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# Assessing the Practices and Products of Darkweb Firearm Vendors

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**ABSTRACT**

The development of the Darknet as a parallel network to the Web in the 21st century has facilitated illegal trafficking in small arms, as defined by the United Nations. The authors have used investigative research methodologies to observe six weapon sale sites on the Darknet over a six-month period to identify sellers of firearms, the type and caliber of weapons for sale, manufacturer, price in Bitcoin, and the principle national origins of the firearms. This is the first study of its type to explore the illegal sale of firearms on the Darknet. This evidence can be used by law enforcement to intercept and shut down said sites and provide insight to the nature of the illegal arms trade on the Darknet.

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The global market for firearms, whether sold legally or through illegal means, is massive, generating substantial profits for distributors. It is estimated that in 2013 the global arms trade exceeded $76 billion while international domestic military expenditures were $1.7 trillion ("International arms transfers" 2016; Shah 2013). Many firearms are produced in major industrialized nations in North Americana and Western Europe. In the United States alone, according to the Bureau of Alcohol Tobacco and Firearms there were over 10 million firearms manufactured and 393,000 in 2013 (Firearms Commerce in the United States: Annual Statistical Update 2015:1–3).

Some of the weapons available within the global market are produced and manufactured for use by either military or home consumers for use in either personal defense or hunting, particularly small arms such as revolvers, self-loading pistols, rifles, and carbines. Others are produced either for military use or restricted sales to consumers depending on national laws, including sub-machine guns, assault rifles and light machine guns (Grimmett and Kerr 2012). Finally, military grade firearms which are not intended for the consumer market, such as light weapons intended for use by two to three people including heavy machine guns, grenade launchers, portable anti-aircraft weapons, recoilless rifles, anti-tank weapons, portable anti-aircraft weapons, and various sizes of mortars (United Nations Department of Public Information 2006:2).

Many of the arms sold globally move through formal, direct contracts between governments and manufacturers, particularly military-grade firearms and light weapons (e.g. Cook and Braga 2001; Wintemute 2013). The consumer market generates substantial revenue as well, though they operate somewhat differently. Individuals may legally purchase certain small arms directly from licensed dealers depending on national or local laws. Additionally, Cook and Ludwig (1996) argued that between 30% and 40% of all firearm sales in the US occur in the secondary market of consumer-to-consumer sellers, such as those operating at gun shows (see also Wintemute 2013). Some of these purchases may be legal, though many may violate federal laws without appropriate documentation of the sale, especially in states with lax gun laws (Cook and Ludwig 1996; Hepburn, Miller, Azrael, and Hemenway 2007; Wintemute 2007; Wintemute 2013).

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There is an additional opaque and indirect distribution channel operating involving brokers and middlemen who operate via either secondary markets or direct sales via illicit markets (Cragin and Hoffman 2003; Feinstein 2011). While some vendors operate via grey markets where sales are conducted through legal channels for covert delivery, there is also a black market where the sale and purchase of the firearm are illegal (Cragin and Hoffman 2003; Feinstein 2011). Though the majority of research has considered the physical sale and distribution of firearms, there is also anecdotal evidence of an online market operating to sell arms via the so-called "Dark Web" (e.g. Office of Public Affairs 2017). The websites and vendors operating on the Dark Web utilize encryption in order to conceal their location. Additionally, the dark web is not indexed by or accessed via traditional web browsers or search engines such as Google (Barratt 2012; Martin 2014; Smirnova and Holt 2017). Individuals must first connect using The Onion Router (Tor) network to connect, and then can only access web content via a specific set of tools, the most common of which is called the Tor Browser (Ablon et al., 2014; Barratt 2012; Martin 2014; Tor 2017).

There is little empirical research documenting the nature of the online market for firearms (Lacson and Jones 2016), calling to question the scope of products available and the distribution methods of vendors. To date, only one study has investigated the market dynamics of dark web forums utilizing a sample of singular screen grabs of 60 vendor accounts on dark web forums (Paoli et al. 2017). This analysis found that pistols, rifles, and sub-machine guns were the most commonly sold products. Prices on these dark web forums were markedly higher than in person or clear web markets, with a cautious estimation of firearm transactions on dark web forums approaching 136 sales per month (Paoli et al. 2017). However, it is not clear how the market for firearms operating on the dark web compares to other illicit products sold on this platform, including drugs (e.g. Cunliffe, Martin, and Decary-Hetu 2017; Decary-Hetu and Giommoni 2017; Martin 2014) and virtual services such as personal data or hacking tools (Ablon et al. 2014; Smirnova and Holt 2017; van Hardeveld, Webber, and O'Hara 2017).

This study attempted to address this gap in the literature through a qualitative examination of six single vendor shops offering firearms on the Dark Web. The findings suggest that dark web firearm marketplaces offered both difficult to obtain products, such as military grade weapons, and more common firearms. Dark web vendors offered a range of products, for which consumers could pay a premium. Firearms sold on the dark web not only have elevated costs, but also place buyers at risk of scam victimization, customs violations, and sanctions if detected. The implications of this analysis for our understanding of illicit market operations for physical goods are discussed in detail, along with policy and law enforcement strategies to disrupt their operations.

## *Research examining online markets and firearms*

Though a number of studies have examined the proliferation of small arms and light weapons (SALW) via real world means there is generally little research considering the role of the Internet generally and the Dark Web specifically in the illicit market for weapons (see Paoli et al. 2017). There have been multiple arrests and prosecutions of vendors on federal charges in the US related to firearms trafficking via Dark Web markets since 2015 (District of Massachusetts 2016; McKay 2018; Middle District of Alabama 2015; Office of Public Affairs, Department of Justice 2017; Western District of Michigan 2015). There have also been several arrests and takedowns of firearms vendors internationally over the last few years as well (C. M. 2018; Cox 2015).

Beyond these incidents, little is known about the quantity or types of firearms sold through Dark Web markets, their price points, or operational techniques in order to ship purchased goods to buyers. Examinations of traditional physical markets for SALW, whether white, grey or black, argue that they can be thought of as a traditional supply chain for products (Markowski et al. 2009; Rothe and Collins 2011). Similar evidence has been found for the illicit online distribution of physical goods including drugs (Cunliffe, Martin, and Decary-Hetu 2017; Decary-Hetu and Giommoni 2017; Martin 2014), as well as digital resources such as malicious software (Holt 2013) and stolen personal

information on the open and dark web (e.g. Franklin et al. 2007; Smirnova and Holt 2017; van Hardeveld, Webber, and O'Hara 2017).

It is possible the social and structural factors that shape these markets may also be observed with online markets for SALW. In particular, there is substantial evidence that vendors operating on the darkweb require payments via cryptocurrencies like bitcoin (e.g. Ablon et al. 2014; Cunliffe et al. 2017; Martin 2014; Smirnova and Holt 2017). Illicit markets that utilize Dark Web services operate in two primary forms: forums and shops (Li and Chen 2014). First, forums function in a similar fashion to illicit markets operating on the Open Web, wherein a vendor posts an ad for their product, indicating price point, methods of communication, payment, and their terms of service (Cunliffe et al. 2017; Li and Chen 2014; Smirnova and Holt 2017). Prospective customers can then post questions to the seller about their products, and they may contact the buyer separately outside of the forum to engage in a transaction.

