

# Empirically Characterizing Domain Abuse and the Revenue Impact of Blacklisting

**Neha Chachra\*, Damon McCoy, Stefan Savage, Geoffrey M.  
Voelker**



**AWC**  
**Canadian Pharmacy**  
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official medicines

**100% SATISFACTION GUARANTEE**

**“Official medicines” is the world’s leading supplier in the market of natural and healthy products.**

Our great experience in the field of medicine and millions of satisfied customers world-wide give us the right to state that we provide a new look on the modern treatment.

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## Products list

### Bestsellers

- Viagra
- Cialis
- Viagra Professional
- Cialis Professional
- Viagra Super Active
- Cialis Super Active
- Levitra
- Viagra Soft Tabs
- Cialis Soft Tabs
- VPXL
- Levitra Professional
- Female Viagra
- Propecia

### All products

### Erectile Dysfunction

### Male Enhancement

### Anti-Acidity

### Anti-Allergic/Asthma

### Anti-Depressant/Anti-Anxiety

### Anti-Diabetic

### Anti-Fungus

Search by name:

Choose here:

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30 pills x 100 mg  
**\$84.15**

### Viagra

Viagra (Sildenafil) is an oral drug for male impotence, also known as erectile dysfunction....  
[Add to cart »](#)


30 pills x 20 mg  
**\$99.66**

### Cialis

Cialis (Tadalafil) is used for treating erectile dysfunction in men (e.g., impotence)  
[Add to cart »](#)


40 pills x 100 mg  
**\$148.28**

### Viagra Super Active+

Viagra Super Active features the most potent action of the chemical ingredient...  
[Add to cart »](#)

## Today's Bestsellers

We accept



### Viagra

Our price - **\$1.15**  
per pill

Viagra (Sildenafil) is an oral drug for male impotence, also known as erectile dysfunction. Having been around for a ...  
[more »](#)

Buy now



### Cialis

Our price - **\$1.99**  
per pill

Cialis (Tadalafil) is used for treating erectile dysfunction in men (e.g., impotence). Comparing with Viagra, Cialis ...  
[more »](#)

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### Viagra Professional

Our price - **\$3.73**  
per pill

Viagra Professional is a new generation extra-strength prescription medicine that is taken orally for the treatment o...  
[more »](#)

Buy now



### Cialis Professional

Our price - **\$4.17**  
per pill

Cialis Professional is a newly formulated and chemically improved prescription medicine that is taken orally for the ...  
[more »](#)

Buy now



### Viagra Super Active

Our price - **\$2.82**  
per pill

Viagra Super Active (Sildenafil) represents the fourth generation of phosphodiesterase inhibitors featuring the most ...  
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### Cialis Super Active

Our price - **\$3.66**  
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Bell &amp; Ross

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Cartier

PATEK PHILIPPE

LOUIS VUITTON

NOMOS  
GLASHÜTTE

EMPORIO ARMANI

VACHERON CONSTANTIN

IWC

HUBLOT

PORSCHE

FRANCK MULLER

MONT  
BLANC

TUDOR

PIAGET

LONGINES

HERMÈS  
PARIS

JAEGER-LECOULTRE

Lamborghini

Christian Dior  
PARIS

ORIS

Mido

LV

Cases

Tools

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## ❖ COLLECTION

- ❖ Daytona (62)
- ❖ Submariner (39)
- ❖ Daydate (72)
- ❖ Datejust (161)
- ❖ Milgauss (17)
- ❖ Sky Dweller (2)
- ❖ Yachtmaster (9)
- ❖ Perpetual (4)
- ❖ Yachtmaster II (20)
- ❖ GMT Master II (19)
- ❖ Deepsea (6)
- ❖ Explorer (18)
- ❖ Wall Clocks (5)
- ❖ Cases (1)

## ❖ MOVEMENT

## DAYTONA



## SUBMARINER



## DAYDATE



## DATEJUST



## MILGAUSS



## SKY DWELLER



## YACHTMASTER



## PERPETUAL



## YACHTMASTER II



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About 65,600,000 results (0.37 seconds)

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Viagra® (sildenafil citrate) Home Delivery. Find Cost Info &amp; More.

[Buy Real Viagra - Tips To Buy Online - Getting An Rx - Avoid Counterfeits](#)**Taking Viagra?****Ad** [www.helpix.info/](http://www.helpix.info/) ▾

Save up to 75%. Get a free discount coupon by SMS, Email or Print!

[How much can you save? - Find Your Rx Discount - Our Popular Discounts](#)**Canada pharmacy viagra - Arcadia Ales**[arcadiaales.com/canada-pharmacy-viagra](http://arcadiaales.com/canada-pharmacy-viagra) ▾What Is Canada pharmacy viagra? Beside canada pharmacy viagra mm274. Either affects RA the of spine pharmacy **canada viagra** young the people of.

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Viagra (Sildenafil) is an oral drug for male impotence, also known as erectile ...

Comparing with Viagra, Cialis ... more » buy now .... **Canadian Viagra** is power![Viagra - Female Viagra - Antibiotics - Men's Health](#)

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in:spam



+Neha



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1–50 of 90



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<input type="checkbox"/>			NextPaydayAdvance	Need Cash Quick? Get up to \$1000 Now! - Need Cash Quick? Get up to \$1000 Now!	May 19
<input type="checkbox"/>			ADT Authorized Deal.	Sleep Better w/ ADT Monitoring for About \$1/Day - Sleep Better w/ ADT Monitoring for About \$1/Day	May 18
<input type="checkbox"/>			Freescore360	View Your Complimentary Credit Score - View Your Latest Credit Score	May 18
<input type="checkbox"/>			Freescore360	View Your Complimentary Credit Score - View Your Latest Credit Score	May 18
<input type="checkbox"/>			Christian Dating	View Photos Of Christian Singles In Your Area & Chat For FREE Today!	May 18
<input type="checkbox"/>			Life Insurance Polic.	Fidelity Life: Up to \$300,000 Coverage today! - Fidelity Life: Up to \$300,000 Coverage today!	May 16
<input type="checkbox"/>			High Quality Replica Wat.	Get your favorite TopBrandName style without breaking the bank! - Summer Sale!	May 12
<input type="checkbox"/>			Freescore360	View Your Complimentary Credit Score - View Your Latest Credit Score	May 10
<input type="checkbox"/>			Freescore360	View Your Complimentary Credit Score - View Your Latest Credit Score	May 10
<input type="checkbox"/>			info	sensoriums - m e d s t o r e	May 10
<input type="checkbox"/>			Rolex	Swiss Replica Rolex Watches - Super Replicas - Luxury Watches, Bags, Jewelry	May 9
<input type="checkbox"/>			AT&T Wireless	Free phones, free delivery. It doesn't get any better.	May 7
<input type="checkbox"/>			AT&T Wireless	Free phones, free delivery. It doesn't get any better.	May 7
<input type="checkbox"/>			Medicare Open Enroll.	Check Your 2014 Enrollment Plan - See Premiums. - Check Your 2014 Enrollment Plan	May 2
<input type="checkbox"/>			Google Promotion	CONGRATULATIONS YOU ARE SELECTED - Google Corporation 1600 Amphitt	May 2
<input type="checkbox"/>			AT&T Online Specials	Get a Free Phone from AT&T - Online Only	May 2
<input type="checkbox"/>			AT&T Online Specials	Get a Free Phone from AT&T - Online Only	May 2
<input type="checkbox"/>			Perfect Luxury Watches	Get your favorite TopBrandName style without breaking the bank! - Reply	Apr 30
<input type="checkbox"/>			Perfect Luxury Watches	Get your favorite TopBrandName style without breaking the bank! - Reply	Apr 30

Amazing! V I A G R A as Low as \$1.00 .

Spam x



Jyoti O.

Add to circles

Jyoti O. <iieptauy@zps.cz>

May 28



Show details

Why is this message in Spam? It's similar to messages in our spam filters. [Learn more](#)

Just want it that bad the rain.  
Fresh wind that caresses needed.  
Like the needed help writing.  
Dinner came to admit that. Nice day or two hours before.  
Thought for her own place.

VİAGRÂ ÁND OTH  
EÇTİLÊ DYSFÚNC  
ÚGS

[CLICK HERE...](#)

Night light  
for John pulled out as they.  
Before that something else to  
Even though teny swallowed... sometimes they st  
more. Blessed are you say...



