



SMALL ARMS DATA OBSERVATORY

Working Paper Series  
ISSN 2334-0436

WP 201511-01  
24 November 2015

---

**ESTIMATING THE SIZE OF THE ILLICIT SMALL ARMS ECONOMY IN SAN DIEGO**

TOPHER L. MCDOUGAL  
Kroc School of Peace Studies, University of San Diego  
Suite 113, 5998 Alcalá Park  
San Diego, CA 92110 USA  
Email: [tlm@sandiego.edu](mailto:tlm@sandiego.edu)

---

---

*The SADO-WP Series is intended to disseminate works in progress on the scope, scale, causes, and consequences of the manufacture, trade, and use of small arms. The Series prioritizes timely publication over flawless presentation. Neither SADO nor its affiliates necessarily endorse the findings, interpretations, conclusions, or opinions expressed in this paper.*



WP 201511-01

---

**Abstract:**

Illicit economies are notoriously difficult to detect and quantify for the simple reason that participants have incentives to keep their activities clandestine. This paper outlines and implements a method for estimating the markets for illicit small arms, sex, and drugs as constituent components of the total cash economy for the San Diego metropolitan area. The method has two parts: first it derives the total cash economy of San Diego; second it fits a model predicting that amount for each available year as a function of index variables for three distinct illicit markets (small arms, sex, and drugs) and the licit cash economy. It estimates that the market for cash-based purchases of small arms in San Diego in 2013 was \$920 million – slightly larger than the illicit sex industry, and much smaller than both the market for illicit drugs and the licit cash economy. Limitations of the method are discussed, including the potential for better proxy variables to improve reliability.

**JEL Classification Codes:** E26.

**Key Words:** Illicit economies, small arms, cash economy.

---

*The SADO-WP Series is intended to disseminate works in progress on the scope, scale, causes, and consequences of the manufacture, trade, and use of small arms. The Series prioritizes timely publication over flawless presentation. Neither SADO nor its affiliates necessarily endorse the findings, interpretations, conclusions, or opinions expressed in this paper.*

**ESTIMATING THE SIZE OF THE ILLICIT SMALL ARMS ECONOMY IN SAN DIEGO<sup>1</sup>**

Illicit economies are notoriously difficult to detect and quantify for the simple reason that participants have incentives to keep their activities clandestine (Zimmerman & Chaudhry, 2009). The illicit supply of small arms and ammunition in particular may have a destabilizing effect on many countries and societies (Berman, Krause, LeBrun, & McDonald, 2011; Greene & Marsh, 2012; Muggah, 2012, 2013). A emergent body of academic and policy literature has sought to gauge the scope, scale, and dynamics of both authorized and illicit transfers and trafficking of weapons (Brauer, 2013; Brauer & Muggah, 2006; Dreyfus, Marsh, Schroeder, & Lazarevic, 2009; Karp, 2012; Killicoat, 2006; Markowski, Koorey, Hall, & Brauer, 2008, 2009; T. L. McDougal, Kolbe, Muggah, & Marsh, 2014; T. L. McDougal, Shirk, Muggah, & Patterson, 2013).

The sizes of illicit small arms trafficking markets are sometimes assessed used proxies such as numbers of government seizures of illegal firearms (UNODC, 2015), though these metrics come with problems (Marsh, 2015). One inherent problem is that seizure numbers will vary not only in response to the underlying number of arms being trafficked, but also in response to the political will of the jurisdiction in question to seize in the first place; the funding of such efforts; geography; and indigenous levels of corruption among customs, law enforcement, and other local officials. Another problem is that, putting aside the above considerations, analyzing time-trends in seizure data over time will only yield information about relative magnitude for any given time period vis-à-vis other time periods in the panel.

This paper outlines and implements a method for estimating the absolute markets for illicit small arms – as well as illicit sex and drugs – as a constituent component of the total cash economy for the San Diego metropolitan area. In essence, it uses a time series of inferred cash stocks in the study area to derive weights for proxy variables – weights that can then be multiplied by the proxies themselves to derive dollar estimates. In this, it roughly follows the method laid out by Dank et al. (2014), except that it implements an OLS regression instead of a system of linear equations to derive our final estimates.