Forums are also operated by an individual or group with some hierarchical structure, thereby enabling third-party regulatory control over posts and user behavior (e.g. Holt 2013; Martin 2014). Forum operators supporting illicit markets on the open or dark web frequently attempt to find ways to manage user encounters so as to minimize in-fighting and promote sales. One of the key mechanisms to encourage economic exchanges is through enabling users to post reviews of vendors' products and services. Seemingly unbiased customer reviews provide a measure of transparency to the market so that customers can identify vendors who cheat their customers, through the delivery of poor quality products or by sending nothing to the buyer after they receive payment (e.g. Holt 2013; Hutchings and Holt 2015).

Thus, the use of feedback enables buyers a measure of crowd-sourced information to check a vendor's legitimacy prior to making a purchase. Positive feedback from customers is essential for a vendor to appear trustworthy and is tied to a growth in their customer base over time (Holt and Lampke 2010; Motoyama et al. 2011). Negative feedback is often detrimental to a vendor, and may even cause a broader disruption in market operations depending on the severity of the claims (Holt, Smirnova, Chua and Copes 2016).

The second form of vending on the Dark Web operate via single-operator shops, which are created by individual vendors to explicitly offer goods or service to potential customers (Martin 2014; Smirnova and Holt 2017). A shop operates independently of forums, enabling vendors to directly offer services with no third party oversight. Structurally, vendors post the same information as in forums by posting their products, prices and processes. Shop operators do not, however, have to post all the feedback they receive from their customers. As a result, vendors may restrict posts of negative feedback on buyer experiences which may make it difficult for buyers to determine the legitimacy of a vendor and their products (Smirnova and Holt 2017).

The role of feedback demonstrates that illicit markets operating on the open and dark web both depend in part on trust between participants (e.g. Franklin et al. 2007; Holt 2013; Hutchings and Holt 2015; Motoyama et al. 2011). The virtual nature of the market renders it impossible for customers to physically inspect products before they make a purchase. Thus, they must find textual and image-based cues to determine a vendor's potential legitimacy, such as the use of photos of products, the presence of customer support lines via Skype or email, and the presence of positive or negative feedback posted by customers (Holt and Lampke 2010; Hutchings and Holt 2015; Martin 2014).

Given the social and behavioral dynamics observed in various illicit markets operating on the Dark Web, it is plausible that the same conditions would be observed in the sale of SALW. Firearms present unique differences from other illicit products sold, as they are frequently larger and heavier in size than narcotics and may be more difficult to ship in a covert way (Paoli et al. 2017). Additionally, it is not clear whether vendors operate out of the US, or in other nations with more restrictive gun laws. Finally, it is unknown if vendors sell SALW that are similar to products consumers can purchase through legitimate channels, or if they offer military-grade weapons that would be illegal to purchase in any way.

A recent analysis by Paoli and associates (2017) found gun vendors in a sample of forums utilized cryptocurrencies in order to accept payment for goods, the majority of which were pistols, rifles, and sub-machine guns. The prices for firearms were higher than those observed in legal supply chains, though customers could provide feedback to vendors in posts to provide an assessment of vendor legitimacy (Paoli et al. 2017). In the wake of major crackdowns against the various forums operating to sell illicit products online, it is plausible these findings no longer reflect the current state of the market. Additionally, this analysis did not take into account single operator shops which constitute a portion of all darkweb market operations (see Smrinova and Holt 2017). Thus, this examined these issues using an exploratory qualitative analysis of advertisements from six shops on the dark web that facilitate the sale of SALW.

### *Methodology*

The primary exploration of any illicit market is to determine the source, destination, and makeup of the good and services being sold. In the case of crypto-markets, this becomes problematic as the source and destination cannot even partially be known without participating in the sale of goods and services. Without violating law and ethics, this leaves passive observation of the markets to determine descriptive characteristics of the good and services of the vendor.

To collect the information desired, six different Tor sites specific to the sale of weapons were monitored over a period of four months from beginning of February 2016 until the end of May 2016. The sites were systematically mined using custom shell scripts on a Linux based computer that connected to the Tor network and downloaded the site in its entirety to a local mirror. These scripts were then scheduled to mirror the sites on a once per week basis. The sites selected were already known to the researchers based on previous experience on the Tor network.

As with any study, there are limitations to the research. Any connection to the Tor network will require up to 6 nodes or points of connectivity. This can delay the transfer speeds between the host client and the server. Data connections can be lost or disconnected if these speeds are reduced to a point or the time between data transfers becomes too large and times out. In addition, hosting companies on the Tor network are sometimes the target of large scale denial of service attacks. These types of attacks can cause similar data transmission issues between host client and server. There are also technical challenges to monitoring such markets in an organized and systematic manner. These technical challenges are compounded by a constant trend on the Tor network of shifting sites to alternate URL addresses to avoid law enforcement or launch scams.

In addition to transmission difficulties, there is the added limitation of the unknown nature of the seller or market vendor. It is not uncommon to find fake or duplicate sites claiming to be a vendor at an alternate URL address. These are typically user reported scam sites designed to look and feel real, but serve only to defraud a potential customer. The second issue with the unknown nature of a site is that some of these sites might be active sting operations by law enforcement from various agencies or countries. This was a primary concern that led to the passive observation of these sites. To alleviate this concern and to show due diligence, senior members of the Dallas FBI were made aware of the intent for this study. The agency found no reason to stop the research study and the researchers proceeded with IRB approval and data collection.

## Findings

This analysis utilized a qualitative case study design to consider the practices of vendors based on the language in their advertisements, as well as images posted for products. The methods for purchase, payment, and distribution of product were explored along with any customer support measures and trust mechanisms used by vendors. Additionally, the range of products sold and differences in price points over time are examined in detail. Deviant cases are highlighted to demonstrate differences across vendors, and direct quotes were taken from the ads to illustrate points where appropriate.

### *Vendor details and processes*

The approach to sales and distribution of weapons varied greatly between the site vendors. As with web sites on the clear web, the design, layout, photos, shipping, and escrow information for firearms vendors were all present to support their apparent purchase and raise consumer trust. Though the general design and layout varied between vendors, some common themes remained. Vendors placed a heavy emphasis on the display of product, largely through the use of photos, ranging from common stock photography available on manufacturer websites and online catalogs to highly detailed photos that noted specific weapon characteristics such as specific rail attachments or optics. Some sites used multiple photos of the same weapon from various angles to show the specificity of the weapon and any additional accessories. Of the six sites, only Black Market provided professional photos, taken from several angles, many of which captured specific specifications and details of the firearm such as serial number and manufacturer markings (see Figure 1 for an example).

The majority of vendors, however, used less professional photos. Many of these photos were simply an image of the weapon with the name of the vendor and date stamp handwritten on paper, as illustrated in Figure 2. Many used photos of the guns laid on bare flooring or carpet, tables, beds, or even paper as a background in the image. Vendors also provided product listings with additional photos and specifications, but they were clearly not taken in a professional manner. Only one of the six vendors in the sample used a collage of weapon images as a banner that did not allow customers to click and view more, nor it did it represent the products being sold at the time. This method limited the potential information available to their customers regarding their products.