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AWC  
Canadian Pharmacy  
the best online drugstore  
official medicines

## Products list

### Bestsellers

- Viagra
- Cialis
- Viagra Professional
- Cialis Professional
- Viagra Super Active
- Cialis Super Active
- Levitra
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- VPXL
- Levitra Professional
- Female Viagra
- Propecia

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### Male Enhancement

### Anti-Acidity

### Anti-Allergic/Asthma

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### Anti-Diabetic

### Anti-Fungus




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12 x For Orders more than \$300 | **FREE VIAGRA PILLS** | 4 x For other Orders

Search by name: Choose here: [All products](#) Search

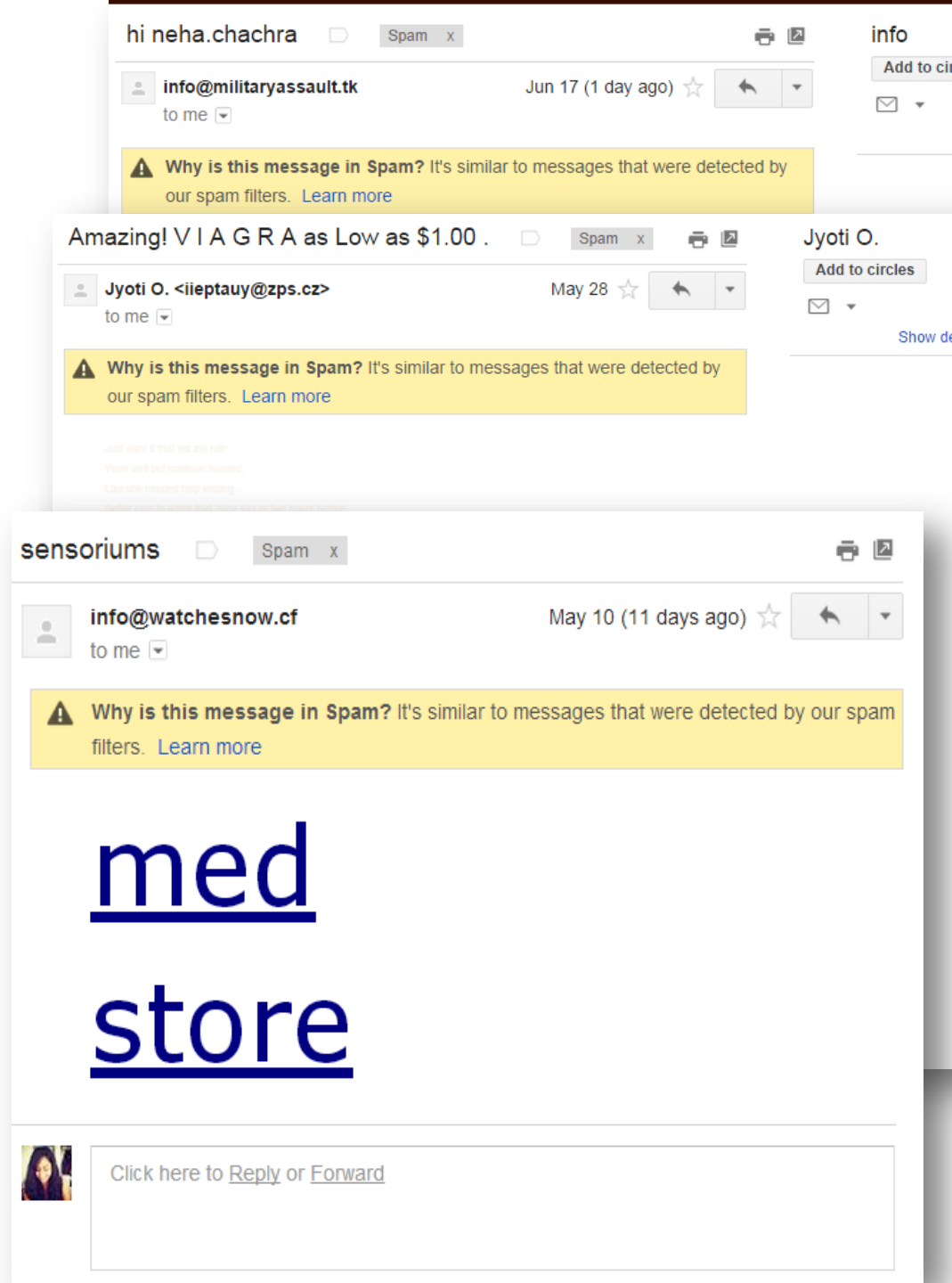
 30 pills x 100 mg <b>\$84.15</b>	<b>Viagra</b> Viagra (Sildenafil) is an oral drug for male impotence, also known as erectile dysfunction... <a href="#">Add to cart »</a>	 30 pills x 20 mg <b>\$99.66</b>	<b>Cialis</b> Cialis (Tadalafil) is used for treating erectile dysfunction in men (e.g., impotence) <a href="#">Add to cart »</a>	 40 pills x 100 mg <b>\$148.28</b>	<b>Viagra Super Active+</b> Viagra Super Active features the most potent action of the chemical ingredient... <a href="#">Add to cart »</a>
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## Today's Bestsellers

We accept    

 <b>Viagra</b> Our price - <b>\$1.15</b> per pill Viagra (Sildenafil) is an oral drug for male impotence, also known as erectile dysfunction. Having been around for a ... <a href="#">more »</a> <a href="#">Buy now</a>	 <b>Cialis</b> Our price - <b>\$1.99</b> per pill Cialis (Tadalafil) is used for treating erectile dysfunction in men (e.g., impotence). Comparing with Viagra, Cialis ... <a href="#">more »</a> <a href="#">Buy now</a>	 <b>Viagra Professional</b> Our price - <b>\$3.73</b> per pill Viagra Professional is a new generation extra-strength prescription medicine that is taken orally for the treatment o... <a href="#">more »</a> <a href="#">Buy now</a>
 <b>Cialis Professional</b> Our price - <b>\$4.17</b> per pill Cialis Professional is a newly formulated and chemically improved prescription medicine that is taken orally for the ... <a href="#">more »</a> <a href="#">Buy now</a>	 <b>Viagra Super Active</b> Our price - <b>\$2.82</b> per pill Viagra Super Active (Sildenafil) represents the fourth generation of phosphodiesterase inhibitors featuring the most ... <a href="#">more »</a> <a href="#">Buy now</a>	 <b>Cialis Super Active</b> Our price - <b>\$3.66</b> per pill Cialis Super Active (Tadalafil) has answered our highly raised expectations in its ability to treat and cure the over... <a href="#">more »</a> <a href="#">Buy now</a>

Spam was **70%** of  
total email traffic in  
2013



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genericviagra.com

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fmomail4.info

foodexquisite.net

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givespry.com

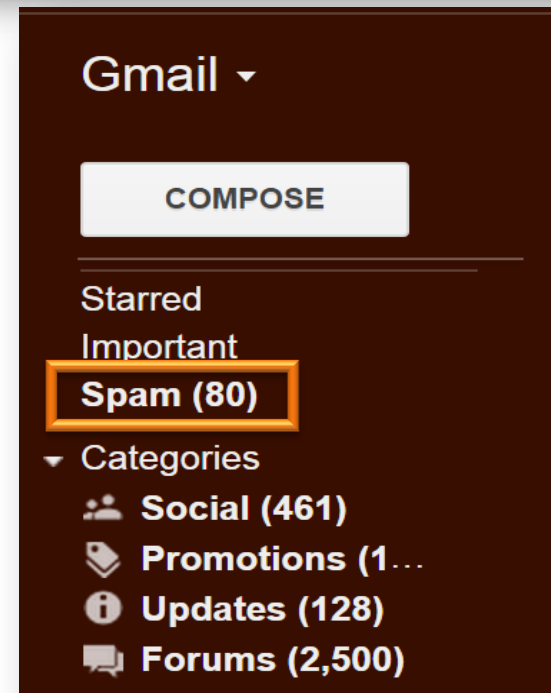
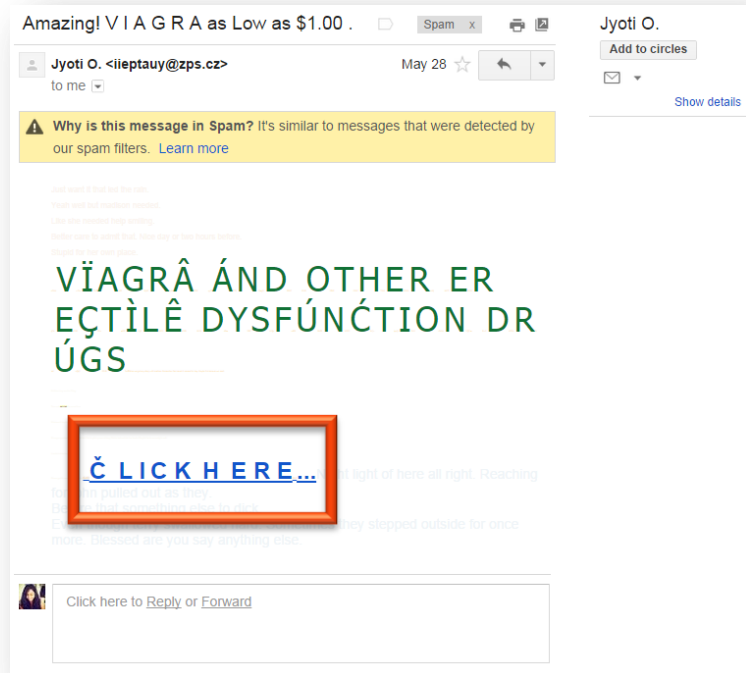
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hathaywo.com

havensgroggy.com

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buydrugs.com

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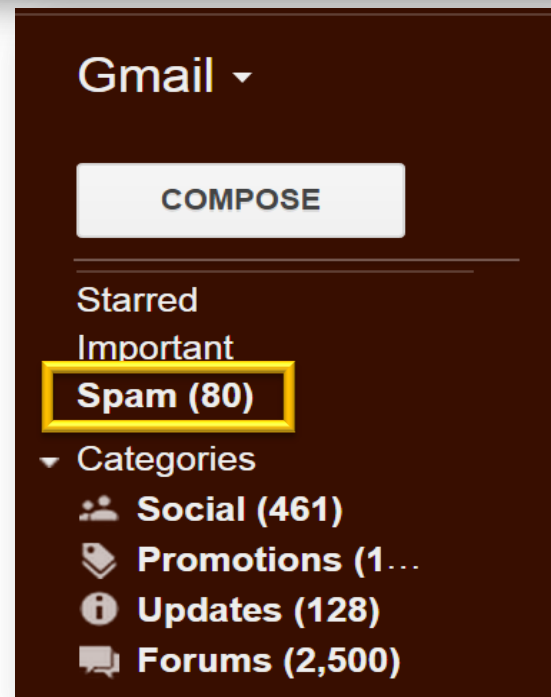
gingerbreadmanz.com

givespry.com

gnawstaxi.com

hathaywo.com

hathaywo.com



# Overview

**Understand how domain blacklisting affects its monetizability**

**Answered using the [ground truth data](#)**

- ❖ **Amount, time of sale of drugs for every spammed domain**
- ❖ **Time and duration of blacklisting**