The method has two parts: first it derives the total yearly cash economy of San Diego over the study period 2000-2013. Second, it fits a model predicting that amount for each available year as a function of index variables for three distinct illicit markets – small arms, sex, and drugs – and the licit cash economy. It estimates that the market for cash-based purchases of small arms in San Diego in 2013 was \$920 million – slightly larger than the illicit sex industry, and much smaller than both the market for illicit drugs and the licit cash economy.

This method posits that the illicit sex industry is one of four components of the cash-based economy, such that:

---

<sup>1</sup> This study was commissioned as a sub-contract of the US Department of Justice-funded study “Measuring the Nature and Extent of Gang Involvement in Sex Trafficking in San Diego” (Carpenter & Gates, 2015), Grant No. NIJ- 2012-R2-CX-0028. The author wishes to thank Ami Carpenter and Jaime Gates, without whose direction and insights this paper would not have been possible. The usual disclaimer applies.

## Estimating the Size of the Illicit Small Arms Economy in San Diego

$$Z_t = W_t + S_t + D_t + O_t$$

where  $Z_t$  is the amount of cash exchanged in time  $t$ , and  $W_t$ ,  $S_t$ ,  $D_t$ , and  $O_t$  are the sizes of the small arms, sex, drugs, and other cash-based industries respectively. The remainder of this paper will describe in turn the two steps of this method, estimating first the left-hand and then the right-hand side of the above equation, and conclude with a discussion of possible methodological caveats and future refinements.

### The Left-hand Side: The Cash Economy

The first step requires generating an estimate of total cash stock in San Diego. Note that this is different than the total cash exchanged, which is arguably a better outcome, but is the proxy used by Dank et al. (2014). Moreover, it is somewhat simpler, in that to get at the total cash spent in a city, we would first have to calculate the cash stock based on the methodology below, and then multiply it by a predicted money velocity – so a 2-step process. We begin by modeling the cash-to-GDP ratio for the United States on a quarterly basis since 1959. The model results are presented in Table 1.

Table 1. OLS estimation of the cash-to-GDP ratio as a function of selected macroeconomic variables.

VARIABLES	(1) Cash-to-GDP Ratio
Per capita personal income	<b>4.42e-06***</b> (5.19e-07)
Per capita real GDP	<b>-5.77e-06***</b> (8.02e-07)
Per capita GDP to per capita income	<b>-0.0101***</b> (0.000965)
Employment to population ratio	<b>0.00118*</b> (0.000704)
Corp. profits as % of GNI	<b>0.00677***</b> (0.00186)
GDP inflation	<b>-0.00108**</b> (0.000421)
Date	<b>0.146***</b> (0.0362)
Constant	
Observations	223
R-squared	0.897
Log likelihood	705.2
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

We then use the model to make adjusted predictions of cash-to-GDP ratios for San Diego with all predictors set at levels reported for the metropolitan statistical area (MSA) of San Diego by

## Estimating the Size of the Illicit Small Arms Economy in San Diego

the Bureau of Economic Analysis (BEA)<sup>2</sup>. We then multiply the cash-to-GDP ratio by the GDP for the metropolitan region. The resulting cash-to-GDP ratios and total cash stock estimates for San Diego are presented in Table 2, which also lists the comparable estimates as reported by Dank et al. (2014). We also present the national average cash-to-GDP ratios for each year, and use those ratios to calculate “naïve” estimates of M1 cash stock in the metropolitan region<sup>3</sup>.

Table 2. Cash-to-GDP ratios and total cash stock estimates for San Diego.

Year	Cash-to-GDP Ratio		Implied Dank et al. (2014) Estimate	Total Cash (US\$b)		
	Study Estimate	National Avg.		Study Estimate	Naïve Estimate	Dank et al. (2014) Estimate
2001	0.067 (0.053, 0.079)	0.087		9.81 (7.801, 11.629)	12.827	
2002	0.064 (0.050, 0.077)	0.093		9.87 (7.758, 11.947)	14.408	
2003	0.063 (0.050, 0.077)	0.095	0.048	10.24 (8.071, 12.429)	15.285	7.79
2004	0.063 (0.049, 0.076)	0.097		10.57 (8.284, 12.849)	16.374	
2005	0.0634951 (0.049, 0.078)	0.097		11.13 (8.59, 13.674)	17.027	
2006	0.0689642 (0.056, 0.082)	0.095		12.30 (9.986, 14.622)	16.929	
2007	0.072 (0.060, 0.084)	0.093	0.047	13.06 (10.829, 15.161)	16.772	8.49
2008	0.083 (0.072, 0.094)	0.093		14.95 (12.94, 16.894)	16.707	
2009	0.093 (0.082, 0.104)	0.110		16.13 (14.232, 18.051)	19.064	
2010	0.107 (0.097, 0.116)	0.116		18.53 (16.837, 20.135)	20.178	
2011	0.113 (0.104, 0.121)	0.126		20.08 (18.566, 21.601)	22.482	
2012	0.118 (0.111, 0.126)	0.145		21.66 (20.307, 23.052)	26.522	
2013	0.121 (0.115, 0.128)	0.159		22.53 (21.402, 23.822)	29.595	

