling for other factors, if the average world price of weapons were to rise by 10 per cent, the risk of civil conflict would fall by approximately 0.5 per cent.[20] Of course, this effect is not equally distributed across all countries. In some regions, the marginal effect of cheaper weapons will be more likely to influence the susceptibility of a country to civil conflict, depending on the prevailing conditions and other risk factors.

Box 8.5 The market for Kalashnikovs in Iraq

As explained above, lower Kalashnikov prices result in a higher risk of civil war, independently of other risk factors. Once a war has begun, however, the relationship between weapons prices and the intensity and duration of conflict takes on a different dynamic. In African conflicts, weapons prices have tended to rise in the early stages of a civil conflict and then fall over time as supply chains are established (Austin, 1999, pp. 29–48). In Iraq, Kalashnikov prices have been consistently rising over the last three years (Chivers, 2006).

Prior to the coalition offensive in 2003, Kalashnikovs were trading for between USD 80 and USD 150. After the Baathist defence forces were routed in 2003, prices fell to USD 50–80. This is largely because stockpiles of weapons were seized by enterprising would-be arms traders. Caches of Kalashnikovs had been left around the country to give citizens something with which to challenge the incoming coalition forces. These weapons were not used for their intended purpose, but rather were hoarded and then sold. Since 2003, weapons prices have been steadily rising to quite extraordinary levels. A basic wooden stock AK-47 was selling in 2006 for USD 400–800. Short-barrelled folding-stock Kalashnikovs (the preferred model of Osama bin Laden[21]) are attracting premium prices of USD 700–1,500 (Chivers, 2006).[22]

The high and rising prices of Kalashnikovs indicate that demand is exceeding supply. Generally, people want to buy Kalashnikovs for security, crime, or conflict. In Iraq, they are being bought for all three reasons, and so prices are at atypically high levels, even for a war zone. If and when the coalition forces leave, prices are likely to fall. Foreign military control is the only thing currently keeping supply by neighbouring countries from fully meeting the Iraqis' strong demand for assault rifles.

The price of a Kalashnikov has similar properties to stock/shares in a company—the price says a lot about expectations of future value. That prices are high and rising in Iraq indicates that Iraqis on the ground are preparing for a long period of conflict and uncertainty.

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An interesting result from the statistical analysis of weapons price determination is that a war in a country does not appear to affect significantly the price of weapons in that particular period. In fact, weapons prices on average rise in the first period of conflict onset. Once the conflict episode is over, however, weapons prices on average fall. Weapons in the post-conflict period have both a temporal and a spatial effect. The surplus of weapons in circulation keeps prices low and availability high throughout the neighbouring region for some time after the end of conflict.

CONCLUSIONS AND FUTURE DIRECTIONS

Tracking Kalashnikov prices has the potential to provide a useful step towards better understanding the small arms market. By documenting prices of a representative class of weapon across countries and time, it is possible to investigate which factors are significant in determining weapons price variation. Price data is difficult to collect, and a number of caveats to the consistency of the observed prices must be recognized. While it would be desirable to observe exactly the same weapon type, in the same condition, transacted between similar individuals, such detailed price reports remain elusive. While acknowledging the limitations of the sample data, it is nevertheless possible to undertake preliminary statistical analysis of this first effort to document cross-country time-series Kalashnikov price data.

A basic demand-and-supply model of the small arms market was developed above and was theorized to be determined by four main factors: income (means), motivation, regulation, and supply costs. Estimating this model using the new price data and proxies for the relevant concepts yielded results that suggest that supply-side factors such as regulatory effectiveness, transport costs, and border porousness are most important in the determination of weapons prices. Since the analysis is at the aggregate macro level, the policy implications of these findings are necessarily general in nature, for example:

- Increasing regulatory effectiveness raises the barriers to trading weapons. It may also reduce the motivation to purchase weapons for purposes of personal or group security.
- Securing national borders is a generally desirable policy objective for governments, and is especially compelling in the case of illicit small arms trade.
- Neighbours' military expenditure was found strongly to reduce weapons prices; therefore, where mutual disarmament is feasible, it will diminish at least one channel of weapons supply.