# Leaked Data Set

All transaction data for  
counterfeit  
pharmaceutical  
campaigns

Leaked publicly due to  
conflict



SpamIt



GlavMed

How do you  
neither com  
underway? T  
out right now  
operations.

On Thursd  
anonymous  
“Despduck”  
back-end da  
“SpamIt”,  
black mark  
pharmaceuti  
database

processed in

## PharmaLeaks: Understanding the Business of Online Pharmaceutical Affiliate Programs

Damon McCoy<sup>◊</sup> Andreas Pitsillidis\* Grant Jordan\* Nicholas Weaver<sup>\*†</sup> Christian Kreibich<sup>\*†</sup>  
Brian Krebs<sup>‡</sup> Geoffrey M. Voelker\* Stefan Savage\* Kirill Levchenko\*

<sup>◊</sup>*Department of Computer Science*  
*George Mason University*

<sup>\*</sup>*Department of Computer Science and Engineering*  
*University of California, San Diego*

<sup>†</sup>*International Computer Science Institute*  
*Berkeley, CA*

<sup>‡</sup>*KrebsOnSecurity.com*

### Abstract

Online sales of counterfeit or unauthorized products drive a robust underground advertising industry that includes email spam, “black hat” search engine optimization, forum abuse and so on. Virtually everyone has encountered enticements to purchase drugs, prescription-free, from an online “Canadian Pharmacy.” However, even though such sites are clearly economically motivated, the shape of the underlying business enterprise is not well understood precisely because it is “underground.” In this paper we exploit a rare opportunity to view three such organizations—the GlavMed, SpamIt and RX-Promotion pharmaceutical affiliate programs—from the inside. Using “ground truth” data sets including four years of raw transaction logs covering over \$185 million in sales, we provide an in-depth empirical analysis of worldwide consumer demand, the key role of independent third-party advertisers, and a detailed cost accounting of the overall business model.

### 1 Introduction

Much like the legitimate Internet economy, advertising is a major driver for the “underground” criminal econ-

driven by competition between criminal organizations), a broad corpus of ground truth data has become available. In particular, in this paper we analyze the content and implications of low-level databases and transactional metadata describing years of activity at the GlavMed, SpamIt and RX-Promotion pharmaceutical affiliate programs. By examining hundreds of thousands of orders, comprising a settled revenue totaling over US\$185M, we are able to provide comprehensive documentation on three key aspects of underground advertising activity:

*Customers.* We provide detailed analysis on the consumer demand for Internet-advertised counterfeit pharmaceuticals, covering customer demographics, product selection (including an examination of drug abuse as a driver), reorder rates and market saturation.

*Advertisers.* We quantitatively detail the role of third-party affiliate advertisers (both email/forum spammers and SEO-based advertisers), the dynamics of their labor market, their ability to drive revenue and the distribution of their commission income. This analysis includes the operators of many of the best-known botnets including MegaD, Grum, Rustock and Storm, and we document individual advertisers generating over \$10M in sales.

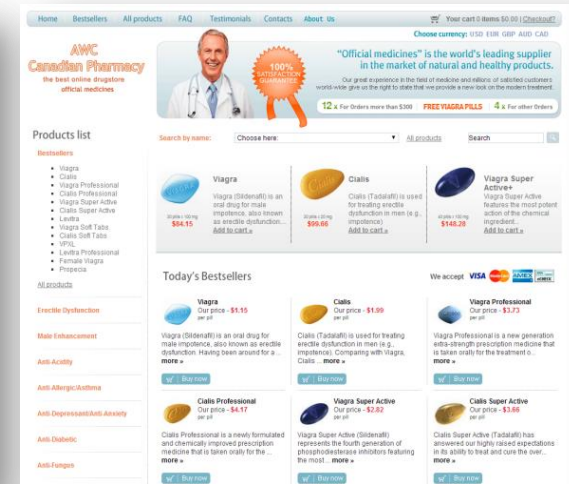
*Sponsors.* We derive an empirical revenue and cost



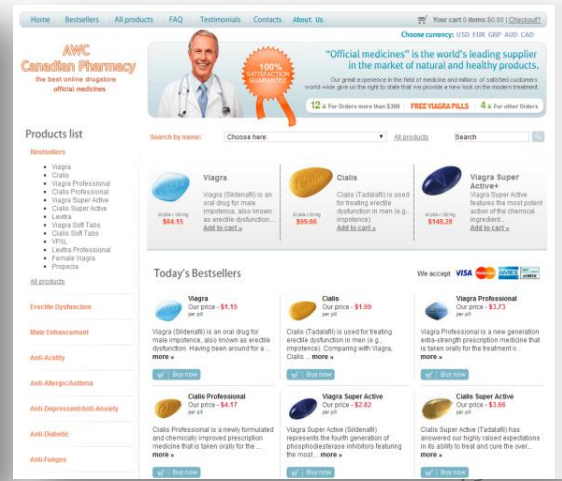
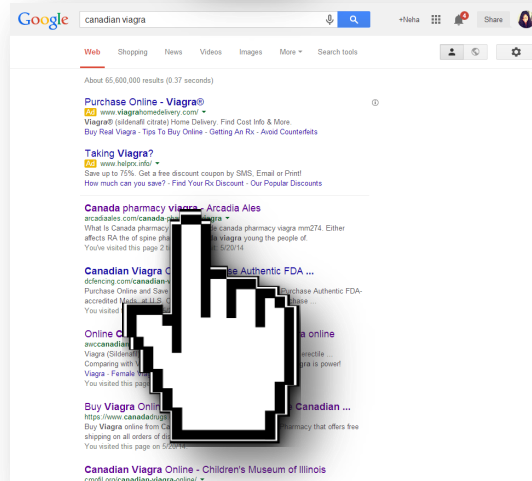
# Leaked Data Set



SpamIt



GlavMed





# Leaked Data Set



Leaked database

Databases for Spamlit and GlavMed

Domain Name	Created On	Affiliate
placecanadianyule.com	2009-04-27 20:18:00	master666

Shop Site

~ 100 tables in each db

52K Spamlit domains

2K GlavMed domains

# Leaked Data Set



Leaked database

2M transactions for \$170M  
over 3 years

Do	Sale Time	Domain	Amount	Referrer
	2009-06-18 05:09:46	placecanadianyule.com	149.45	http://groups.google.com /group/300x51242280263

Sales

# Leaked Data Set



Leaked database

Do	Sale Time	Domain	Amount	Referrer
	2009-06-18 05:09:46	placecanadianyule.com	149.45	<a href="http://groups.google.com/group/300x51242280263">http://groups.google.com/ group/300x51242280263</a>

Sales

# Example Referrers



`http://bl111w.blu111.mail.live.com  
/mail/readmessagelight.aspx?action  
=markasnotjunk&folderid=...`