Regardless of photo type or production quality, all sites used a catalog type system to display product photos and descriptions. These were either in a vertical or matrix (row and column) fashion and very similar to contemporary clearweb sites. Vendors differed in the manner in which they described their products. Most all advertisements described the primary weapon operation and

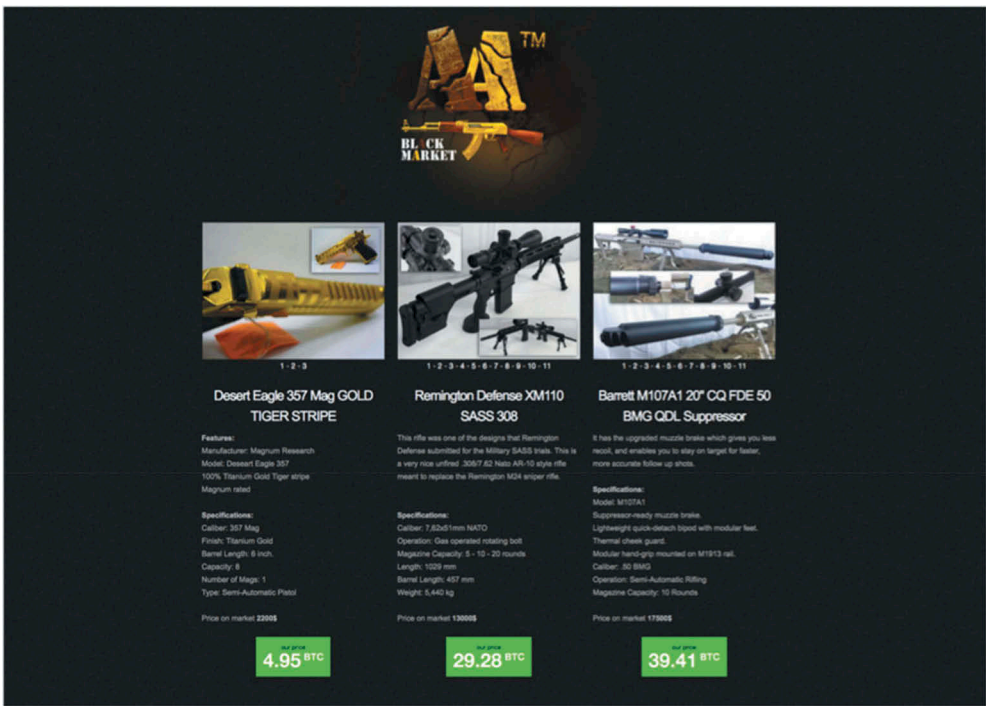


**Figure 1.** Screenshot of the shop page for black market.


**Figure 2.** Screenshot of the shop page for lucky 47.

accessories that were provided with purchase in addition to any descriptive text. For instance, the Black Market site contained a listing for a TAVOR SAR rifle, stating: "The elite model TAVOR® SAR "IDF" model is the US civilian version in a semi-auto only configuration. It comes with a Meprolight® MEPRO 21 Day/Night Illuminated reflex sight mounted directly to the barrel, just as it is issued to the IDF [Israeli Defense Force]." In this description, the make, model, brand, variant, and accessories were all listed directly under the eight photos of the product. The description also contained a reference to the military issue standards, commonly referred to as "milspec" (military specification). This attribute typically means that a device, weapon, or piece of equipment meets or exceeds the specifications outlined for military service.

## *Payment*

As noted in prior research on dark market illicit products (e.g. Cunliffe et al. 2017; Decary-Hetu and Giommoni, 2017; Martin 2014; Paoli et al. 2017), cryptocurrencies such as Bitcoin and Bitwallet were the standard accepted payment option for all six sites under analysis. The site Darkseid hinted at the possibility of expanding these options, stating: "At this moment we only accept bitcon as a form of accepted currency because it is the most accesible [sic] we might implent [sic] Dashcoin if it proves to be profitable." The Black Market site operators specifically stated: "For payment we prefer Bitcoins. You must use a Bitcoin Wallet to make the payment for our service. Other payment methods are not currently available."

Though all sites solely accepted cryptocurrencies, only four of the six listed their product price point in Bitcoin currency. The remaining two used either US Dollars or Euros. The vendor Darkseid listed their products in US Dollars, while Lucky 47 listed in both Euros and BTC, and Manufrance exclusively used Euros. While Black Market listed the cost of their products by BTC, they provided a US Dollar conversion on their site. Importantly, neither listed price changed, regardless of variations in Bitcoin conversion rates. Their conversion also consistently over-estimated the cost of their products in US Dollars. For example, a listing for the "FN SCAR Heavy 17S .308 Rifle, Black, 20 Round" semi-automatic rifle on February 3, 2016 was listed at 7.66 BTC/3400 USD. However, conversion rates on this date would only amount to $ 2868.52. Euro Guns and "UK Guns and Ammo" were the only two sites to exclusively list their products using bitcoin currency.

Of the six single vendor shops under analysis, none directly mentioned the use of escrow services unlike in other clearweb (Franklin et al. 2007; Holt and Lampke 2010; Hutchings and Holt 2017) and darkweb illicit product markets (Paoli et al. 2017). Rather, each site provided distinct stipulations and processes by which a consumer could receive their products. The site Lucky 47 used language providing incentivizes for returning customers, stating: "For the first purchase, we require payment in advance. When you purchase again in our Shop, you pay 50% in advance and the rest after receiving the goods." For others, such as Black Market, customers were instructed to:

> Select product, enter valid email and shipping address, click buy and send the CORRECT amount of bitcoins to the deposit address. After 4 confirmations (approximately 15 minutes) the product details and walkthrough guide will be sent to your email. If you have any further questions, don't hesitate to ask us.

Though far less detailed, UK Guns and Ammo provided similar terms: "After purchase of an item contact form will become available to you for coordination of delivery terms."

### *Shipping*

All six vendors offered their customers some indication of their shipping process, though the majority simply noted their country of origin and listed the countries where they would ship their products. Manufrance provided both specific shipping details, as well as advice to customers on how to avoid detection. They stated that customers may receive their product in two weeks or less, depending on their location, and products would be shipped within 72 hours after purchase. They also noted that "shipping post office changes regularly," and customers should "simulate surprise" should a problem arise as "They [postal and shipping inspectors] can't prove anything."

Black Market took a similar approach, noting that they shipped purchases "within 24 hours after you place an order, Receive WORLDWIDE in faster than 72 h after shipped." The site went into the greatest detail on how they ship and package products to avoid detection by Customs, stating:

> Here is a small part of the technical used to ship our products. To be sure the Customs Border will never find it! Do not hesitate to contact us if you have any problem with our service… [Purchased products are concealed] In Computer devices; In cans never opened; In air freshener or coca cans; In books; In stoles of pairs of shoes; It may come in bottles; In all kind of Computer devices; In Electrical goods; And in all kind of products.

Black Market also provided an extensive list of suspicious "flags," or attributes, a parcel may have that would alert customs, with more "flags" increasing the likelihood of a package being "intercepted." Among the listed "flags" were: "no return address; addresses contain mispelled [sic] information (such as names, streets or cities); fictitious return address is used; and listing a sender or receiver name of a common type (Such as John Smith)."

Given the precautions necessary, Black Market advises customers to ship to PO boxes and use "Mom and Pop box companies," as they:

> often have poor security compared to franchises, for example they are less likely to require photocopies of the ID and also are less likely to have a camera system, or if they do have a camera system it is probably very poor as compared to a big franchise company.