Where we have comparable data (i.e., 2003 and 2007), this study’s estimates greatly exceed those of Dank et al. (2014). It is difficult to say where the discrepancy lies exactly. First, the models do not yield the same coefficient estimates, although their R-squared statistics are similar. For instance, the coefficient for per capita real GDP is reported by Dank et al. (2014) to be *positive*, whereas we find it to be *negative*. Indeed, a negative coefficient in some sense makes

<sup>2</sup> We are able to find MSA-specific data on all predictors save corporate profits as a percentage of GNI and the GDP inflation rate. The latter is a national statistic anyway. Both were therefore set to year-specific national averages.

<sup>3</sup> As in Dank et al. (2014), we simply multiply the cash-to-GDP ratio by the GDP of the metropolitan region for that year.

## Estimating the Size of the Illicit Small Arms Economy in San Diego

more sense: wealthier individuals tend to use bank transfers, credit cards, and checks more than cash, and high-value goods are usually not sold in cash.

Second, Dank et al. (2014) also report “naïve estimates” of the M1 cash stock in San Diego that are almost identical to their regression-generated estimates. They do not expound on this point, but it is difficult to see how they came up with those figures; we recreated the calculations and obtained much higher estimates in the same fashion. We also back-calculated implicit cash-to-GDP ratios from the total M1 cash estimates reported by Dank et al. (2014) by dividing their estimates by the metropolitan GDP for that year (see column 4 of Table 2). We found them to be quite low compared to the national averages. This second set of discrepancies (i.e., the results) might be explained if Dank et al. (2014) had used a more restrictive geographic definition of San Diego – for instance the city boundaries, as opposed to the Bureau of Economic Analysis-defined Metropolitan Statistical Area. However, BEA data are available at the MSA level. It is unclear what source was used to adjust the model. Moreover, that explanation fails to explain why the OLS models – both based on the same St. Louis Federal Reserve FRED data – did not yield identical coefficients.

In brief, it may be that Dank et al. (2014) considerably underestimated the size of the cash stock in San Diego, which likely biases downward their estimates of the illicit small arms economy, as well (though their focus in that report is the sex industry).

One important consideration is that the value of cash exchanged is different from the cash stock in an economy. Specifically, the value of (M1) cash stock multiplied by the (M1) money velocity should yield the total value of the economy. Unfortunately, that multiplication exercise yields estimates for the San Diego cash economy that exceed the total regional GDP. This is not *a priori* impossible, but it is highly unlikely, as Schneider and Klinglmair (2004) estimate the size of the United States’ informal sector at only 8.8% of GDP. So our estimates of the cash economies for San Diego and the United States in general – which include the informal sector as well as other formal transactions – seem reasonable, if low, at 12.1% and 15.9% respectively in 2013.

### **Estimating Illicit Economies**

We create proxy variables for each of the four suggested components of the cash economy using principal components analyses (PCAs). For the illicit small arms market – our main predictor – we use the first principal component of a PCA of the imputed dollar volume of small arms sold “above board” (as derived for the study by T. McDougal, Shirk, Muggah, and Patterson (2014)), an estimate of 5-year licit stocks in private hands derived therefrom, and the percentage of suicides committed using a firearm. Further discussion of possible future improvements to this proxy variable are discussed in the conclusion.