Economic development and government effectiveness reduce the risk of civil war directly.

Although motivational variables on the demand side of the model did not prove statistically significant, this does not necessarily mean that they are unimportant for weapons price determination. This is more likely due to the absence of suitable proxy measures to capture appropriately the motivational component of demand for small arms.

Including weapons prices in statistical conflict models indicated that cheaper weapons are independently associated with an increased risk of civil conflict. To this end, there are a number of general policy measures that would increase the price of weapons and thereby mitigate the effect of weapons availability on conflict outbreak. In particular, economic development and government effectiveness reduce the risk of civil war directly, and also indirectly, by raising the regulatory barriers to illicit trade in small arms.

The statistical analysis of the small arms market and conflict risk described in this chapter relies on the sample data collected being broadly representative of underlying 'true' prices. While every effort has been made to adopt a consistent measure of Kalashnikov prices across countries and time, there are a number of factors that are difficult

to account for explicitly. Such factors include the exact Kalashnikov type, the precise location of the transaction, the nature of the trading parties, and their financing methods.

This initial price data collection effort and statistical analysis are intended to provide a stimulus and framework for quantitative and rational choice approaches to small arms issues. The field of small arms research has produced a sizeable quantity of case-specific data. Compiling this growing wealth of information into a format amenable to statistical analysis has the potential to provide insights in addition to those garnered from close investigation of single cases.

Collecting data on small arms is a slow, ongoing process, but the cumulative effect will be to provide a more robust understanding of the relative importance of different factors in the small arms market. The information that will be of most benefit for understanding the small arms market are weapons prices, ammunition prices, trading quantities, stockpile quantities, and production quantities. The Small Arms Survey has begun to compile some of this information. Quantitative analysis of such data can enhance the effectiveness of national and multilateral small arms policy, identifying with greater precision the most effective means of preventing unnecessary suffering from these weapons.

ANNEXE 1. DATA COLLECTION METHODOLOGY

In order to maintain consistency, the exact variable of interest is the quoted or transacted price in US dollars (USD) for a non-government entity to take possession of an AK-47 assault rifle. Each price observation was coded with:

- country;
- USD price;
- time period (1986–90, 1991–95, 1996–2000, 2001–05);
- exact assault rifle type observed (e.g. AK-47, AK-74, craft replica);
- location where price was quoted (city, province, border, international transaction);
- quality of the weapon: new, used, or in need of repair; and
- source of the price observation.

Sufficiently reliable indicators for the last four of these factors were not available to justify their inclusion in the statistical analysis, so only the first three points were included (see Annexe 2). Where there are multiple price observations for the same country-period, a set of coding rules is employed to determine which observation appears in the dataset for analysis. All observations are nevertheless kept in a master dataset. The coding rule dictates that a quote or transaction involving an AK-47 in good condition observed in a city will take precedence over other observations.

The majority of prices were originally reported in USD. Where prices were observed in the local currency, the price was converted to USD at the prevailing exchange rate at the time of the quoted price or transaction (World Bank, n.d.). To control for inflation in the statistical analysis, weapons prices are deflated using the US consumer price index (World Bank, n.d.).

Region coding:

1 = Asia
2 = Africa
3 = Former Soviet Union and Eastern Europe
4 = Americas
5 = Western Europe
6 = Middle East

ANNEXE 2. AVAILABLE KALASHNIKOV PRICES FOR SPECIFIC COUNTRIES AND PERIODS

For region codes, see Annexe 1. Figures for the four periods are in USD.