Ultimately, the site cautioned potential customers to seek the quickest shipping possible that did not require a signature, such as "Tracked mail with out [sic] delivery confirmation, […] as the recipient can follow the status of the package online (using Tor!) and can be alerted if the package is held by customs for a prolonged period of time." Since firearms present a high risk of detection, similar to shipping narcotics via the post, such language helped to inform buyers of best practices and potentially increase consumer trust in the vendor.

### *Verification of trust*

Though the majority of vendors utilized consistent language regarding the sales process, the greatest variation across advertisements related to their utilization of mechanisms to facilitate consumer trust. Two sites, Darkseid and Black Market, provided PGP encryption key blocks on their sites to secure communications between themselves and their customers. The site Lucky 47 also provided a bit message address for customers to access. The only site to use verification seals was Black Market noting: "We are verified sellers on Hidden wiki and other forum [sic] with good reviews."

The presence or use of customer reviews were also notably absent from these vendors' sites, similar to research by Smirnova and Holt (2017) on darkweb data shop operators. Only two sites provided any mechanism for visible customer feedback. Black Market maintained a feedback page which required customers to provide their name, country, and a valid tracking number in order to leave a comment. Customers were given the option to select whether their rating should be classified as "good" or "bad," though during the time of analysis zero negative reviews were posted to the "recent feedback" thread. Black Market, which also sold drugs, counterfeit currency, and identification documents, posted customer reviews which frequently provided feedback pertaining to specific purchased products and overall customer satisfaction. One such reviewer, "idontknowmyself" from China, wrote on January 4, 2016: "Top seller! Highly recommended [sic]! My brand new fake ID and the new gun are just incredibly awesome! Thank you soooo [sic] much !!!!" Additionally, "Kleovoulos666" from Greece commented on September 17, 2014: "Quick efficient guns seller. A+++". On average, Black Market's feedback page contained 50 reviews, with only five mentioning weapons throughout the time of analysis, despite the fact that the majority (63%) of the products sold on this site were firearms.

Customers purchasing weapons from Manufrance were unable to provide overall feedback thorough the vendor's site, though a rating system was provided for each specific firearm listed. In the frequently asked questions section of the site, Manufrance addressed the rating system, writing: "Why is [sic] there so few reviews? We wait two weeks before sending the instructions email to post a review. Some of our customers never read it. Some do not care." Customers who left a review were able to rate the product out of five stars. Four of the five products listed on the site were rated, with all ratings being four or five stars. During the time of analysis, no additional ratings were added, and ratings did not change. The Black Market site listed identical user feedback with varied posting dates, suggesting that vendors may be recycling or fabricating user feedback. Such a finding mirrors prior research that shop operators may manipulate feedback on dark web marketplaces (Smirnova and Holt 2017).

Though vendors differed on feedback mechanisms, the six in this sample all offered some form of customer service to facilitate trust and promote customer loyalty in keeping with other illicit market operations online (Holt 2013; Holt and Lampke 2010; Martin 2014). Black Market utilized language guaranteeing customers "Fresh and new weapons every day!" and free bullets as a promotional giveaway: "All weapons are delivered with 10 bullets for free." Manufrance offered discounted pricing on ammunition: "SPECIAL OFFER!! 3 ammo boxes for the price of 2 !!" Lucky 47 took a similar tactic, writing:

> We have a lot more weapons for sale. The other [sic] will be offered after the agreement through the mail. Weapons that are not specified in the menu such as grenades, mines, and the like. All Prices Include Shipping and Handling! All Weapons Are Delivered With 50 Bullets For Free, Shipping is Worldwide NEW Goods Every Month!

Despite these sites' claims that new products would be offered to their clientele, no new products were listed during the time of analysis. Thus, the language may have been nothing more than creative advertising on the part of the vendor to entice buyers.

Beyond providing consumer incentives, three of the sites addressed concerns over scamming and vendor legitimacy. For instance, Manufrance wanted customers to feel confident that their site was not a scam and addressed these concerns in their "Frequently Asked Questions" section, noting:

> Q: I read somewhere that you are a scam. What do you answer?
>
> A: We can not [sic] prevent people from lying. Perhaps is it an unscrupulous competitor, a buyer who has had bad experience [sic] and put us in the same basket, or simply a pathological liar. Anyway, if you send us the address where you read this, we will be happy to answer.

While the dark web functions as a platform to provide anonymity to both the buyer and seller, vendors commonly provided personal information as a means of building trust and establishing legitimacy. Though the manner in which vendors personalized their pages varied, Manufrance made it clear that consumers would not be financing organized crime by purchasing their products. Instead, they were funding "a modest gunsmith who can't anymore manage to pay his taxes." Similarly, Darkseid sought to gain customer trust, stating:

> I am a professional Arms seller have been in the industry five years and I build and modify small arms. Before I used to sell on Nucleus market under the name RiflesandPistols [SIC] and i am also on Cryptomarket formerly RiflesandPistols […] Drkseid [sic] I am here to supply good products for reasonable prices. My prices are honest and this is my expertise i have shipped succesfully [sic] to the EU and from the US for five years with no seized packages.

One of the vendor sites, Lucky 47, noted that they were not a single dealer, but rather: "We are a paramilitary organization that fights in the present, against the massacre on the domestic population Luhanska [or Luhansk, a city in Ukraine]" and asked customers to provide cryptocurrency donations "if you want to support in our fight." Since the anonymity software which supports Tor affords both buyers and sellers a level of protection from detection or identification, it is difficult to discern the realities of these vendor statements. It is possible that these three vendors may have falsified their online identities in order to provide a more compelling narrative for buyers or make themselves appear trustworthy.

Two of the sites in this sample, Euro Guns and UK Guns and Ammo, provided incentives for registered customers to help promote their services. They both allowed customers to register with their site and receive money back on every purchase made. Euro Guns provided a clear policy, writing:

> Tell others about this shop, and earn 1% from every purchase they will make. Simply give them this link: http://pistolcqex2ecr5r.onion/?ref=YOURUSERNAME. Replace YOURUSERNAME with your actual username on this site and get earnings directly to your wallet.

UK Guns and Ammo directly mirrored this wording, including their unique site information. This was a unique program which has not been identified in prior research related to online illicit market operations.

### *Warranty*

Though vendors attempted to communicate their trustworthy nature through advertisements and language, only one site offered a warranty and return policy on their weapons. The Black Market site which also provided higher quality photos, detailed descriptions, and a variety of mechanisms to ensure trust and verification of their services included the following language in their ads: "Guarantee successful shipping worldwide" and "Arms replacing [SIC] if it's not working." While

there is little to indicate whether refunds are provided should an item unsuccessfully ship, they wrote:

> We guarantee the successful shipping because we have a good experience with the major
>
> Customs and Border institute and we have more than hundred type [sic] of packaging to make sure it arrives without any problems. If you have any problems, contact us via torchat.

Beyond shipping guarantees, the site also offered a refund on inoperative or defective weapons. They stated in two separate places on their shop: "Yes, there's a replace [sic] time of 1 week. That means, You will get a new one, if you proof its invalidness [sic] by photo or by webcam within 1 week after delivery." Though consumers concerned about obtaining warranties or refunds are unlikely to find these options on the dark web, vendors explicitly provided instructions, advice, and best practices as it pertains to shipping and receiving these illicit products.