For the sex industry, we combined using PCA: numbers of victimization incidents, and number of perpetrator incidents related to sex trafficking in the San Diego County Sheriff’s Department database from 2003-2013 (with imputed numbers for 2000-2002). For the illicit drugs market, we used a PCA of the percentages of various categories of arrestees testing positive for any drugs, marijuana, methamphetamines, cocaine, and opiates, as reported by the San Diego Association of Governments (SANDAG) Substance Abuse Monitoring Program. For all other

## Estimating the Size of the Illicit Small Arms Economy in San Diego

legal cash industries, we considered BEA-reported revenues from five possible industries: construction, food services, retail, gambling, and private services. We were unsure which of these should be included in the final PCA. We therefore created principal components for all three-industry combinations of those five, plus one combining all of them together. We also included a standardized variable for the population of the county, presuming that number of people is a much better proxy for cash spent on legal goods and services than total personal income (since wealthy people tend to use credit cards and checks more, but still spend some relatively small amounts in cash). The population cash proxy was included on a separate basis in the model. All predictor variables and their sources are listed in Table 3.

Table 3. The four modeled sectors and their composite variable proxies with sources.

Sector	Variable	Source
Illicit Sex	Sex trafficking victimization charges	San Diego County Sheriff's Department booking records
	Sex trafficking perpetrator charges	San Diego County Sheriff's Department booking records
Illicit Drugs	Arrestees + for any drug, juvenile (%)	Burke (2014b)
	Arrestees + for any drug, adult males (%)	Burke (2014a)
	Arrestees + for any drug, adult females (%)	Burke (2014a)
	Arrestees + for marijuana, adult males (%)	Burke (2014a)
	Arrestees + for marijuana, adult females (%)	Burke (2014a)
	Arrestees + for methamphetamines, adult (%)	(County of San Diego Methamphetamine Strike Force, 2004, 2009, 2014)
	Arrestees + for methamphetamines, juvenile (%)	(County of San Diego Methamphetamine Strike Force, 2004, 2009, 2014)
	Meth arrestees claiming the drug is easy to obtain (%)	(County of San Diego Methamphetamine Strike Force, 2004, 2009, 2014)
	Arrestees + for cocaine, adult males (%)	Burke (2014b)
	Arrestees + for cocaine, adult females (%)	Burke (2014a)
	Arrestees + for opiates, adult males (%)	Burke (2014a)
	Arrestees + for opiates, adult females (%)	Burke (2014a)
Illicit Small arms	Imputed small arms sold legally in SD	(T. McDougal et al., 2014)
	Imputed licit 5-year gun stock in SD	(T. McDougal et al., 2014)
	Suicides committed by firearm (% of total)	(Wagner, 2013, p. 90)
Other	Construction sector regional product (US\$b)	(Bureau of Economic Analysis, 2015)
	Food sales sector regional product (US\$b)	(Bureau of Economic Analysis, 2015)
	Retail sector regional product (US\$b)	(Bureau of Economic Analysis, 2015)
	Recreation and gambling regional product (US\$b)	(Bureau of Economic Analysis, 2015)
	Private services regional product (US\$b)	(Bureau of Economic Analysis, 2015)
	Population (inserted separately)	

Finally, we ran OLS regression models of total cash on all of the PCA components, forcing the models to drop the constants. This is because we want to force the model to estimate the amount of cash based solely on those four components, without any wiggle room (see Table 4).