Country	Region	1986–90	1991–95	1996–2000	2001–05
Afghanistan	1	80	100	100	150
Albania	3	300	50	150	180
Algeria	2	400	400	300	200
American Samoa	1				
Andorra	5				
Angola	2	150	12	30	30
Antigua and Barbuda	4	609			
Argentina	4	800	700	1,000	1,200
Armenia	3				
Aruba	4				
Australia	1	500	500	550	600
Austria	5				
Azerbaijan	3				
Bahamas, The	4				
Bahrain	6				
Bangladesh	1		982	1,080	1,200
Barbados	4				
Belarus	3	150	250	140	160
Belgium	5			1,200	1,500
Belize	4				
Benin	2				
Bermuda	4				
Bhutan	1				
Bolivia	4			1,000	
Bosnia and Herzegovina	3		350	400	500
Botswana	2	200	250	200	200
Brazil	4		1,350	2,000	2,400
Brunei	1	1,200	1,200	1,500	1,500
Bulgaria	3		200	300	

Burkina Faso	2				
Burundi	2				
Cambodia	1		200	250	40
Cameroon	2				
Canada	4			800	880
Cape Verde	2				
Cayman Islands	4				
Central African Republic	2			35	150
Chad	2				
Channel Islands	5				
Chile	4			1,000	
China	1		450	400	350
Colombia	4	609	800	350	400
Comoros	2				
Congo, Democratic Republic of	2	200	215	120	50
Congo, Republic of the	2	200	180	120	50
Costa Rica	3			400	400
Côte d'Ivoire	2	180	100	100	120
Croatia	3	330	180	250	300
Cuba	4	120	100	150	180
Cyprus	3		200	300	320
Czech Republic	3		200	300	360
Denmark	5				
Djibouti	2				
Dominica	4				
Dominican Republic	4				
Ecuador	4		600		
Egypt	1	400	400	300	300
El Salvador	4			400	400
Equatorial Guinea	2				
Eritrea	1			220	250
Estonia	3		300	150	180

Ethiopia	1			220	250
Faeroe Islands	5				
Fiji	1				
Finland	5				
France	5				
French Polynesia	1				
Gabon	1				
Gambia, The	1				
Georgia	3	150	135		250
Germany	5			1,400	1,300
Ghana	1			100	120
Greece	1		180	260	400
Greenland	5				
Grenada	4	120	100	150	180
Guam	1				
Guatemala	4				
Guinea	2				
Guinea-Bissau	2				
Guyana	4				
Haiti	4		250	250	250
Honduras	4		25	200	200
Hong Kong, China	1	400	400	450	
Hungary	3		200	300	
Iceland	5				
India	1		982	1,080	1,200
Indonesia	1			228	250
Iran	6		225	250	200
Iraq	6	300	250	250	150
Ireland	5				
Isle of Man	5				
Israel	6	2,500	3,000	2,800	3,000
Italy	5				

Jamaica	4				
Japan	1			6,000	
Jordan	6	1,000	1,000	2,500	3,000
Kazakhstan	3				
Kenya	2	500	100	200	150
Kiribati	1				
Korea, North	1		250	300	320
Korea, South	1		600	400	400
Kuwait	6				
Kyrgyz Republic	3	400	500	1,000	1,200
Lao PDR	1		200	250	300
Latvia	3		150	150	180
Lebanon	6	500	500	500	700
Lesotho	2	100	100	100	100
Liberia	2	100	100	100	45
Libya	2				250
Liechtenstein	5				
Lithuania	3		150	150	180
Luxembourg	5				
Macao, China	3				
Macedonia, FYR	3		300	250	350
Madagascar	2				
Malawi	2		50	60	60
Malaysia	1				
Maldives	1				
Mali	2				
Malta	5				
Marshall Islands	4				
Mauritania	2				
Mauritius	2				
Mayotte	2				
Mexico	4	400	400	400	450