### *Weapon types and specifications*

Understanding the methods of sales, shipping, and advertising language is vital to give context to the range of products offered by vendors within these shops. The majority of weapons sold within this sample based on the range of weapon caliber involved either NATO or western ammunition type specifications. This included the .22 long range, .308 Winchester, .357 magnum, .380 ACP, 40 SandW, .44 Magnum, .45 ACP, .50 BMG, 9 mm, 12 gauge, 12 mm, 5.56 mm, 5.7 × 28 mm, 7.62 × 39 mm, 7.62 × 51 mm, 7.65 × 57 mm, 9.3 × 72 mm and 9.3 × 74 mm (see Figure 3). Of all the ammunition calibers observed, only the 5.45 × 39 mm and the 7.62 × 39 mm were non-NATO or Soviet type calibers. Thus, the vendors appeared to target the most popular weapon calibers manufactured by common vendors such as Glock, Beretta, and Smith and Wesson. At the same time, the 5.56 mm caliber observed in these ads are the basis for the AR-15 platform which includes the M16 and its variants as predecessors. The caliber also includes a variety of current military weapon systems based on that design commonly seen in use today globally.

Vendors also noted manufacturer information in some cases, which consisted of many well known vendors such as Beretta, Colt Defense, Glock, Heckler and Koch, Remington, and Smith and Wesson (See Figure 4 for detail). A number of ads also made it difficult to determine the maker of origin for the weapon, which may be either because it had been found without markings or manufactured by hand. Despite missing information, the manufacturer demographics mirrored the primary weapons companies globally. Companies like FN Herstal, Glock, Heckler and Koch, and Sig Sauer service military, law enforcement, private security, and civilian markets around the world. The appearance of their products in illicit markets should not be a surprise as they simply have a larger market share for manufacture and distribution. Whether these goods were diverted from the licit supply chain for resale or were in some way adulterated is not, however, clear from the language in these ads.

Action type, which refers to the weapon's method of loading a round of ammunition into the chamber and rate of fire, was also noted by vendors. The action types observed included semi-automatic, fully automatic, revolving cylinder, bolt action, and pump action. The action is of particular interest, particularly the availability of fully automatic weapons compared to semi-automatic weapons, as they are currently either highly regulated or illegal to own depending on the weapon and the country (Paoli et al. 2017).

In total, 105 firearm product listings were identified across all six vendors' advertisements. As illustrated in Table 1, the most common listings were for semi-automatic handguns (64%) and semi-automatic long guns (17%), including both shotguns and rifles. Most weapons recorded were either fully automatic or semi-automatic with the remaining being some sort of single action. Semi-automatic weapons were to be expected as they are the most commonly manufactured for both civilian markets as well as the law enforcement and military consumers (see Figure 5).