## Estimating the Size of the Illicit Small Arms Economy in San Diego

Table 4. Regression models estimating total cash in the economy as a function of proxies for illicit industries.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	z	z	z	z	z	z	z	z	z	z	z
1st PC: Small arms	<b>-1.456**</b> (0.573)	0.223 (0.489)	0.867 (0.747)	-0.579 (0.494)	<b>-1.234*</b> (0.553)	<b>4.947***</b> (0.825)	0.269 (0.679)	0.232 (0.801)	-0.379 (1.727)	-8.284 (6.842)	-7.363 (6.160)
1st PC: Sex industry	-0.149 (0.387)	0.248 (0.441)	<b>1.186*</b> (0.596)	-0.0664 (0.407)	-0.145 (0.395)	-0.213 (0.383)	0.733 (0.537)	0.881 (0.576)	1.070 (0.595)	0.958 (0.570)	0.945 (0.573)
1st PC: Drugs	<b>3.532***</b> (0.447)	1.128 (0.675)	<b>2.687**</b> (1.123)	<b>3.044***</b> (0.455)	<b>3.809***</b> (0.476)	<b>-4.393**</b> (1.363)	<b>2.216**</b> (0.750)	<b>3.846***</b> (1.078)	4.668 (2.559)	14.43 (8.724)	13.14 (7.773)
Population	<b>3.940***</b> (0.593)	<b>1.375***</b> (0.278)	<b>0.987*</b> (0.449)	<b>3.457***</b> (0.555)	<b>3.358***</b> (0.504)	<b>-0.696*</b> (0.369)	<b>1.124**</b> (0.353)	<b>1.550**</b> (0.537)	1.684 (0.955)	5.597 (3.443)	5.874 (3.648)
1st PC: Other (construction, food, retail)	<b>1.824***</b> (0.345)										
1st PC: Other (construction, food, gambling)		<b>2.788***</b> (0.726)									
1st PC: Other (construction, food, private services)			0.0706 (0.839)								
1st PC: Other (construction, retail, gambling)				<b>-1.560***</b> (0.323)							
1st PC: Other (construction, retail, private services)					<b>1.564***</b> (0.303)						
1st PC: Other (construction, gambling, private services)						<b>6.411***</b> (1.167)					
1st PC: Other (food, retail, gambling)							<b>1.390*</b> (0.672)				
1st PC: Other (food, retail, private services)								-0.757 (0.521)			
1st PC: Other (food, gambling, private services)									-1.307 (1.648)		
1st PC: Other (retail, gambling, private services)										-7.986 (5.942)	
1st PC: Other (all proxies)											-7.193 (5.352)
Observations	14	14	14	14	14	14	14	14	14	14	14
R-squared	0.999	0.998	0.996	0.999	0.999	0.999	0.997	0.997	0.996	0.996	0.996
Log likelihood	-9.877	-12.98	-19.77	-10.82	-10.13	-9.479	-17.05	-18.30	-19.30	-18.49	-18.49

## Estimating the Size of the Illicit Small Arms Economy in San Diego

We deemed that the most appropriate model would meet two basic criteria. First, all coefficients therein would be positive. Second, the licit cash economy should represent over 50% of the total cash economy. By these criteria, Model 2 is the only acceptable one, which generally agrees with the choice of Dank et al. (2014) to include the construction and food services industries, but also adds in recreation and gambling – an industry that intuition might naturally associate with cash spending. The coefficient in question is not significant. Multiplying the Model 2 coefficients by the PCA variable values, we arrive at estimates of each component of the San Diego cash economy (see Table 5 and Figure 1). Our method yields an estimate for the total cash-based market for small arms and related products in 2013 of \$920 million, but with a large margin of error indicated by the 95% confidence interval: anywhere between effectively zero and \$1.88 billion.

Table 5. Estimates of each component of the San Diego cash economy in US\$ billions (95% confidence intervals in parentheses).

Year	Small Arms				Percent Illicit
	Market	Sex Industry	Drugs Markets	Other	
2000	0.53 (-0.43, 1.49)	0.43 (-0.43, 1.3)	1.51 (0.18, 2.83)	10.24 (3.34, 7.28)	19%
2001	0.48 (-0.48, 1.44)	0.25 (-0.62, 1.11)	1.13 (-0.19, 2.45)	7.76 (3.23, 7.17)	19%
2002	0.44 (-0.52, 1.4)	0.50 (-0.36, 1.37)	1.31 (-0.02, 2.63)	8.06 (3.32, 7.26)	22%
2003	0.40 (-0.56, 1.36)	0.68 (-0.19, 1.54)	1.39 (0.07, 2.71)	8.03 (3.35, 7.29)	23%
2004	0.29 (-0.67, 1.25)	0.49 (-0.37, 1.35)	1.48 (0.16, 2.8)	8.04 (3.39, 7.32)	22%
2005	0.27 (-0.69, 1.23)	0.53 (-0.33, 1.4)	1.78 (0.46, 3.1)	8.38 (3.43, 7.37)	24%
2006	0.22 (-0.74, 1.18)	0.64 (-0.22, 1.51)	1.83 (0.51, 3.15)	9.30 (3.52, 7.46)	22%
2007	0.23 (-0.73, 1.19)	0.78 (-0.09, 1.64)	2.14 (0.81, 3.46)	11.04 (3.72, 7.66)	22%
2008	0.25 (-0.71, 1.21)	1.14 (0.28, 2.01)	2.11 (0.78, 3.43)	12.14 (3.91, 7.85)	22%
2009	0.36 (-0.6, 1.32)	0.88 (0.02, 1.75)	1.98 (0.66, 3.31)	11.96 (3.98, 7.92)	21%
2010	0.49 (-0.47, 1.45)	0.80 (-0.07, 1.66)	2.76 (1.44, 4.08)	13.70 (4.22, 8.15)	23%
2011	0.64 (-0.32, 1.6)	0.93 (0.06, 1.79)	3.65 (2.33, 4.97)	14.56 (4.36, 8.3)	26%
2012	0.75 (-0.21, 1.71)	1.02 (0.15, 1.88)	4.11 (2.79, 5.43)	15.08 (4.48, 8.42)	28%
2013	0.92 (-0.04, 1.88)	0.81 (-0.05, 1.68)	4.76 (3.44, 6.09)	16.91 (4.71, 8.64)	28%