Micronesia, Federated States of	1				
Moldova	3				50
Monaco	5				
Mongolia	1				
Morocco	2				
Mozambique	2	160	60	15	30
Myanmar	1		200	250	
Namibia	2				250
Nepal	1				
Netherlands	5			1,200	1,500
Netherlands Antilles	4				
New Caledonia	1				
New Zealand	1				
Nicaragua	4		700	350	400
Niger	2				150
Nigeria	2			150	180
Northern Mariana Islands	1				
Norway	5				
Oman	6			185	320
Pakistan	1	120	200	200	280
Palau	1				
Panama	4	609	700	400	400
Papua New Guinea	1		1,600	1,800	2,400
Paraguay	4			1,000	
Peru	4		600	1,000	
Philippines	1	250	300	300	328
Poland	3		248	436	
Portugal	5		600		
Puerto Rico	4				
Qatar	6				
Romania	3	120	180	260	300
Russian Federation	3		300	450	500

Rwanda	2				
Samoa	1				
San Marino	5				
São Tomé and Principe	4				
Saudi Arabia	6			220	280
Senegal	2				
Serbia and Montenegro	3		180	250	300
Seychelles	2				
Sierra Leone	2	270	150	120	100
Singapore	1	1,200	1,200	1,500	1,500
Slovak Republic	3			400	500
Slovenia	3		180	250	300
Solomon Islands	1			1,800	2,400
Somalia	2	165	200	120	160
South Africa	2	160	200	195	180
Spain	5		600	225	
Sri Lanka	1		200	250	280
St. Kitts and Nevis	4				
St. Lucia	4				
St. Vincent and the Grenadines	4				
Sudan	2	150	150	100	86
Suriname	4				
Swaziland	2				
Sweden	5				
Switzerland	5				
Syrian Arab Republic	6				200
Tajikistan	3	500	600	300	250
Tanzania	2			200	200
Thailand	1		200	400	720
Timor-Leste	1				
Togo	2				
Tonga	1				

Trinidad and Tobago	4				
Tunisia	2				
Turkey	3			900	
Turkmenistan	3				250
Uganda	2	500	200	100	86
Ukraine	3		250	300	350
United Arab Emirates	6		250	300	320
United Kingdom	5			1,200	1,500
United States	4	420	450	480	500
Uruguay	4			1,000	
Uzbekistan	3			250	250
Vanuatu	1				
Venezuela, RB	4			1,000	360
Vietnam	1	180	200	250	300
Virgin Islands (US)	4				
Yemen	6			185	320
Zambia	2	200	250	80	80
Zimbabwe	2	200	250	200	150

Source: World Bank (2005)

ANNEXE 3. DESCRIPTIVE SUMMARY STATISTICS

Variable	No. of obs.	Mean	Std. dev.	Min.	Max.
Weapon price (current USD)	334	511.36	660.84	12	6,000
Weapon price (current USD) $_{t-1}$	234	494.57	651.07	12	6,000
Weapon price (constant 2000 USD)	334	515.3	662.37	12.38	6,000
War start (UCDP/PRIO)	770	0.06	0.24	0	1
GDP per capita (PPP 2000 USD)	668	8,360.66	8,646.46	499.82	60,536
GDP per capita (constant 2000 USD)	711	5,492.38	8,143.59	80.32	46,191
GDP per capita growth	706	1.41	5.28	-43.7	32.9
Military expenditure (% of GDP)	547	3.24	3.94	0	44.66
Neighbours' avg. mil. exp.	536	3.48	3.21	0	22.61
Post-Soviet collapse period	824	0.25	0.43	0	1
Ln population*	785	15.21	2.12	9.9	20.97
Africa	824	0.22	0.41	0	1
Civil war legacy	785	538.6	1,836.66	0	20,672
Government effectiveness	808	0.03	0.97	-2.32	2.43
Ln distance from Moscow*	692	8.44	0.8	4.3	9.71
Law and order	522	3.75	1.46	0.57	6
Democratic accountability	522	3.6	1.61	0	6
Young men (15–29% of population)	744	0.13	0.02	0.09	0.23
Homicide rate (per 100,000 deaths)	504	8.11	10.72	0.3	63.36

Notes:
* Ln = natural log: a tool to scale down magnitudes without losing data relativity.
UCDP = Uppsala Conflict Data Project.
PRIO = International Peace Research Institute of Oslo.
PPP = purchasing power parity.