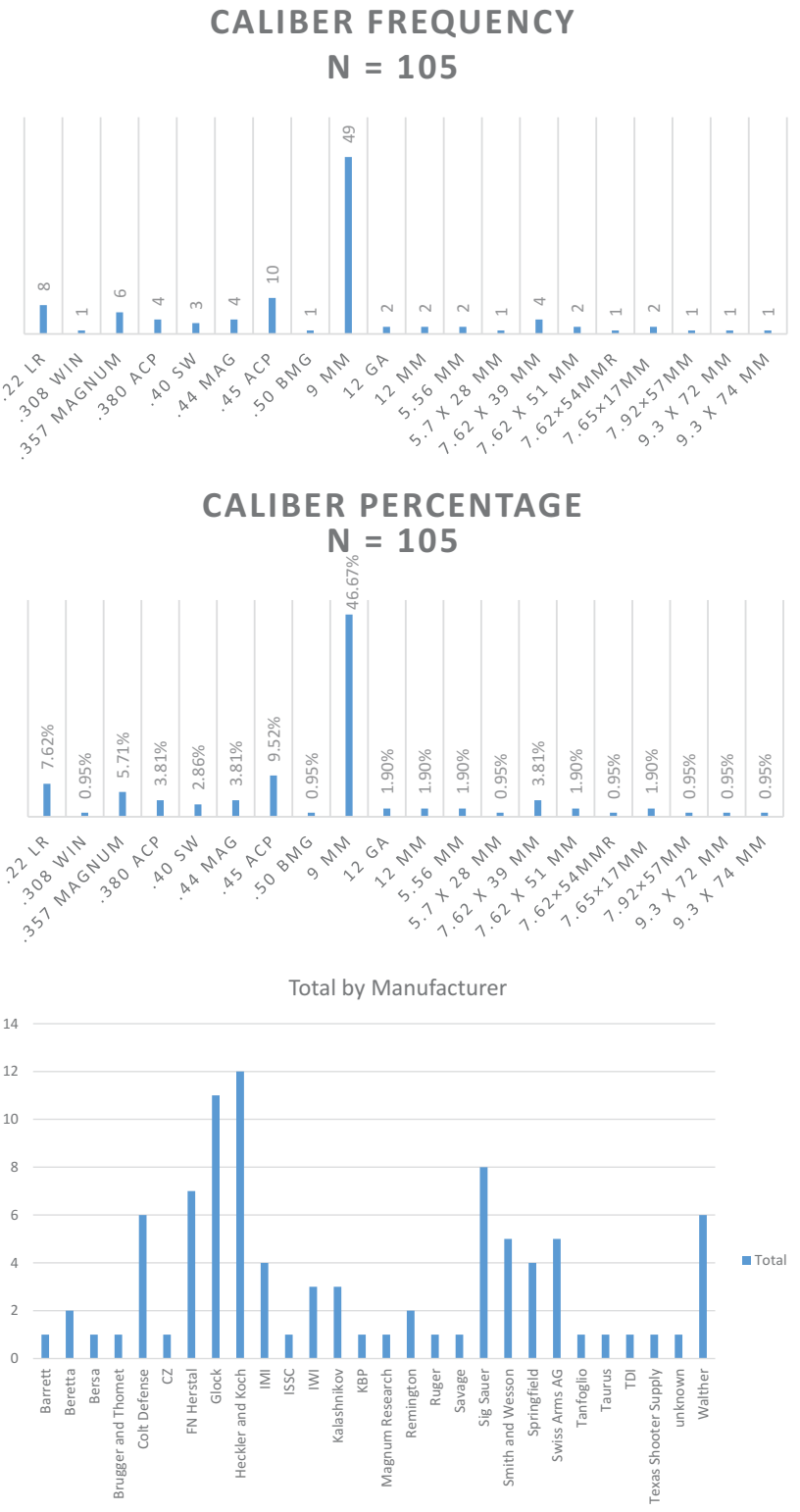


**Figure 3.** Total product listings by caliber type.

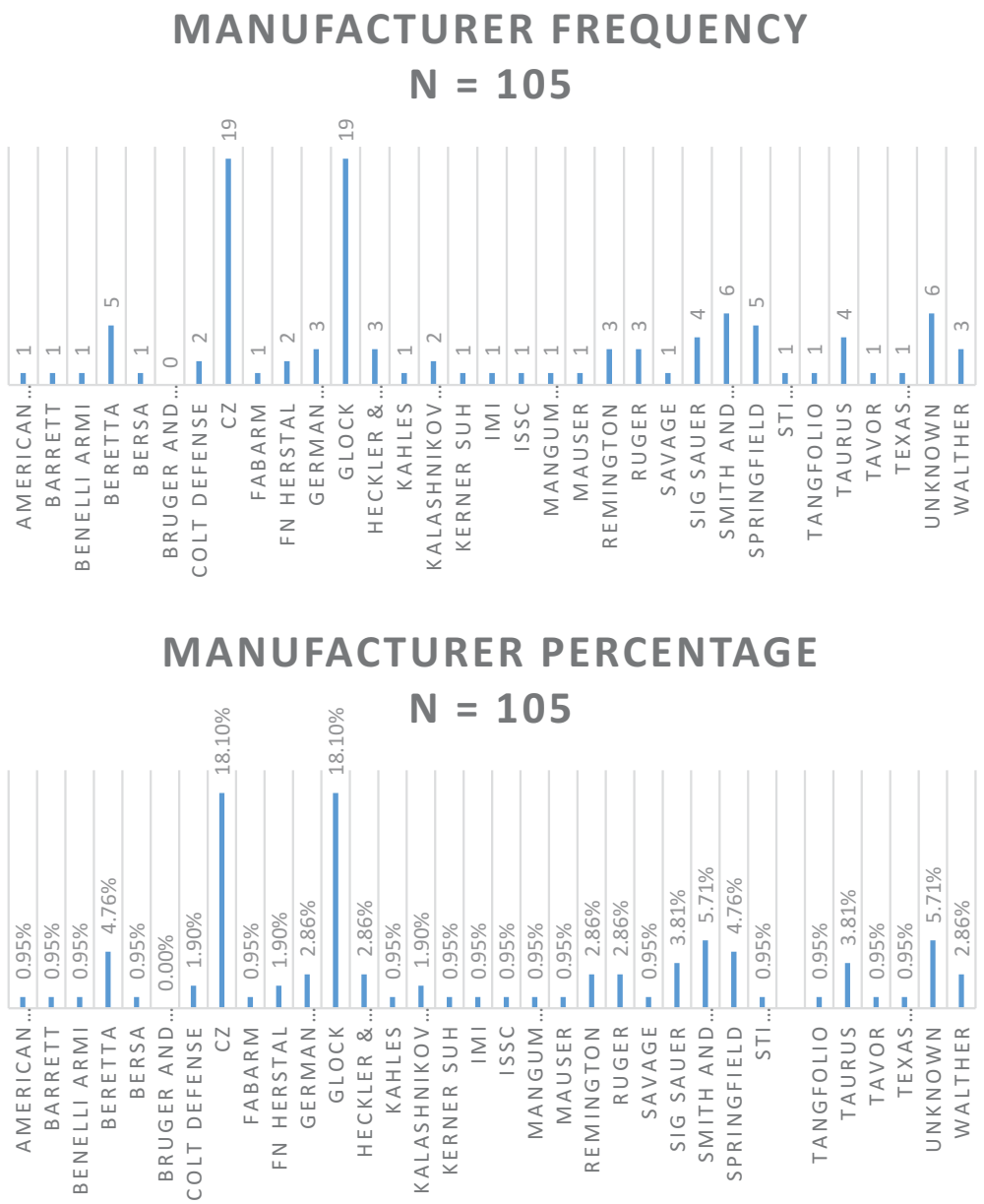


**Figure 4.** Total product listings by manufacturer.

Though semi-automatic handguns and long guns were the most common products sold on the dark web shops, the vendors differed in the types of firearms they sold product lines (see Table 2 for detail). The Lucky 47 shop listed a total of 71 distinct firearms on their site, 77% of which were handguns followed by 23% of long guns. Notably, Lucky 47 accounted for the majority of handguns and long guns sold across all six sites. The only other sites who offered long guns were Black Market and Darkseid. In total, Black Market listed 15 distinct firearm products, five of which were handguns and eight long guns. Of Darkseid's eight firearm postings, 25% were for long guns. Handguns were sold by every vendor included in this analysis, though all others paled in comparison to Lucky 47's product size and selection.

**Table 1.** Frequency of products sold by action type (N = 105).

| Action Type | Number of Firearms | Percentage |
|---|---|---|
| Handgun | | |
| Semi-Automatic | 67 | 64% |
| Revolver | 10 | 10% |
| Long Gun | | |
| Semi-Automatic | 18 | 17% |
| Fully Automatic | 4 | 4% |
| Bolt Action | 5 | 5% |
| Pump Action | 1 | 1% |