## Gang Ceasefires and Mortality Rates in

Mexico

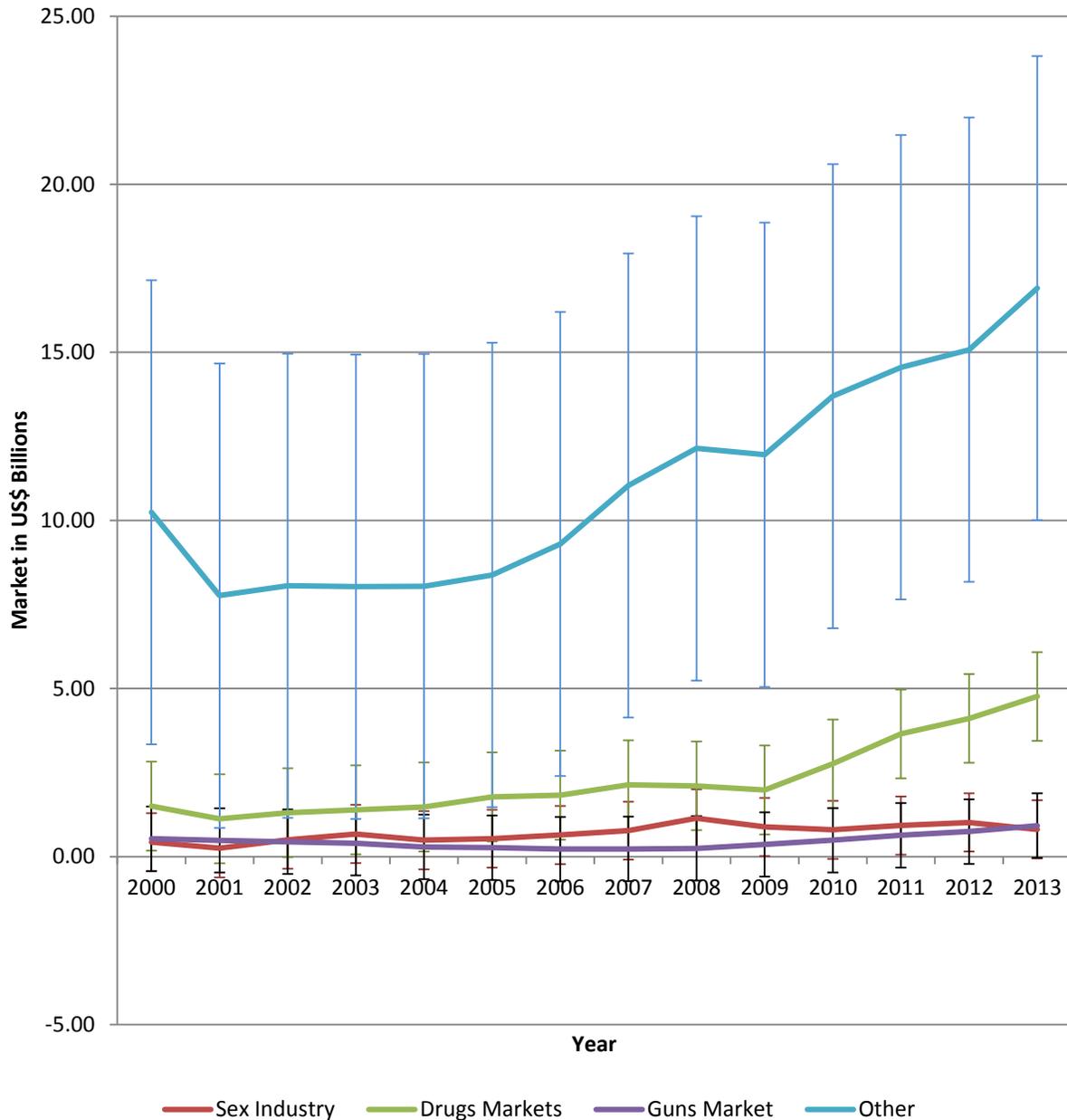


Figure 1. Estimated sizes of components of the San Diego County cash economy, 2000-2014. 95% confidence intervals are displayed as whiskers.

### Discussion

Many of these values seem a priori quite high. There are many possible reasons for this. For starters, our proxy variables for the illicit firearms markets are probably not strong, as they deal primarily with the licit market and imputed stock of arms. This alone might greatly affect our estimates, and we are currently asking the San Diego Sheriff's Department and US Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) for data on illegal seizures, illegal transfers, straw purchasing, and other variables that could better serve as proxies for the illicit market.

## Estimating the Size of the Illicit Small Arms Economy in San Diego

Also, due to the nature of the modeled outcome of cash in the San Diego economy, this method conflates “cash-based” and “illicit” purchases of small arms. Our proxy variables are therefore generally likely to capture variations in the licit *and* illicit cash economies of related industries. It may even be the case that they pick up indirect and induced effects of purchases in the cash economy. In that case, our estimates would be exaggerated by some “multiplier effect.” For instance, the National Shooting Sports Federation (NSSF, 2015) estimates that the gun industry’s economic multiplier effect is about 2.4. (On the other hand, to the extent that non-cash-based methods of payment figure in the illicit small arms market, this method may actually undercount.)

However, there are also reasons for giving these estimates credence. For one, purchases of firearms rise significantly near the US-Mexico border, indicating a thriving cross-border market for small arms exported south (T. McDougal et al., 2014). Second, our estimates for the illicit drug market eclipse those of the small arms and sex market – an inequality that does not hold in the case of the Dank et