ANNEXE 4. RESULTS OF WEAPONS PRICE REGRESSION

Annexe 4 considers a variety of model specifications, with each column corresponding to a different version of the model. Variables are included according to their significance.

Part 1

	1	2	3	4	5	6	7	8
GDP per capita (PPP 2000 USD)	0.003	0.004	0.004	0.01		0.01	0.01	0.01
	[0.01]	[0.01]	[0.01]	[0.01]		[0.01]	[0.01]*	[0.01]*
Neighbours' avg. mil. exp.	-36.55	-29.71	-30.24	-31.87	-29.55	-28.32	-27.28	-31.75
	[12.35]***	[12.54]**	[10.81]***	[10.93]***	[9.01]***	[10.89]***	[12.98]**	[13.55]**
Government effectiveness	215.83	176.17	173.12		135.59	173.4		
	[59.62]***	[61.89]***	[60.67]***		[56.08]**	[60.66]***		
GDP per capita growth, t-1	0.25	0.74						
	[2.86]	[2.97]						
Civil war legacy		-0.03	-0.02	-0.03	-0.03	-0.03	-0.05	-0.05
		[0.02]*	[0.01]*	[0.01]**	[0.01]**	[0.01]**	[0.02]*	[0.02]*
Africa (dummy)		-292.5	-293.87	-394.04	-356.95	-302.34	-332.79	-364.85
		[122.54]**	[120.93]**	[120.78]***	[113.85]***	[121.06]**	[136.46]**	[139.41]***
Ln distance from Moscow[a]		124.05	125.45	129.76	112.53	125.16	134.17	130.08
		[62.66]**	[61.54]**	[64.20]**	[53.57]**	[61.52]**	[68.80]*	[71.45]*
Law and order								2.98
								[25.88]
Democratic accountability							33.9	
							[19.32]*	
Post-Soviet collapse period						-41.42		
						[30.15]		
No. of observations	222	212	228	228	265	228	187	187
No. of countries	85	81	81	81	94	81	69	69
R^2	0.08	0.18	0.17	0.18	0.10	0.17	0.18	0.11

Notes:

Standard errors appear in square brackets. All regressions contain a constant.

* Statistically significant at 90 per cent. ** Statistically significant at 95 per cent. *** Statistically significant at 99 per cent.

[a] Ln = natural log: a tool to scale down magnitudes without losing data relativity.

Part 2

	9	10	11	12	13	14	15	16
GDP per capita (PPP 2000 USD)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	[0.01]	[0.01]	[0.01]	[0.01]*	[0.01]	[0.01]	[0.01]	[0.01]
Neighbours' avg. mil. exp.	-33.16	-30.1	-34.78	-35.25	-35.46	-32.04	-32.16	-32.16
	[12.56]***	[12.45]**	[11.37]***	[10.96]***	[10.97]***	[10.90]***	[10.91]***	[10.91]***
Government effectiveness	175.05							
	[66.64]***							
Civil war legacy	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
	[0.02]*	[0.02]	[0.01]**	[0.01]**	[0.01]**	[0.01]**	[0.01]**	[0.01]**
Africa (dummy)	-325.54	-378.19	-390.35			-331.24	-337.8	-337.8
	[126.03]***	[126.94]***	[125.89]***			[126.47]***	[126.95]***	[126.95]***
Ln distance from Moscow[a]	132.02	125.18	90.47	70.81	72.3	120.79	123.66	123.66
	[62.89]**	[67.57]*	[72.46]	[64.19]	[64.50]	[64.06]*	[64.27]*	[64.27]*
Gov. effectiveness, 33rd–66th percentile					224.1		-105.61	125.22
					[120.90]*		[130.42]	[120.88]
Gov. effectiveness, 66th–100th percentile					307.48			230.83
					[134.81]**			[131.67]*
Gov. effectiveness, 33rd percentile				-257.91		-169.57	-230.83	
				[107.03]**		[107.58]	[131.67]*	
Young men (15–29% of population)			26.66					
			[32.06]					
War start		1.5						
		[70.47]						
Military expenditure	14.55							
	[9.40]							
No. of observations	201	196	215	228	228	228	228	228
No. of countries	77	78	76	81	81	81	81	81
R^2	0.13	0.17	0.18	0.07	0.08	0.08	0.13	0.14

