Assignment 2

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Who is the problem owner of the security issue as measured in your first assignment?

The security issue we consider is the public safety. The marketplace facilitates the trading in illegal goods and by this it also facilitates the existence of crime. The government has the task to maintain public safety and by this is the owner of the security issue. However as the marketplace is operating on an international level, this ownership can not be assigned to one government only. If governments want to address this issue they should probably work together to solve it.

What relevant differences in security performance does your metric reveal?

As can be seen from the top 10 shipping countries in the appendix, The Netherlands is on the 4th place of source countries despite being a relatively small country. This indicates that it is generally easier to produce and ship certain products in the Netherland than in other countries. Looking more in detail at the Netherlands, it can be seen that pills have a big contribution in the total turnover, while worldwide weed has the biggest share. An explanation could be that the Netherlands already has several security controls / regulations in place to reduce the trade of weed. Furthermore, there is an increase in supply from the Netherlands of most product categories over the 6 month covered in the data set. This shows that any controls that were implemented in this time frame to restrain cryptomarkets, specifically Silkroad 1, were not sufficient. However, when compared to the global development of the market, the growth of most product categories in the Netherlands was less than globally.

What risk strategies can the problem owner follow to reduce the security issue as measured in your first assignment?

Government is a “Security consumer” where the security issue has indirect business impact because it harms the customers (public safety). It generates indirect costs through citizen dissatisfaction. The security strategy is to add security for customers. There are four possible instruments in risk management, all of which we will discuss for this case:

- Risk mitigation - Try to reduce the likelihood and severity of loss events by protecting vulnerable assets with technical and organizational measures. In this case, the government has several options to implement this strategy:
    - Invest money in the police (or other governmental agencies) to attempt to find out where the markets are hosted and take these down.
    - Invest money in doing research in order to better understand and track the traders and buyers on these markets, with the goal of ultimately prosecuting them.
    - Mitigate by means of law - in order to 'scare off' potential illegal traders, raise the fines for these particular crimes. This also makes it less appealing for existing traders to continue on these markets.

- Risk acceptance. If no risk management instrument is economically feasible, the government can choose to tolerate losses. In this case, this is not a viable option, since it would have a very negative impact on the government.
- Risk avoidance means the organization withdraws completely from a risky business. This is also not an option, since the government doesn't initiate the existence of a cryptomarket. They are not hosting it, and whether such a market exists is completely out of the government's control.
- The last option, risk transfer, means there is a contractual agreement between the organization and and a third party, which compensates for potential losses. This is also not a viable option, since there can't be a contractual agreement between an insurance company and a government. This only refers to an agreement between two companies.

What other actors can influence the security issue as measured in your first assignment?

- Customers
- Distributors
- Operators of Silk Road
- Postal services
- Customs
- Police or other governmental enforcement agencies
- (Il)legal businesses that compete with products on the marketplace

Identify the risk strategies that the actors can adopt to tackle the problem
Are there actors with different strategies? why?

- Postal services
    - Risk Mitigation
      Postal services can invest in machines and/or human resources in order to detect illegal goods more frequent. However, it should be noted that an incentive from the government is needed. Since postal services are mostly commercial companies, they will just care about how much turnover they have, not necessarily what they are transporting. With an incentive from the government, they could be obliged to run security checks.
    - Risk Acceptance
      When no incentive for security checks is present, the postal company can decide to accept the risk of illegal goods being present in the transportation process. For the postal company, this does (almost) not introduce new costs.
    - Risk Avoidance
      The postal service can decide to stop delivering packets/letters coming from certain locations who are known to hide illegal goods. This has complications, since packets/letters from “good” people at the same location also won’t get transported, which results in a lack of service.
- Customs
    - Risk Mitigation
      Customs can invest more in machines/human resources in order to detect illegal goods coming from foreign countries more often. They will have to

accept that they cannot block all illegal goods from coming into the country, but an optimal point of costs and throughput of illegal goods should be the goal.

- (il)legal businesses that compete with products on the marketplace
    - Mitigation
      For example, regular coffeeshops in the Netherlands are affected by the illegal marketplace. They can compete with the illegal marketplace on price and service, but this will be a hard task.
    - Acceptance
      The (il)legal businesses can accept the presence of an illegal marketplace and calculate how much revenue this will be cut. Since they cannot attack the illegal marketplace and depend on law enforcement agencies, accepting the presence is the most likely option.

Have the strategies changed significantly over time in a way that reduces or increases risks?
The first cryptomarket, Silk Road, was founded in 2011. Therefore, not much time has passed since this is a problem for governments. Of course, agencies such as the FBI are trying to some of these websites down, but new cryptomarkets arise at the same time. Taking down these websites remains a difficult problem, since the servers are anonymous and thus hard to locate. Potentially, the risk increases since illegal marketplace owners will learn of the mistakes that previous owners made and thus, they will try to hide their marketplace even better and more secure. This problem is a 'cat and mouse game' that has existed since 2011, and will remain existing for the upcoming years.