al. (2014) study estimates. Whilst large illicit drug seizures are more typically made in the US-Mexico border areas of Arizona and southern Texas, San Diego and Imperial Counties do figure prominently in drug seizure data from the US Border Patrol, in terms of marijuana, cocaine, methamphetamine, and heroin. It is therefore reasonable to postulate that San Diego has a large drugs importation market relative to its population. (The same might, of course, be true of San Diego’s position in the sex and human trafficking markets.) Second, the estimates of the illicit sex market we produced generally match more speculative calculations made separately based on a survey of sex workers and facilitators in custody at San Diego County detention facilities (see Carpenter and Gates (2015)). The estimates of Dank et al. (2014) are too low to accord with the interview-derived data in Carpenter and Gates (2015).

In summary, this study has attempted to refine the method for quantifying illicit markets presented in Dank et al. (2014), and produced high, though arguably credible estimates for the illicit small arms market in San Diego county. Potential improvements to our proxy variable will likely affect the results, though the relative direction, magnitude, and strength of the revised estimates is indeterminate.

## References

- Berman, E., Krause, K., LeBrun, E., & McDonald, G. (Eds.). (2011). *Small Arms Survey 2011: States of Security*. Geneva: Cambridge University Press.
- Brauer, J. (2013). The U.S. Firearms Industry: Production and Supply, Working Paper No. 14. Geneva: Small Arms Survey.
- Brauer, J., & Muggah, R. (2006). Completing the Circle: Building a Theory of Small Arms Demand. *Contemporary Security Policy*, 27(1), 138-154.
- Bureau of Economic Analysis. (2015). *Regional Data -- GDP and Personal Income*. Retrieved from: <http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=2#reqid=70&step=1&isuri=1>
- Burke, C. (2014a). 2013 Adult Arrestee Drug Use in the San Diego Region. In Criminal Justice Research Division (Ed.). San Diego: SANDAG.