Notes:

Standard errors appear in square brackets. All regressions contain a constant.

* Statistically significant at 90 per cent. ** Statistically significant at 95 per cent. *** Statistically significant at 99 per cent.

[a] Ln = natural log: a tool to scale down magnitudes without losing data relativity.

LIST OF ABBREVIATIONS

AK-47	Avtomat Kalashnikova, 1947	NISAT	Norwegian Initiative on Small Arms Transfers
GDP	gross domestic product		
ICRG	*International Country Risk Guide*	USD	US dollar

ENDNOTES

1 The AK-47—Avtomat Kalashnikova, 1947—is named after its designer, Mikhail Kalashnikov, and the year it first went into production.

2 The AK-47 was not the first effective personal automatic weapon (or assault rifle); indeed, it was not much of an invention at all. It has been claimed that the weapon was nothing more than a rough copy of the German StG44 (Long, 1988). While the two weapons look very similar, and Kalashnikov undoubtedly drew on the StG44 and US M1 carbine, the bolt carrier mechanism and the design of the receiver of the AK do mark a significant innovation that sets it apart.

3 Purchasing a weapon online in the United States requires the purchaser to do so through a recognized federal firearms licence dealer.

4 Author's interviews with Alan Offringa, former assault rifle monitor, US Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) in Boston, Massachusetts, November–December 2005; correspondence by phone between Offringa and the author.

5 There were not 208 countries for every period, as some were created in the last 15 years (e.g. ex-Soviet republics that became independent states), hence 742 and not 208 × 4 = 832.

6 The model of the small arms market is based on a simultaneous equations model of demand and supply. Demand for small arms depends on three factors: relative price (P), income (I), and the motivation for acquiring a weapon (M). The supply side of the small arms market is determined by price (P), the prevailing regulations in relation to small arms (R), and intrinsic supply costs (S). The structural demand (Qd) and supply (Qs) equations of this simultaneous equations system are given by:

$$Qd = -a + bP + cI + dM$$
$$Qs = e + fP - gR - hS$$

Price is determined by the meeting of demand and supply. Setting these equations equal to each other:

$$Qs = Qd$$
$$e + fP - gR - hS = -a - bP + cI + dM$$

Solving the equilibrium conditions for the dependent variables price (P) and quantity traded (Q) gives the following reduced-form equations:

$$P = -\left\{\frac{e+a}{b+f}\right\} + \left\{\frac{c}{b+f}\right\}I + \left\{\frac{d}{b+f}\right\}M + \left\{\frac{g}{b+f}\right\}R + \left\{\frac{h}{b+f}\right\}S$$
$$Q = -\left\{\frac{be-af}{b+f}\right\} + \left\{\frac{cf}{b+f}\right\}I + \left\{\frac{df}{b+f}\right\}M + \left\{\frac{gb}{b+f}\right\}R + \left\{\frac{hb}{b+f}\right\}S$$

Since there are currently no country estimates for the quantity of Kalashnikov trades (Q), it is not possible to estimate both reduced-form equations. As a result, the structural parameters from the initial demand and supply equations cannot be directly estimated. With the benefit of the collected price data, however, it is possible to estimate the reduced-form equation for weapons price. While the magnitude of the estimated coefficients should not be interpreted in the normal linear fashion, their signs and significance can nevertheless provide meaningful insights into the nature of the small arms market. A 20-year cross-country panel is used to estimate the reduced-form model for weapons price determinants:

$$P_{it} = \beta_0 + \beta_1 I_{it} + \beta_2 M_{it} + \beta_3 R_{it} + \beta_4 S_{it} + e_{it}$$

What we are looking for is whether the coefficient estimates (β_1, β_2, etc.) are statistically significant. This indicates whether the variation in a particular explanatory variable is significant in explaining changes in Kalashnikov prices.