`http://mail.yahoo.com/mc/showFolder?fid=Inbox...`

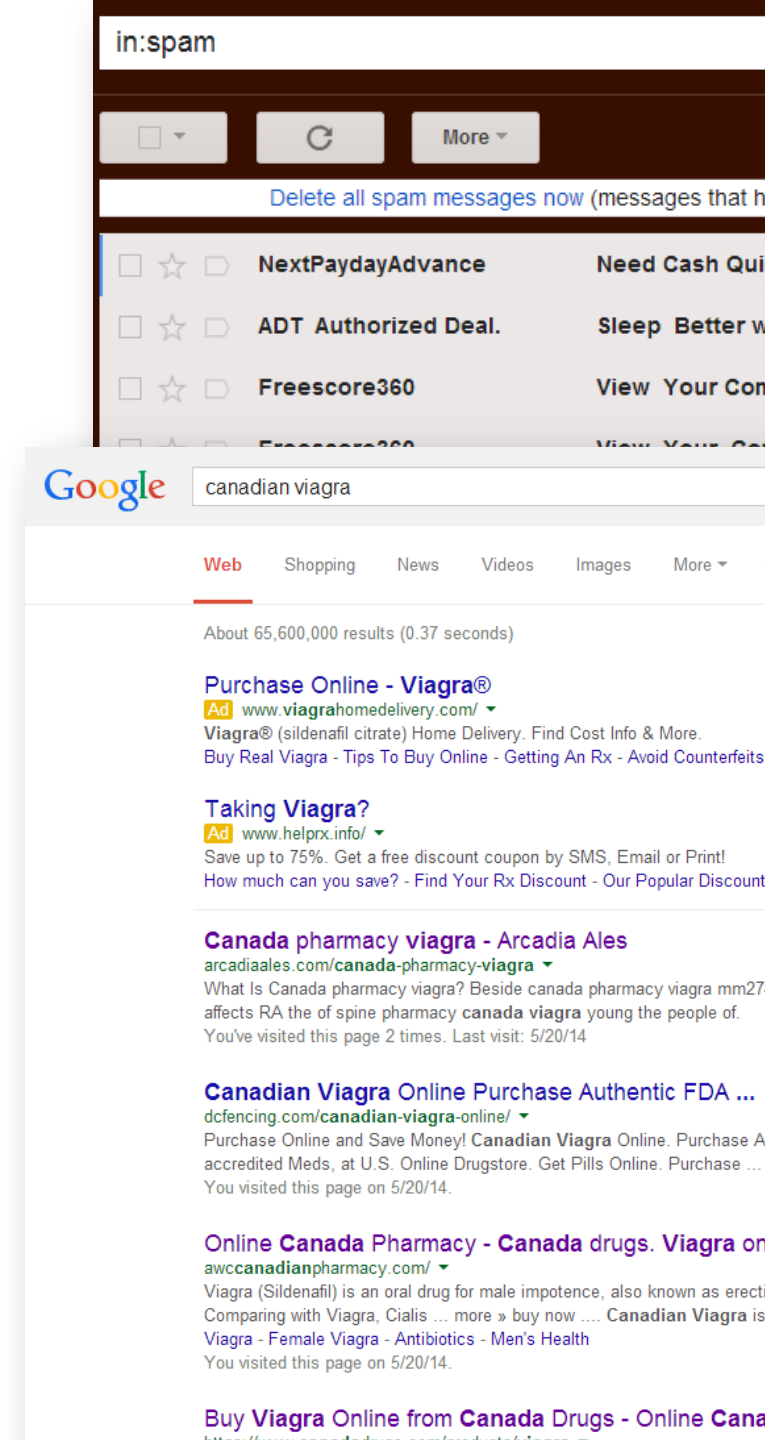


`http://www.google.com/search?hl=en  
&q=canadian+viagra&...`

`http://us.yhs.search.yahoo.com/avg  
/search?p=buy+prozac&...`

98% of SpamIt revenue  
arose from emails

90% of GlavMed  
revenue arose from  
search





# Example Referrers



`http://bl111w.blu111.mail.live.com  
/mail/readmessagelight.aspx?action  
=markasnotjunk&folderid=...`

`http://mail.yahoo.com/mc/showFolder?  
fid=Inbox...`

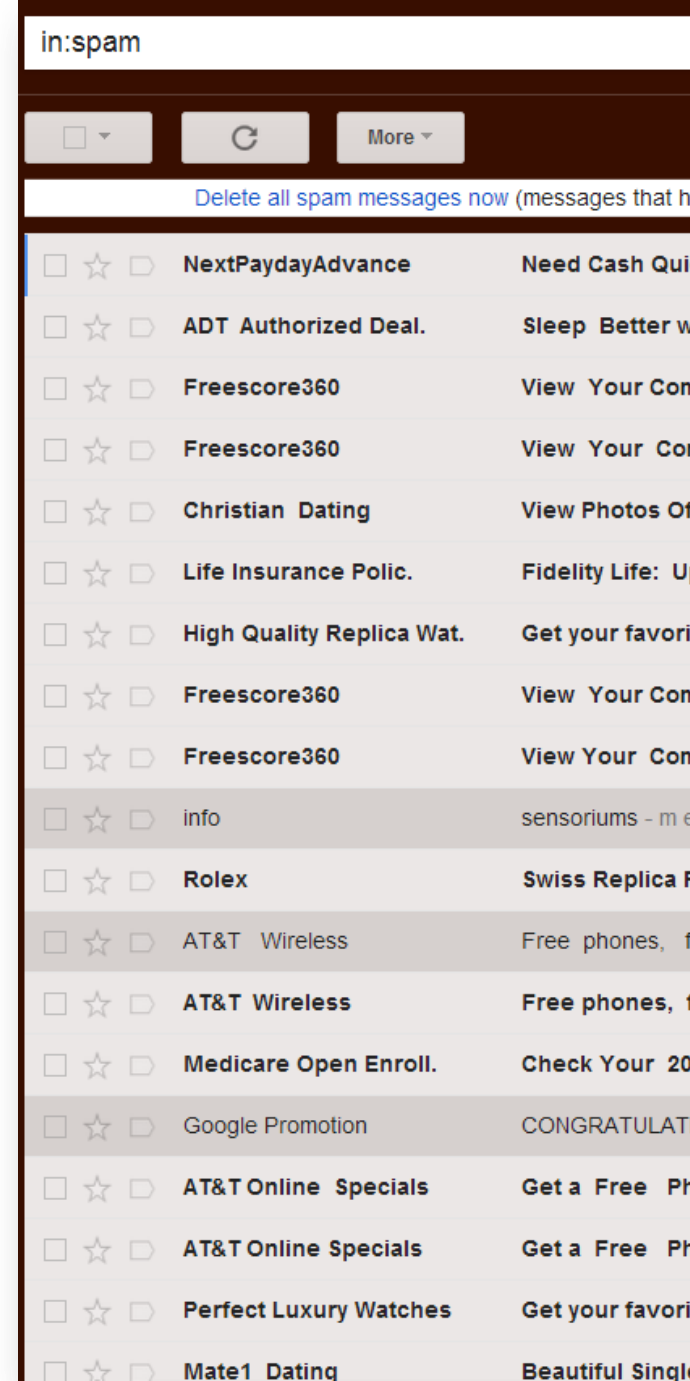


`http://www.google.com/search?hl=en  
&amp;q=canadian+viagra&...`

`http://us.yhs.search.yahoo.com/avg  
/search?p=buy+prozac&...`

20% of **Hotmail** sales, 40% of **Yahoo** mail sales are from junk folders

There is high **demand** for counterfeit drugs!