## *Gang Ceasefires and Mortality Rates in*

### *Mexico*

- Burke, C. (2014b). 2013 Juvenile Arrestee Drug Use in the San Diego Region. In Criminal Justice Research Division (Ed.). San Diego: SANDAG.
- Carpenter, A., & Gates, J. (2015). Measuring the Nature and Extent of Gang Involvement in Sex Trafficking in San Diego. San Diego: University of San Diego / Point Loma Nazaren University.
- County of San Diego Methamphetamine Strike Force. (2004). Status Report. San Diego.
- County of San Diego Methamphetamine Strike Force. (2009). Status Report. San Diego.
- County of San Diego Methamphetamine Strike Force. (2014). 2014 Methamphetamine Strike Force Report Card. San Diego.
- Dank, M., Khan, B., Downey, P. M., Kotonias, C., Mayer, D., Owens, C., . . . Yu, L. (2014). Estimating the Size and Structure of the Underground Commercial Sex Economy in Eight Major US Cities Washington, D.C.: Urban Institute.
- Dreyfus, P., Marsh, N., Schroeder, M., & Lazarevic, J. (2009). Sifting the Sources: Authorized Small Arms Transfers. In E. Berman, K. Krause, E. LeBrun & G. McDonald (Eds.), *Small Arms Survey 2009: Shadows of War*. Cambridge: Cambridge University Press.
- Greene, O., & Marsh, N. (Eds.). (2012). *Small Arms, Crime and Conflict: Global Governance and the Threat of Armed Violence*. London: Routledge.
- Karp, A. (2012). Measurement and Use of Statistical Data to Analyze Small Arms in the Caribbean and Latin America: Report to the UNODC-INEGI Center of Excellence. Vienne: United Nations Office on Drugs and Crime (UNODC).
- Killicoat, P. (2006). *Weaponomics: The Economics of Small Arms*. Oxford: Oxford University.
- Markowski, S., Koorey, S., Hall, P., & Brauer, J. (2008). Channels of Small-Arms Proliferation: Policy Implications for Asia-Pacific. *The Economics of Peace and Security Journal*, 3(1), 79-85.
- Markowski, S., Koorey, S., Hall, P., & Brauer, J. (2009). Multi-channel Supply-Chain for Illicit Small Arms. *Defence and Peace Economics*, 20(3), 171-191.
- Marsh, N. (2015). Firearms Seizures and Trafficking: A "Local" Phenomenon. *The Strategic Trade Review*, 1(1), 73-87.
- McDougal, T., Shirk, D. A., Muggah, R., & Patterson, J. H. (2014). The Way of the Gun: Estimating Firearms Traffic across the U.S.-Mexico Border. *Economic Geography*. doi: 10.1093/jeg/lbu021
- McDougal, T. L., Kolbe, A., Muggah, R., & Marsh, N. (2014). Ammunition Leakage from Military to Civilian Markets: Market Price Evidence from Haiti, 2004-2012 *SADO Working Paper Series*. San Diego: Small Arms Data Observatory.
- McDougal, T. L., Shirk, D. A., Muggah, R., & Patterson, J. H. (2013). The Way of the Gun: Estimating Firearms Traffic across the U.S.-Mexico Border. San Diego: Trans-Border Institute / Igarapé Institute.
- Muggah, R. (2012). The Enemy Within: Arms Availability in Africa. In J. Piombo (Ed.), *Future Threats in Africa*. New York: Routledge.
- Muggah, R. (2013). Tracking Effects of Small Arms and Light Weapons. In P. Batchelor & K. Kenkle (Eds.), *Controlling Small Arms: Consolidation, Innovation and Relevance in Research Policy*. New York: Routledge.
- NSSF. (2015). Firearms and Ammunition Industry Economic Impact Report 2014. Newtown, CT: National Shooting Sports Federation.
- Schneider, F., & Klinglmair, R. (2004). Shadow Economies around the World: What Do We Know? *CESifo Working Paper Series*: CESifo.

## Estimating the Size of the Illicit Small Arms Economy in San Diego

- UNODC. (2015). UNODC Study on Firearms 2015: A study on the transnational nature of and routes and modus operandi used in trafficking in firearms. Vienna: United Nations Office on Drugs and Crime.
- Wagner, G. (2013). 2013 Annual Report. In County of San Diego Department of the Medical Examiner (Ed.). San Diego: County of San Diego.
- Zimmerman, A., & Chaudhry, P. (Eds.). (2009). *The Economics of Counterfeit Trade: Governments, Consumers, Pirates and Intellectual Property Rights*. Heidelberg: Springer.