7 The estimation method is random effects generalized least squares. Further details on panel data methods employed in this analysis are given in Killicoat (2006).

8 A variable that is statistically significant but has the opposite sign to that which was expected would suggest a problem with the choice of variables included in the model of the market.

9 It may be argued that weapons price determination is partly endogenous to the homicide rate; i.e. one may suspect that when prices fall, homicide rates may rise. This effect is ignored in the current analysis, given the weak result. It may be addressed in future with appropriate use of instrumental variables.

10 The civil war variable is coded as one if, in a five-year period, a civil conflict claims at least 25 battle deaths in a given year and is based on the Uppsala Conflict Data Project/International Peace Research Institute of Oslo Armed Conflicts Dataset (Gleditsch et al., 2002).

11 The result was similar for a threshold of 1,000 battle deaths.

12 See Kaufmann, Kraay, and Mastruzzi (2005, pp. 37–8) for a full description of how government effectiveness is calculated by the World Bank.

13 This data fact regarding neighbouring countries was obtained from the World Bank's World Development Indicators (World Bank, n.d.).

14 The Soviet collapse is deemed not to be significantly correlated with weapons prices because there is less than a 90 per cent chance of the Soviet collapse being statistically associated with weapons prices. In statistics, 90 per cent is the lowest band for accepting a hypothesis.

15 Although dozens of other countries—in particular, China, Egypt, and Iraq—produce large quantities of Kalashnikovs, the majority of Kalashnikov derivative weapons over the last 20 years are believed to be sourced from the former Soviet Union (Kahaner, 2006, pp. 55–71).

16 It is important to understand that the distance from Moscow proxy variable does not literally measure transport costs. Rather, it represents the approximate transport costs of countries relative to one another.

17 The specification of each model type is a trimmed version of the Collier-Hoeffler (2004) conflict regression model. Since the sample for this study contains only four time-series observations (price data is for a 20-year period) compared with the conventional eight five-year periods (the 40 years since 1960), a greater degree of parsimoniousness is required when determining which regressors to include. The period of each observation is the same as for the estimation of the small arms market (1986–90, 1991–95, 1996–2000, and 2001–05). Small sample problems from weapons price coverage would be exacerbated by including all ten significant regressors from Collier and Hoeffler (2004). With all ten variables in a Collier-Hoeffler model included, listwise (i.e. in turn) deletion of observations with missing data would reduce the sample to only 106 panel observations.

18 The quantitative conflict research community has come to some degree of convergence on the factors that seem most important in explaining civil conflict onset, namely, population size, the level and growth of income, dependence on lootable natural resources, and geographic features that reduce the cost of incubating an insurgency. For reviews of the quantitative literature on civil war, see Sambanis (2004) and Lacina (2004).

19 In economics, it is necessary to define the causal mechanism by which cheap weapons are hypothesized to lead to an increased probability of civil conflict. Cheap weapons imply that the cost of conflict-specific capital is low, thus increasing the feasibility of rebellion. Weapons prices are, in effect, a signal to would-be insurgents about the extent to which conflict-specific capital will be a constraint in the decision to rebel violently.

20 This is roughly equivalent to the effect that a 0.5 per cent increase in per capita income would have on reducing the risk of conflict. For details on marginal probabilities of different factors in conflict risk, see Collier and Hoeffler (2004, pp. 580–92).

21 As Chris Chivers found when talking to small-time arms sellers in Iraq over the last few years.

22 Also confirmed in the author's interview with Chris Chivers, *New York Times* correspondent in Iraq, 6 December 2006.

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