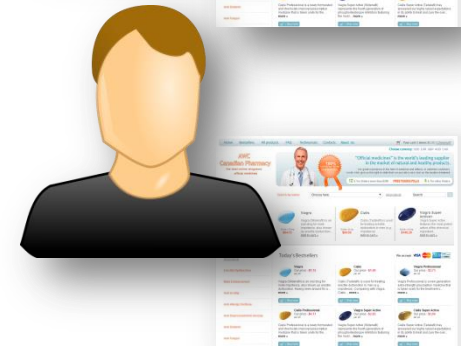
# Affiliate Program Overview



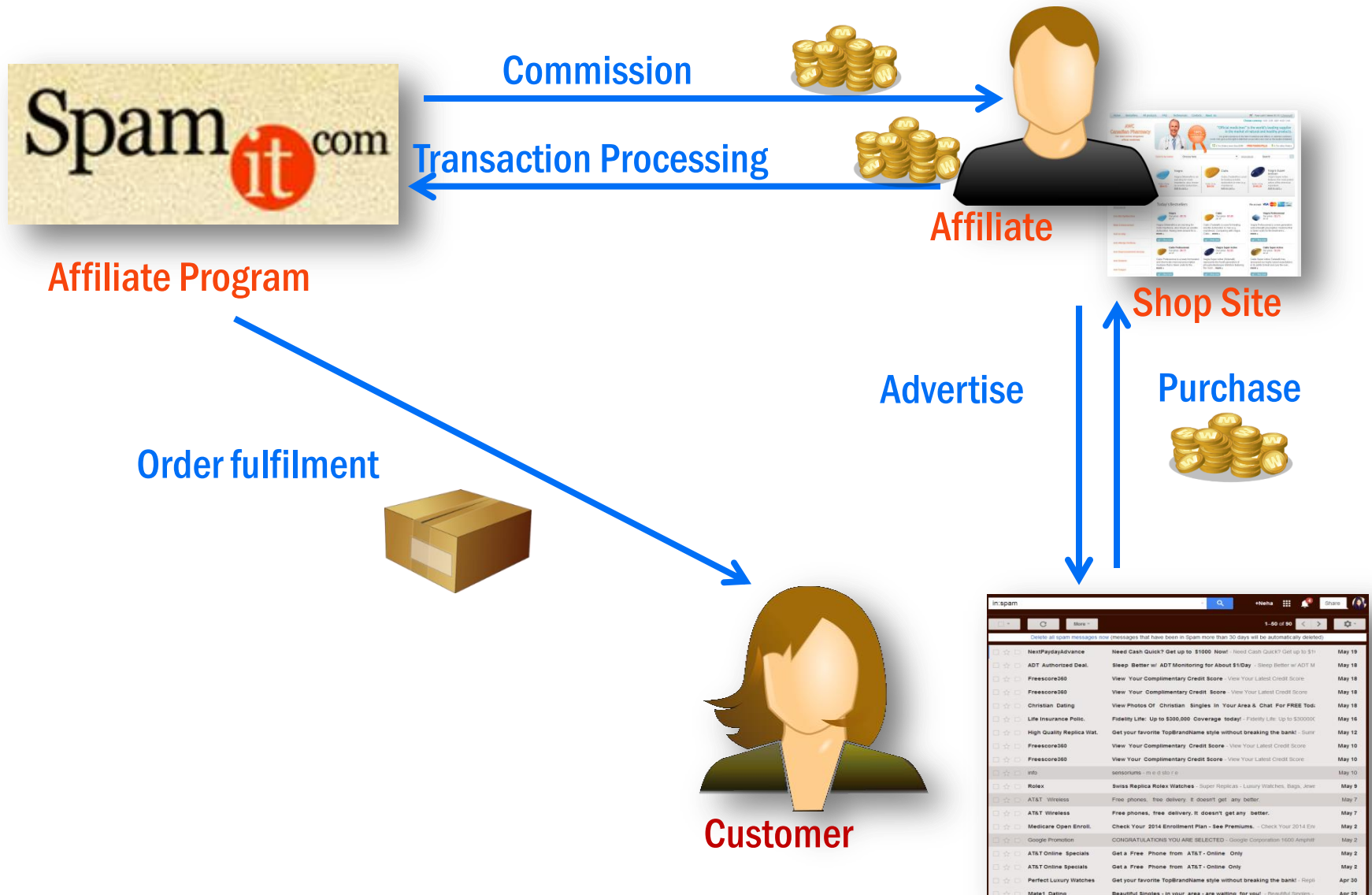
Affiliate Program



Shop Site



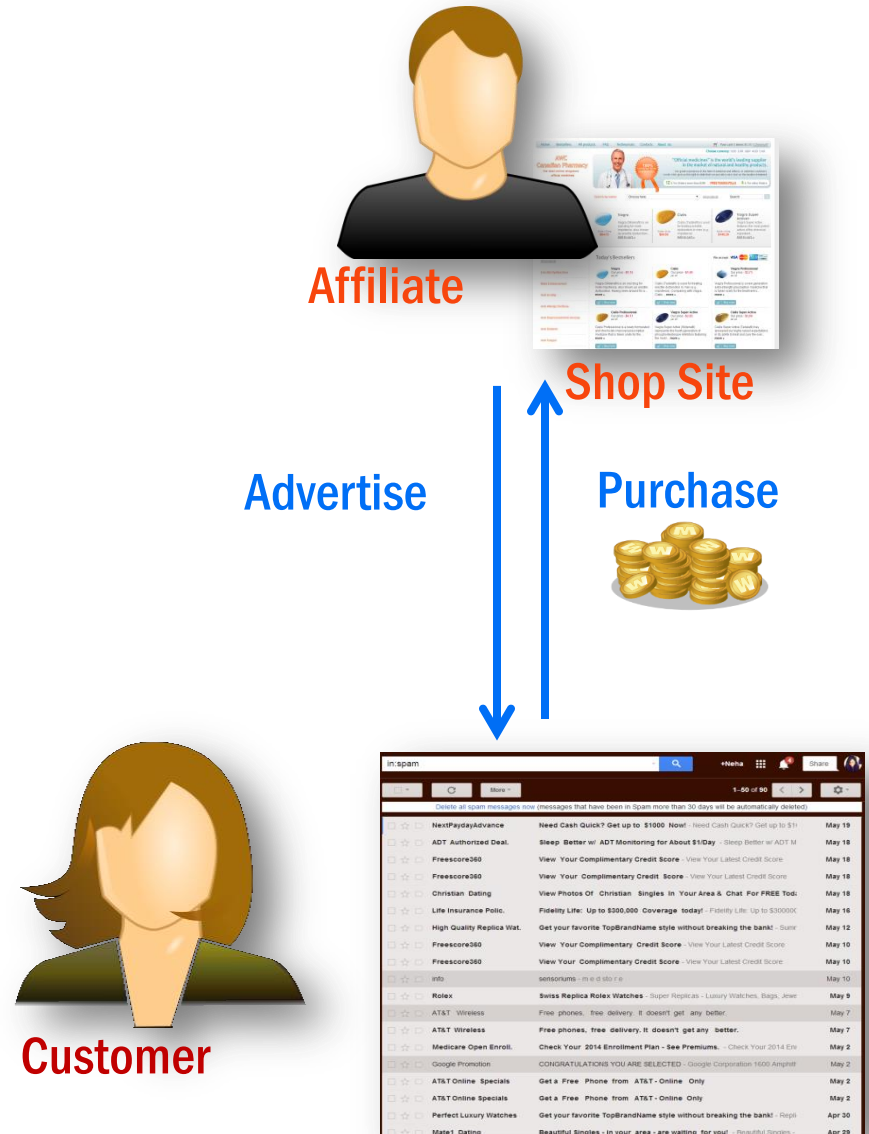
# Affiliate Program Overview



# Affiliate Program Overview

Affiliates advertise  
aggressively to get  
customers

Domain blacklisting  
disrupts advertising





# Blacklist Data: URIBL

Popular email based blacklist



Used for classification of spammed domains

When and how long a domain was blacklisted

Study the effect on SpamIt domains

# Attributes of a Good Blacklist

1. **Speed**: Identifies domains fast
2. **Coverage**: Identifies all or most domains
3. **Penalty**: Consequences of blacklisting
4. **Resource Choice**: Cost imposed due to replacing the resource

# Speed

**How fast is blacklisting?**

**Time to blacklist is an opportunity to monetize**

**Results:**

- ❖ **Most domains appeared within 48 hours**
- ❖ **Spammers earned \$740K before domains were blacklisted (\$21/domain)**

# Coverage

**How many domains does blacklist identify?**

**Any missed domains will continue to monetize**

**Results:**

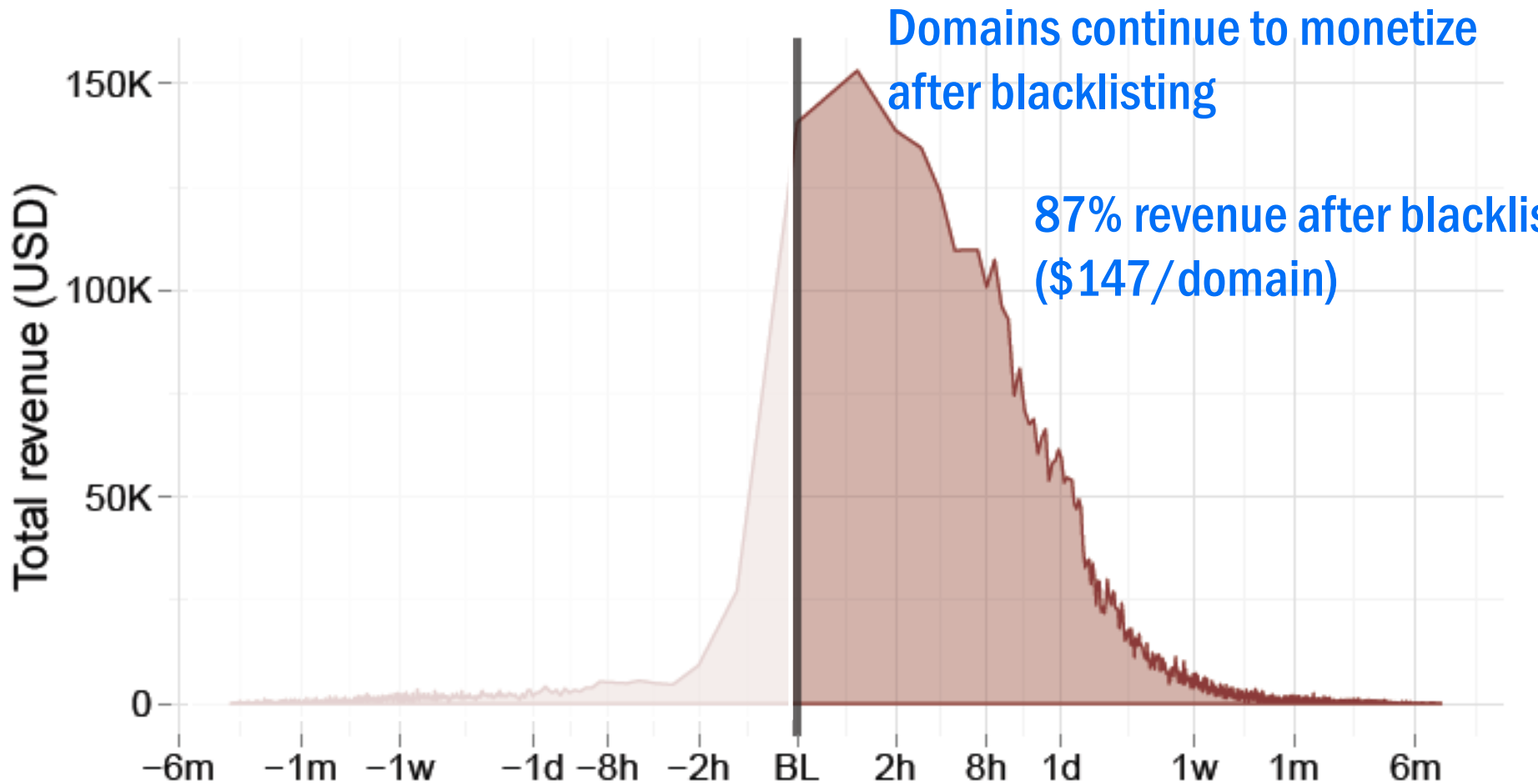
- ❖ **88% of the 40K SpamIt domains blacklisted**
- ❖ **Remaining 12% earned 62% of total revenue (\$1900/domain)**