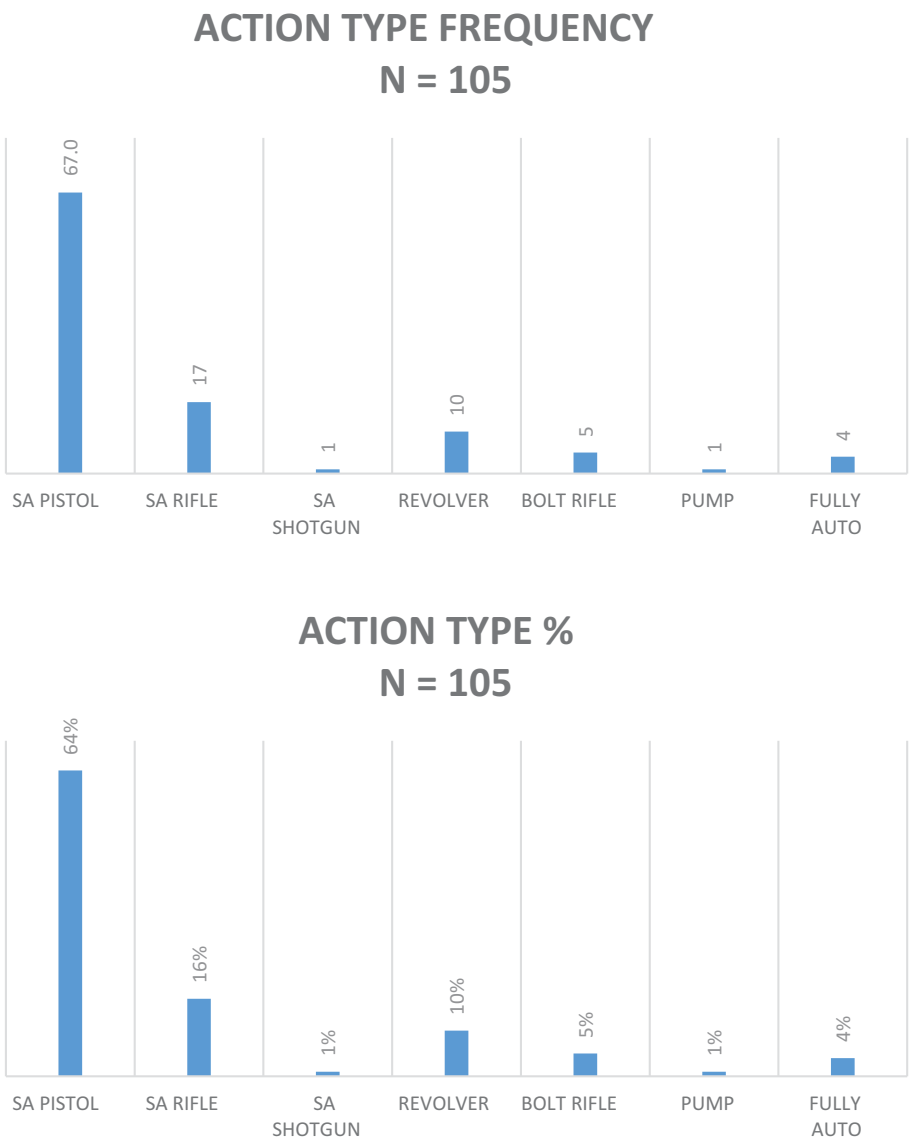


**Figure 5.** Total product listings by action type.

**Table 2.** Vendor product listings by action type.

| Vendor | Number of Firearms | Within Vendor Percentage | Overall Percentage |
|---|---|---|---|
| **BLACK MARKET** | | | |
| Handgun | 5 | 33% | 6% |
| Semi-Automatic | 2 | 13% | 3% |
| Revolver | 3 | 20% | 30% |
| Long Gun | 10 | 67% | 36% |
| Semi-Automatic | 8 | 53% | 44% |
| Fully Automatic | – | – | – |
| Bolt Action | 1 | 7% | 20% |
| Pump Action | 1 | 7% | 100% |
| Total Firearm Listings | 15 | | |
| **DARKSEID** | | | |
| Handgun | 6 | 75% | 8% |
| Semi-Automatic | 6 | 75% | 9% |
| Revolver | – | – | – |
| Long Gun | 2 | 25% | 7% |
| Semi-Automatic | – | – | – |
| Fully Automatic | 2 | 25% | 50% |
| Bolt Action | – | – | – |
| Pump Action | – | – | – |
| Total Firearm Listings | 8 | | |
| **EURO GUNS** | | | |
| Handgun | 3 | 100% | 4% |
| Semi-Automatic | 3 | 100% | 4% |
| Revolver | – | – | – |
| Long Gun | | | |
| Semi-Automatic | – | – | – |
| Fully Automatic | – | – | – |
| Bolt Action | – | – | – |
| Pump Action | – | – | – |
| Total Firearm Listings | 3 | | |
| **LUCKY 47** | | | |
| Handgun | 55 | 77% | 71% |
| Semi-Automatic | 48 | 68% | 72% |
| Revolver | 7 | 10% | 70% |
| Long Gun | 16 | 23% | 57% |
| Semi-Automatic | 10 | 14% | 56% |
| Fully Automatic | 2 | 3% | 50% |
| Bolt Action | 4 | 6% | 80% |
| Pump Action | – | – | – |
| Total Firearm Listings | 71 | | |
| **MANUFRANCE** | | | |
| Handgun | 6 | 100% | 8% |
| Semi-Automatic | 6 | 100% | 9% |
| Revolver | – | – | – |
| Long Gun | | | |
| Semi-Automatic | – | – | – |
| Fully Automatic | – | – | – |
| Bolt Action | – | – | – |
| Pump Action | – | – | – |
| Total Firearm Listings | 6 | | |

(*Continued*)

Table 2. (Continued).

| Vendor | Number of Firearms | Within Vendor Percentage | Overall Percentage |
|---|---|---|---|
| **UK GUNS AND AMMO** | | | |
| Handgun | 2 | 100% | 3% |
| Semi-Automatic | 2 | 100% | 3% |
| Revolver | – | – | – |
| Long Gun | | | |
| Semi-Automatic | – | – | – |
| Fully Automatic | – | – | – |
| Bolt Action | – | – | – |
| Pump Action | – | – | – |
| Total Firearm Listings | 2 | | |

The price points for products sold differed across vendors, though semi-automatic pistols were listed for less money than semi or fully-automatic rifles in general (see Table 3 for detail). Comparing the common handgun and long guns listed on the dark web shops, and their average price points demonstrated that consumers purchasing a semi-automatic handgun could pay $531.80 from Manufrance to $1,391.20 if purchasing from "Black Market." On average, consumers pay the highest premium for shopping with Black Market. Though consumers could purchase a handgun for lower prices from Darkseid, UK Guns and Ammo, or Manufrance, they would also be selecting from a small range of products. For instance, Manufrance only offered two types of handguns, compared to Black Market's, 15 options. It is possible some of these differences were a function of customers' willingness to pay a premium for additional incentives, indicators of trust and legitimacy, or warranties.

To further compare vendor pricing, Table 4 provided data on the cost per vendor of the most prevalent firearm listing by type and caliber in U.S. Dollars. The site Lucky 47's overall cost for a 9 mm handgun was $1,040.91, representing the highest overall price point. The lowest average cost was advertised on Darkseid for just $600.18. Consumers purchasing from Lucky 47 could be paying, on average, nearly $400 more than those purchasing on other single vendor shops. While all shops had handguns available for purchase, only two offered a .22 LR long gun. Individuals could spend anywhere from $2,868.52, on average, from Black Market to $787.12 from Lucky 47. As noted in Table 4 the price points are fairly comparable, with some notable discrepancies when looking at specific firearm type and action. For buyers purchasing a .22 LR long gun, choosing Black Market over Lucky 47 could cost them over $2,000. Thus, pricing appeared to be less consistent across vendors than what has been observed in stolen data markets and other illicit online markets (e.g. Holt and Lampke 2010; van Hardeveld, Webber, and O'Hara 2017).

## *Discussion and conclusions*

Though firearms are a major commodity that are sold in a variety of licit and gray market channels, there is generally little research considering the extent to which they are sold through underground online markets (see Paoli et al. 2017 for exception). Recent evidence highlights the range of illicit digital and physical goods sold via forums and shops on both the clear and dark web (Holt and Bossler 2016; Lacson and Jones 2016). The dearth of study on illicit firearms sales calls to question how these markets may operate or the products available from vendors. This study attempted to address this gap in the literature through an exploratory qualitative investigation of advertisements from six vendors offering firearms through the dark web.