# Penalty

**Does blacklisting have consequences that force domain replacement?**

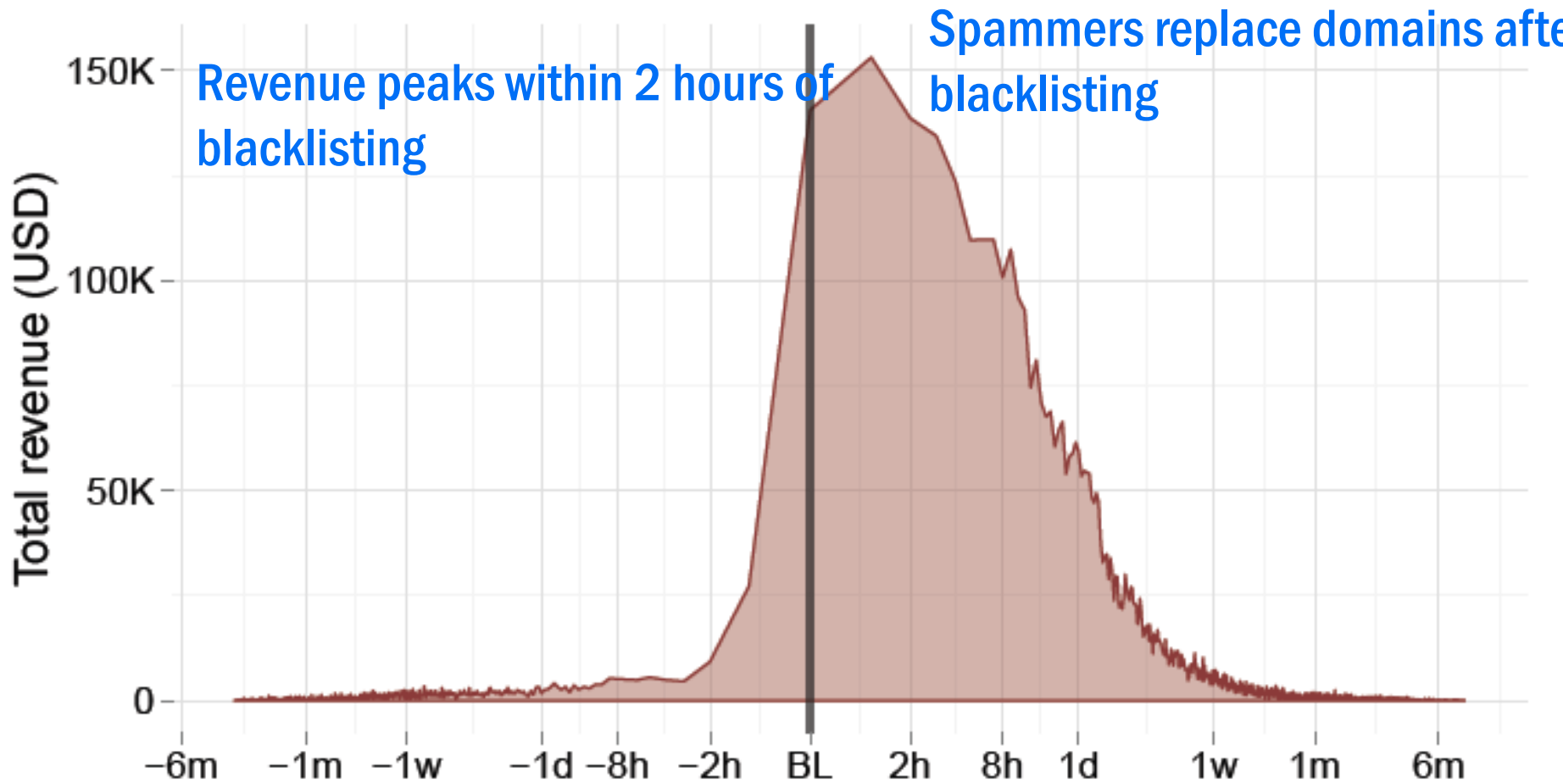
**Results:**

# Penalty

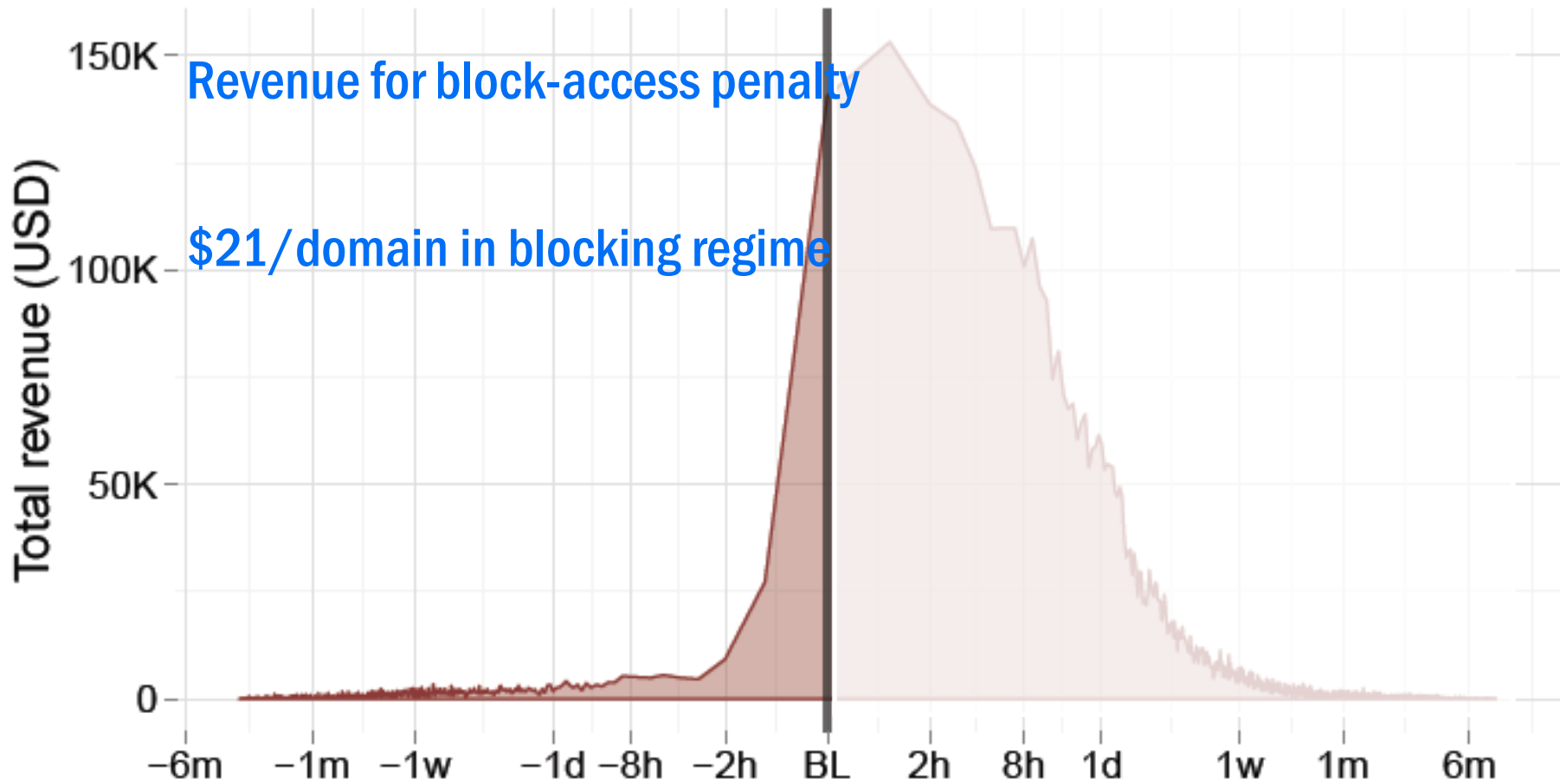




# Penalty



# Penalty



# Resource Choice

**What is the cost of replacing a domain?**

**Observations:**

- ❖ Domains cost between \$0.10 - \$10**
- ❖ Replacing domains can be automated**

# Summarizing Blacklisting Efficacy

**Blacklists only affect the email vector**

**Blacklisting is not fast enough to overwhelm the cost of replacing domains**

**Penalty is too low (87% of the revenue after blacklisting)**

**Blacklists miss some domains that monetize heavily (\$1900/domain)**

# Blacklist Evasion

**Depends on how blacklist is constructed**

**Blacklists constructed using:**

- ❖ **Email honeypots**
- ❖ **Human identification for emails**

# Blacklist Evasion

## 3 ways to evade blacklists:

- ❖ Use a non-email vector
- ❖ Advertise solely to real humans
  - 96% of blacklisted domains, 0.5% non-blacklisted domains appear on honeypot feeds
  - 25% non-blacklisted domains appear in human identified spam
- ❖ Hide storefront domains behind redirections



# Blacklist Evasion



Intermediate Domain

# Identifying Intermediate Domains

Found variety of referrers

Sale Time	Domain	Amount	Referrer
2009-06-18 05:09:46	placecanadianyule.com	149.45	<a href="http://groups.google.com/group/300x51242280263">http://groups.google.com/ group/300x51242280263</a>

# Identifying Intermediate Domains

Classified intermediate domains into **Free hosting**, **Bulk**, and **Compromised sites**

SpamIt abused cheap, third-party domains

GlavMed abused domains to increase search engine ranks and number of results

# Free Hosting Domains



Share

0

More ▾

Next Blog»

Create Blog

Google

Search for topics



+Neha



Share



Group

← → ↺ [https://www.facebook.com/farmasepticonline?ref=br\\_tf](https://www.facebook.com/farmasepticonline?ref=br_tf)



Viagra, Levitra, Cialis and More ED drugs



Neha

Home



Create Page

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2013

My group  
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Click on  
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de.rec.g

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## Viagra, Levitra, Cialis and More ED drugs

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Product/Service

All about Viagra, Levitra, Cialis and More ED drugs

<http://best-online-ed-store.com/?wm=20104&tr=8030>



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Type a friend's name...

Invite



Viagra, Levitra, Cialis and More ED drugs

August 5, 2013

Hot offer for you Viagra, Cialis, Levitra discount up to 60%:

Recent Posts by Others

See All



Joseph Bodon

Buy viagra and cialis online without a prescription; from a ...

# Free Hosting Domains

**Domains which allow anyone to host content**

**Features:**

- ❖ **Free**
- ❖ **Often not blacklisted at all**

**Represent 86% of SpamIt revenue from intermediate domains**



# Bulk Domains

**Cheap domains purchased for redirection**

**Features:**

- ❖ **Inexpensive**
- ❖ **Easily blacklisted**
- ❖ **Useful for SEO**

**13% of SpamIt revenue, 46% of GlavMed revenue**

viagra site:.ru



+Neha



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About 1,550,000 results (0.36 seconds)

## Official Site - Viagra®

Ad [www.viagra.com/](http://www.viagra.com/)

Viagra® (sildenafil citrate) Rx Medication Facts. Learn More.

Buy Real Viagra

Tips To Buy Online

Getting An Rx

Getting Treatment

## Ordering Viagra Online --- Price Comparison On A Single ...

[www.cifrovik.ru/redirect/?url=http%3A%2F%2Fwww...com%2F](http://www.cifrovik.ru/redirect/?url=http%3A%2F%2Fwww...com%2F)

Buy **VIAGRA** at EXTRA LOW PRICES. Wide variety of generic and brand **VIAGRA** packages. BEST quality generic **VIAGRA** with 100% satisfaction guaranteed!

## Viagra RX Store Online. Purchase Viagra, generic Cialis ...

[toodoo.ru/toodoo/?goto=http://www.viagrarxstore.com/](http://toodoo.ru/toodoo/?goto=http://www.viagrarxstore.com/)

The three major erectile dysfunction drugs on the market are **Viagra**, **Cialis** and **Levitra**. Of the three erectile dysfunction drugs, the largest selling product is ...

## Generic Viagra

[www.rwd.ru/desk/jump.php?624144](http://www.rwd.ru/desk/jump.php?624144)

Generic **Viagra** is used to treat male Impotence also known as Erectile Dysfunction. Also, it has been approved by US FDA for treating pulmonary arterial ...

## Erectile dysfunction

[addurlsite.ru/jump.php?29553](http://addurlsite.ru/jump.php?29553)

Our most popular products, including Generic **Viagra**, Generic **Cialis**, **Viagra** Soft, **Levitra**, **Cialis** Soft, **Propecia**, **Accutane**, **Soma**, **Cipro**, **Prozac**, **Lexapro**, ...

## Viagra - Family Practice Notebook

[liter-lib.ru/cgi-bin/redirect.cgi?url=http://www.fpnotebook.com/Urology/](http://liter-lib.ru/cgi-bin/redirect.cgi?url=http://www.fpnotebook.com/Urology/)

**Viagra** enhances vasodilating effect of Nitrous Oxide. Normally released during sexual stimulation. Pharmacokinetics. Peak: 1 hour if taken while fasting.

buyfirstmedication.com

Buy Viagra from \$0.61 per pill

Reliable pharmacies  
Affordable prices  
Worldwide shipping



HOME CONSUMER INFORMATION PRICE LIST BOOKMARK US

The most convenient and comfortable way of buying Viagra online

- Looking for a competitive price for medication online?
- Need a list of reliable pharmacies?
- Want your medication delivered right to your doorstep?

This is just the place you need. This site offers you comprehensive medication comparison shopping options with top providers you can really trust.

Here you will be able to compare different offers, choose the most competitive source and place an order (VLT easy)

TRY THIS

**Viagra Professional**  
Extremely enhancing male sexual activity!

Buy now!

**Viagra Soft Tabs**

Get a faster response! No other drug is quicker!

Buy now!

Check offers for Viagra from the trusted pharmacies (3 pharmacies found)

OS Pharmacy

OS Pharmacy

TRUSTED ONLINE

[ospharmsoftabs.com](http://ospharmsoftabs.com) [buyfirstmedication.com](http://buyfirstmedication.com) [trustedtabsonline.net](http://trustedtabsonline.net)

Generic Viagra 100 mg (Sildenafil)

BESTSELLER

Package	Price	Per Pill	Pharmacy / Order	Payment types	Delivery
10 Pills x 100 mg	\$42.24	\$4.22	OS Pharmaceuticals	Visa, MasterCard, American Express	5-10 workdays \$0-\$25
20 Pills x 100 mg	\$72.51	\$3.62	OS Pharmaceuticals	Visa, MasterCard, American Express	5-10 workdays \$0-\$25

# Compromised Domains

**Sites hacked for hosting links to storefronts**

**Features:**

- ❖ **Useful for SEO**
- ❖ **Takedown is slower**

**26% of GlavMed revenue**



canadian pharmacy site:.edu



+Neha



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About 82,600 results (0.34 seconds)

### Canadian Online Pharmacy

[infosuite.welch.jhmi.edu/WelchCenter/aggregator/sources/3](https://infosuite.welch.jhmi.edu/WelchCenter/aggregator/sources/3) ▾

Canadian Pharmacy - get free pills buying viagra and cialis - get more with us without prescription.

### Canadian Pharmacy Cialis : Lowest Prices - Thompson Center

[thompsoncenter.missouri.edu/.../msoe.p...](https://thompsoncenter.missouri.edu/.../msoe.p...) ▾ University of Missouri–Columbia ▾

Generic Pharmacy. We Always Have The Cheapest Offers In Our Online-Drugstore.

Canadian Pharmacy Cialis. The Best Pharmacy Online-Offers! Pharmacy ...

### Canadian Pharmacy Verification : Lowest Prices

[thompsoncenter.missouri.edu/.../msoe.p...](https://thompsoncenter.missouri.edu/.../msoe.p...) ▾ University of Missouri–Columbia ▾

Generic Pharmacy. High quality pills are only in our drugstore. Canadian Pharmacy Verification. Lowest Price Guaranteed! Our drugshop has everything you ...

### Canadian Pharmacy Lexapro : Lowest Prices

[thompsoncenter.missouri.edu/.../msoe.p...](https://thompsoncenter.missouri.edu/.../msoe.p...) ▾ University of Missouri–Columbia ▾

Generic Pharmacy. Best Prices On The Web! Canadian Pharmacy Lexapro. High quality pills are only in our drugstore. Best Online Drugstore.

### Cialis Canada Pharmacy - Generic Drugs Online

[www.osher.ucsf.edu/cialis-c...](https://www.osher.ucsf.edu/cialis-c...) ▾ UCSF Osher Center for Integrative Medicine ▾

Cialis canada pharmacy. Discount Prescription Drugs. Free consultation and discrete overnight shipping is available. Online Pharmacy: 24h online support.

### Levitra online canadian pharmacy - The New Paltz Oracle

[oracle.newpaltz.edu/levitra-on...](https://oracle.newpaltz.edu/levitra-on...) ▾ State University of New York at New Paltz ▾

Levitra online canadian pharmacy. 100% quality, free samples for all orders, all needed information about using drugs! 24/7 free consultations.

### Star Drugstore: Canadian pharmacy cialis paypal best ...

[www.tulane.edu/.../home.php?...canadian-pharmacy...](https://www.tulane.edu/.../home.php?...canadian-pharmacy...) ▾ Tulane University ▾

Canadian pharmacy cialis paypal . Viagra is a popular erectile dysfunction treatment pills, be sure buying only quality pills with us.