**Table 3.** Pricing for most common firearm type by vendor in U.S. Dollars ($).

| Vendor | N | Min. ($) | Max ($) | Mean ($) | Median ($) | Mode ($) |
|---|---|---|---|---|---|---|
| **BLACK MARKET** | 15 | | | | | |
| Handgun | 5 | | | | | |
| Semi-Automatic | 2 | 928.71 | 1,853.68 | 1,391.20 | 1,391.20 | – |
| Revolver | 3 | 928.71 | 1,265.74 | 1,041.05 | 928.71 | 928.71 |
| Long Gun | 10 | | | | | |
| Semi-Automatic | 8 | 928.71 | 14,758.26 | 5,266.13 | 2,889.12 | 928.71 |
| Fully Automatic | – | – | – | – | – | – |
| Bolt Action | 1 | 2,868.52 | 2,868.52 | 2,868.52 | 2,868.52 | – |
| Pump Action | 1 | 928.71 | 928.71 | 928.71 | 928.71 | – |
| **DARKSEID** | 8 | | | | | |
| Handgun | 6 | | | | | |
| Semi-Automatic | 6 | 550.00 | 800.00 | 625.15 | 550.44 | 550.00 |
| Revolver | – | – | – | – | – | – |
| Long Gun | 2 | | | | | |
| Semi-Automatic | – | – | – | – | – | – |
| Fully Automatic | 2 | 800.00 | 800.59 | 800.30 | 800.30 | – |
| Bolt Action | – | – | – | – | – | – |
| Pump Action | – | – | – | – | – | – |
| **EURO GUNS** | | | | | | |
| Handgun | 3 | | | | | |
| Semi-Automatic | 3 | 587.56 | 1,231.66 | 864.92 | 775.55 | – |
| Revolver | 3 | – | – | – | – | – |
| Long Gun | – | | | | | |
| Semi-Automatic | | – | – | – | – | – |
| Fully Automatic | – | – | – | – | – | – |
| Bolt Action | – | – | – | – | – | – |
| Pump Action | – | – | – | – | – | – |
| **LUCKY 47** | 71 | | | | | |
| Handgun | 55 | | | | | |
| Semi-Automatic | 48 | 807.30 | 2,502.63 | 997.77 | 968.76 | 807.30 |
| Revolver | 7 | 807.30 | 1,110.04 | 1,006.54 | 807.30 | 807.30 |
| Long Gun | 16 | | | | | |
| Semi-Automatic | 10 | 706.39 | 2,098.98 | 1,055.55 | 888.03 | 807.30 |
| Fully Automatic | 2 | 807.30 | 1,614.60 | 1,210.95 | 1,210.95 | – |
| Bolt Action | 4 | 807.30 | 2,502.63 | 1,876.97 | 2,098.98 | 2,098.98 |
| Pump Action | – | – | – | – | – | – |
| **MANUFRANCE** | 6 | | | | | |
| Handgun | 6 | | | | | |
| Semi-Automatic | 6 | 272.72 | 872.70 | 531.80 | 531.80 | – |
| Revolver | – | – | – | – | – | – |
| Long Gun | | | | | | |
| Semi-Automatic | – | – | – | – | – | – |
| Fully Automatic | – | – | – | – | – | – |
| Bolt Action | – | – | – | – | – | – |
| Pump Action | – | – | – | – | – | – |
| **UK GUNS AND AMMO** | 2 | | | | | – |
| Handgun | 2 | | | | | – |
| Semi-Automatic | 2 | 629.13 | 819.36 | 724.25 | 724.25 | – |
| Revolver | – | – | – | – | – | – |
| Long Gun | | | | | | |

(*Continued*)

**Table 3.** (Continued).

| Vendor | N | Min. ($) | Max ($) | Mean ($) | Median ($) | Mode ($) |
|---|---|---|---|---|---|---|
| Semi-Automatic | – | – | – | – | – | – |
| Fully Automatic | – | – | – | – | – | – |
| Bolt Action | – | – | – | – | – | – |
| Pump Action | – | – | – | – | – | – |

**Table 4.** Average pricing for most common firearm types in U.S. Dollars ($).

| Vendor | Handgun 9 mm Price ($) | Long Gun .22 LR Price ($) |
|---|---|---|
| Black Market | 928.71 * | 2,868.52 * |
| Darkseid | 600.18 | – |
| Euro Guns | 775.55 * | – |
| Lucky 47 | 1,048.91 | 787.12 |
| Manufrance | 763.62 | – |
| UK Guns and Ammo | 724.25 | – |

*Only one product listing matching this description. Price listed reflects individual product pricing.

The findings highlight the relative consistency observed between the practices of firearms vendors and those offering drugs (Cunliffe et al. 2017; Decary-Hetu and Giommoni 2017; Martin 2014) and data operating on both the open and dark web (Holt and Lampke 2010; Smirnova and Holt 2017; van Hardeveld, Webber, and O'Hara 2017). The shop vendors attempted to provide clear messaging and ads to specify their products, payment preferences, and enable communications with customers. Some vendors also provided substantial information on the way in which sellers attempt to bypass firearm laws and customs detection through covert shipping and packaging techniques, and advice to consumers on how to pick up products in discrete manners. Such information is common in dark market drug forums where products must be shipped through physical means (Barratt 2012; Martin 2014).

There was some difference observed in the extent to which vendors were willing to provide a sense of legitimacy and build consumer trust through the use of warranties and feedback. Rating systems were only present on two of the six sites, though their feedback mechanisms could be subject to manipulation. The firearms vendors advertising through single operator shops in this sample appear to be less transparent in allowing customers to provide direct input to potential customers on the quality of goods and vendor practices compared to those in forums generally (Paoli et al. 2017; Smirnova and Holt 2017). Without clear feedback, it is difficult to assess the rate at which vendors were selling products or the overall legitimacy of their claims generally (e.g. Holt et al. 2016). This may be a function of the perception among market operators that they have limited competition compared to drug and cybercrime-as-service vendors. Further study is needed with advertisements acquired from dark web forums and shops for both firearms and drugs as well as other illicit products to better understand the ways that the advertising environment influences the practices of the vendor and their relationship to customers.

Examining the range of weapons and their pricing revealed that the majority of weapons appeared to originate from western, NATO-based manufacturers. This is counter-intuitive compared to conceptualization of the topic of manufacture or origin of weapons. When looking at the history of small arms and light weapons, failed or rogue states tend to at the forefront of common sense as producers and distributors of weapons. Former Soviet bloc members and conflicts in Africa produce a large amount of imagery when talking about illicit weapons. Instead, the presence of these weapons may simply reflect the fact that Austrian, German, and American weapons are the primary countries of manufacture for the observed data. In fact, businesses in these countries manufacture some of the most popular and widely accepted small arms, mainly pistols and rifles.

The pricing of products varied substantially, which may reflect a lack of potential legitimacy on the part of certain vendors as noted in other research on illicit online market price points (Herley and Florencio 2010; Holt and Lampke 2010; Smirnova and Holt 2017). For instance, sites like Black Market provided descriptive product details, professional photographs, product warranties, and used covert shipping techniques, though their prices were substantially higher than the other sites in the sample. It is possible that certain weapons like fully automatic long guns may necessitate a higher price due to perceived risk of the purchase. Buying handguns at inflated prices may not, however, be sensible unless local laws and regulations restrict access to these weapons. Research is needed examining the perceived legitimacy of vendor pricing among customers and the background of the buyers overall. Such information is vital to better understand the global audience for darkweb gun vendors and the potential value of purchasing weapons online rather than through other available channels.

Taken as a whole, these findings provide some direction for law enforcement practitioners. Unlike the processes of data and drug markets, weapons vendors appear to operate in environments that cannot be subverted through slander or Sybil attacks that leverage the feedback and trust mechanisms in the community to sow mistrust (e.g. Franklin et al. 2007; Holt and Lampke 2010; Hutchings and Holt 2017). Law enforcement could concentrate efforts toward the creation of convincing undercover advertisements to entice potential buyers to sting operations (see also Hutchings and Holt 2017). For instance, posting ads with dynamically rotating stock and pricing would could be a useful mechanism to facilitate the perception of trust in a market that has little to no feedback tool for users.

In addition, this study emphasizes the need for continuing research to assess the state of illicit products sold through online markets operating on the clear and darkweb. The increasing use of technological platforms as a medium to sell illegal physical goods challenges our understanding of the nature of illicit markets, particularly for those goods that can be readily identified through inspection and traditional detection methods (Holt and Bossler 2016). It is unknown how the use of online platforms may affect the distribution and pricing for illicit products, or the ways that offender's behaviors will change in the face of aggressive enforcement and takedown campaigns (e.g. Holt, Blevins, and Kuhns 2014; Hutchings and Holt 2017). The use of exploratory qualitative and quantitative assessments such as this study are essential to provide direction for future scholarship and identify potential paths for illicit markets to evolve overtime and transition on and off-line.

## Notes on contributor

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