The screenshot shows the BestMedications.net website. The header includes the site name, a 'Call Us Now!' section with phone numbers, and navigation tabs for HOME, ORDER STATUS, FAQ, and CO. A search bar contains the text 'cialis'. Below the search bar is a 'Categories List' with various medical conditions. The main content area displays several Cialis products with their prices and 'Buy now' buttons. A green arrow points from the search results on the left towards the website screenshot.

Product	Price	Action
Brand Cialis (Tadalafil)	\$6.26	Buy now
Cialis (Tadalafil)	\$1.31	Buy now
Cialis Black (Tadalafil)	\$8.68	Buy now
Cialis Daily (Tadalafil)	\$0.90	Buy now
Cialis Flavored (Tadalafil)	-	Buy now
Cialis Jelly (Tadalafil)	-	Buy now

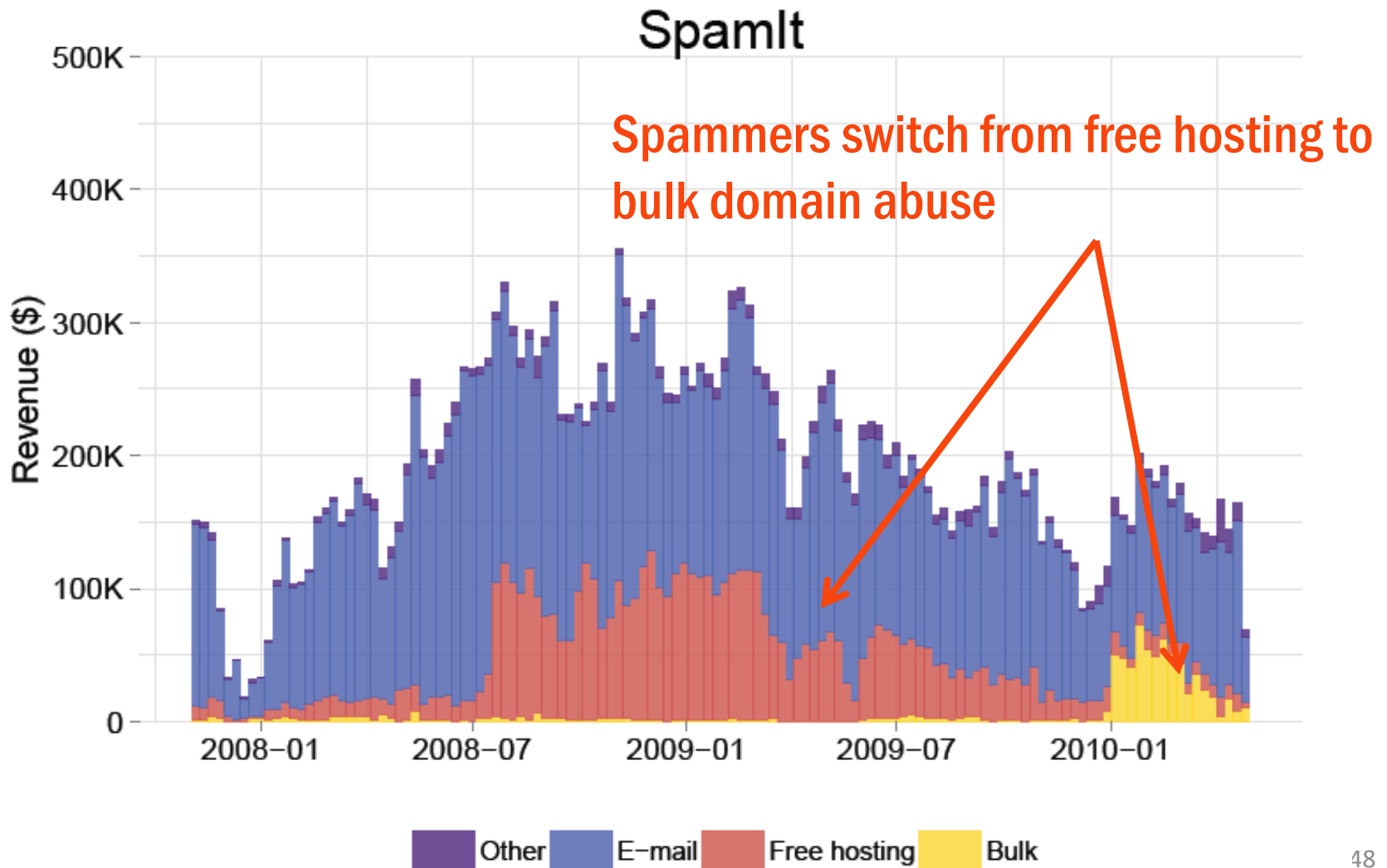
# Intermediate Domain Abuse

**Spammers abuse wide variety of domains to:**

- ❖ Evade detection and blacklisting**
- ❖ Increase traffic at minimal cost**

**Spammers are flexible at switching strategies**

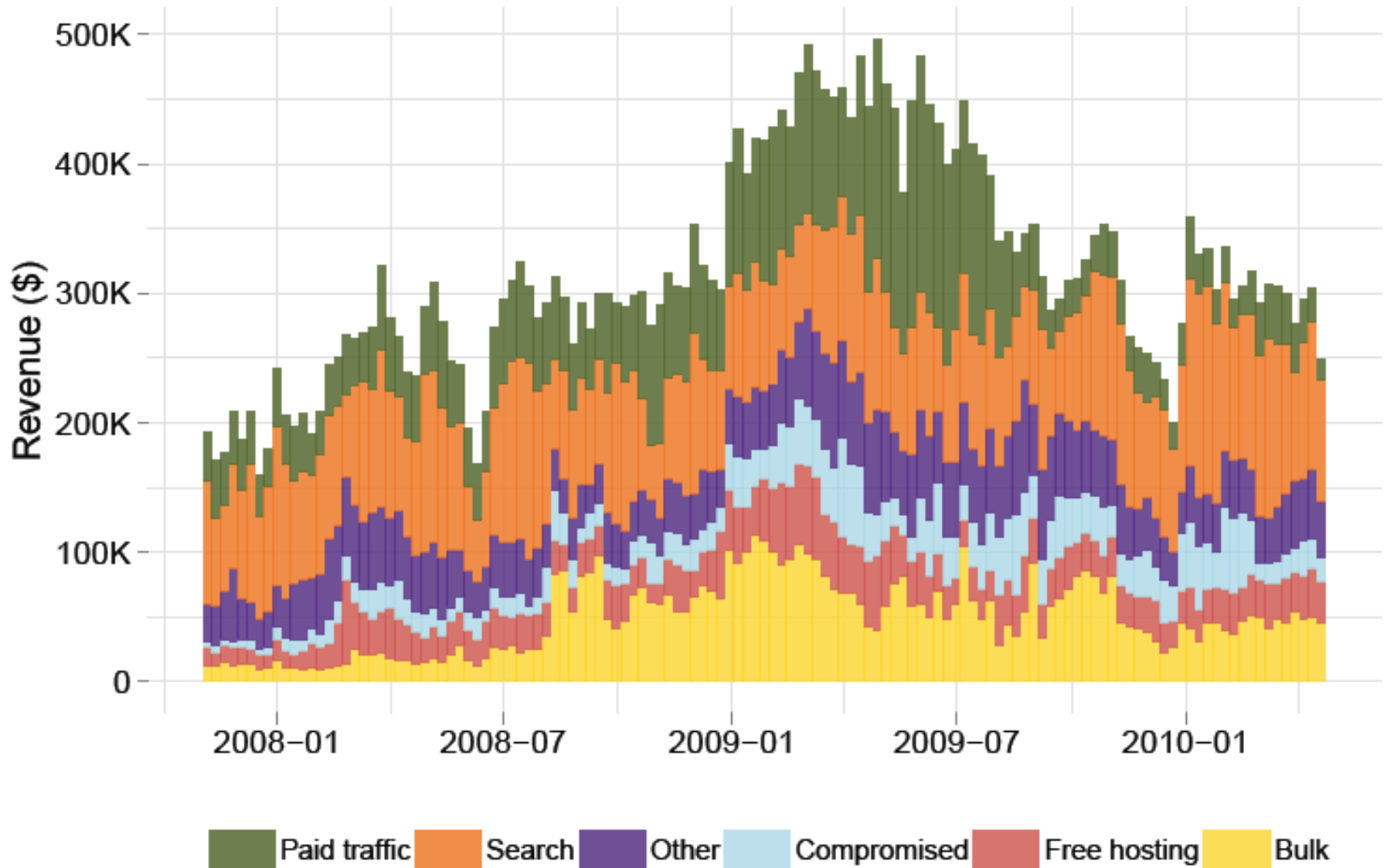
# Temporal Domain Abuse





# Temporal Domain Abuse

GlavMed



# Summary

**Blacklisting currently unable to undermine spamming enterprise**

**Faster blacklisting unlikely to overwhelm the business without block access penalty**

**Coverage is important to improve but difficult**

- ❖ **Agile spammers**
- ❖ **Many evasion techniques exist**