Pick one of the risk strategies identified previously and calculate the Return on Security Investment (ROSI) for that particular strategy. I.e.,

*ALE = ARO * SLE*
*ROSI = (ALE * mitigation ratio - cost of solution) / cost of solution*

SLE = single loss expectancy
ARO = annual rate of occurrence
ALE = annual loss expectancy
ROSI = return on security investment

A ROSI of over 100% indicates a cost-effective solution.
Source:
https://www.enisa.europa.eu/publications/introduction-to-return-on-security-investment

We investigate the ROSI for the risk strategy where we invest in more manpower to detect illegal packages. As an example government for this case we will use the Netherlands, however the assumed numbers scale for other countries relative to their customs employment, healthcare costs and drug traffic. Current measures in place at customs are x-rays, puffer machines and sniffer dogs. Furthermore, PostNL uses sniffer dogs in distribution centers to find drugs in domestic mail.

(https://nos.nl/artikel/2181478-drie-arrestaties-in-onderzoek-naar-verzenden-drugs-via-de-post.html)

In 2011 the cost of healthcare for alcohol and drug addiction was 1,2 billion euros. (https://www.volksgezondheidenzorg.info/onderwerp/afhankelijkheid-van-drugs/kosten/kosten#node-kosten-van-zorg-voor-afhankelijkheid-van-alcohol-en-drugs) We use this cost as the ALE, however a limitation is that this cost excludes further costs caused by drugs induced crime for example.

An assumption we make for the ROSI calculation is that the reduction in healthcare cost caused by our risk strategy is linearly related to the amount of drugs intercepted. Another assumption is that the amount of drugs intercepted linearly relates to the number of personnel employed.

In 2015 customs had 4.500 employees. They performed 157.000 physical monitorings on couriers and mail, which were 34,4% of the total monitorings. (https://download.belastingdienst.nl/douane/docs/jaarrapportage_douane_2015_do3761z1ed.pdf). Therefore we assume that 1.500 workers were employed for monitoring couriers and mail.

Average salary of customs employees is between €17.604 and €102.492 per year, depending on former education (https://www.nationaleberoepengids.nl/Medewerker_Douane). We assume that the employees performing physical monitoring are close to minimum wage, so €20.000 per year.

Say we propose an increase of 10% in manpower, which will cost 0,1 * 1.500 * €20.000 = €3.000.000 per year. Assume this results in 10% more drugs intercepted in couriers and mail, which in turn mitigates 0,1% of the ALE because less people need healthcare for addiction. Then:

*ROSI = (1.200.000.000 * 0,001 - 3.000.000) / 3.000.000 = 60%*

According to this ROSI calculation, the increase of customs employment is not a cost-effective solution.

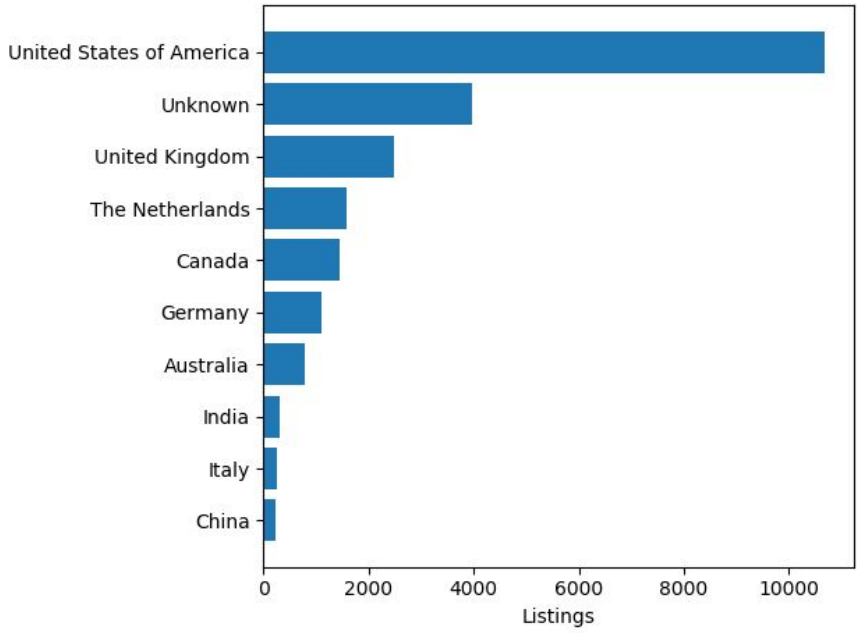
Appendix Metrics

Addition to assignment 1:

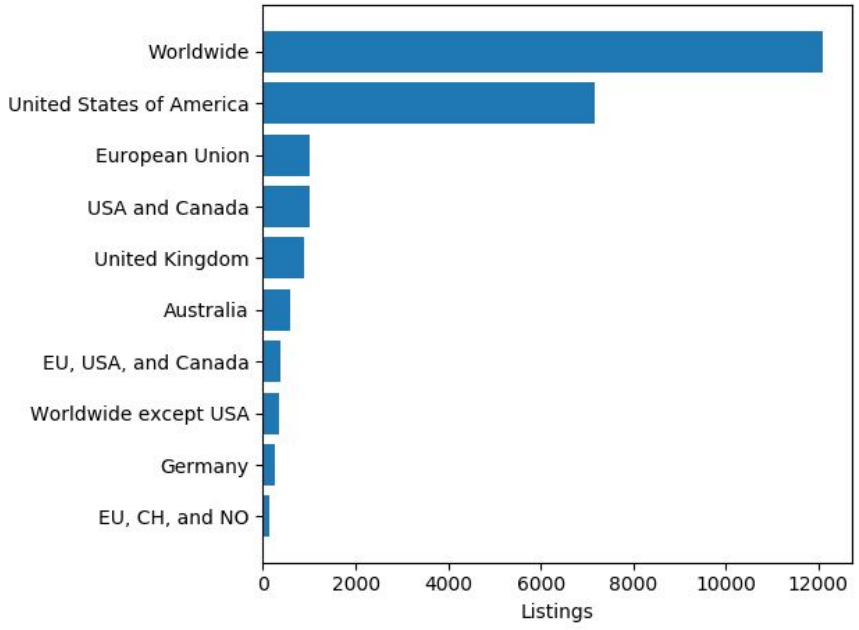
Graphs & metrics

All metrics are over measured over a 6 month period in 2012.

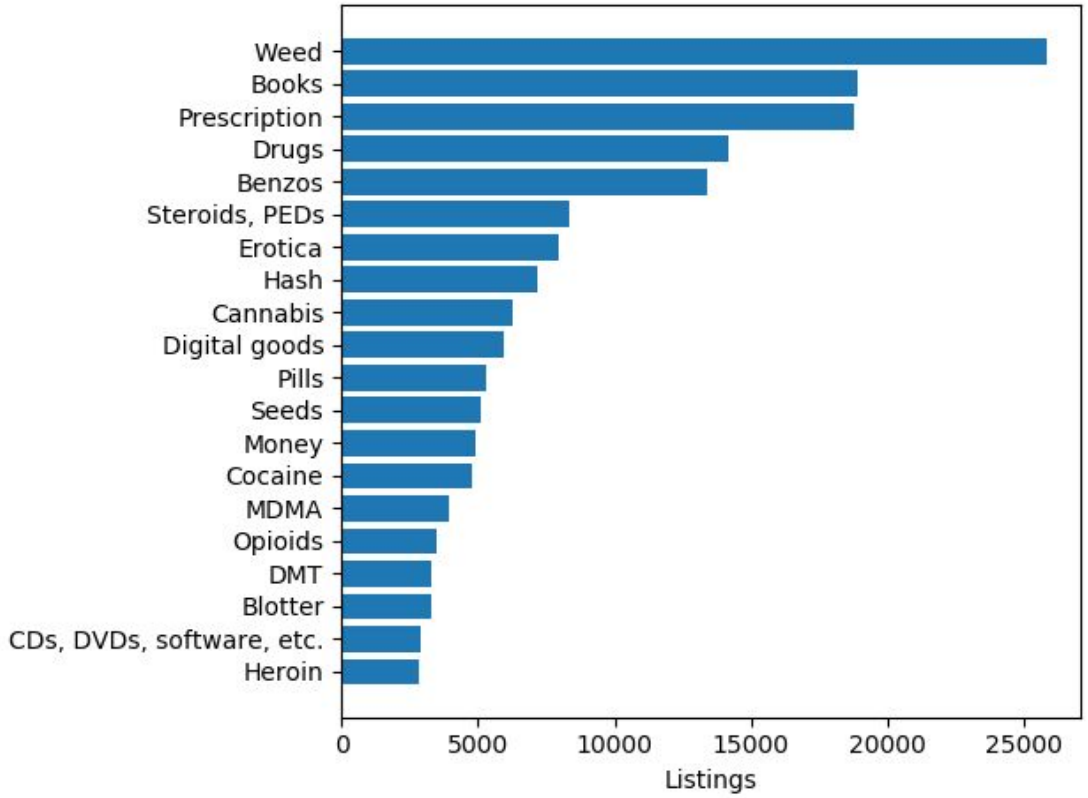
Top 10 Source countries (number of listings)



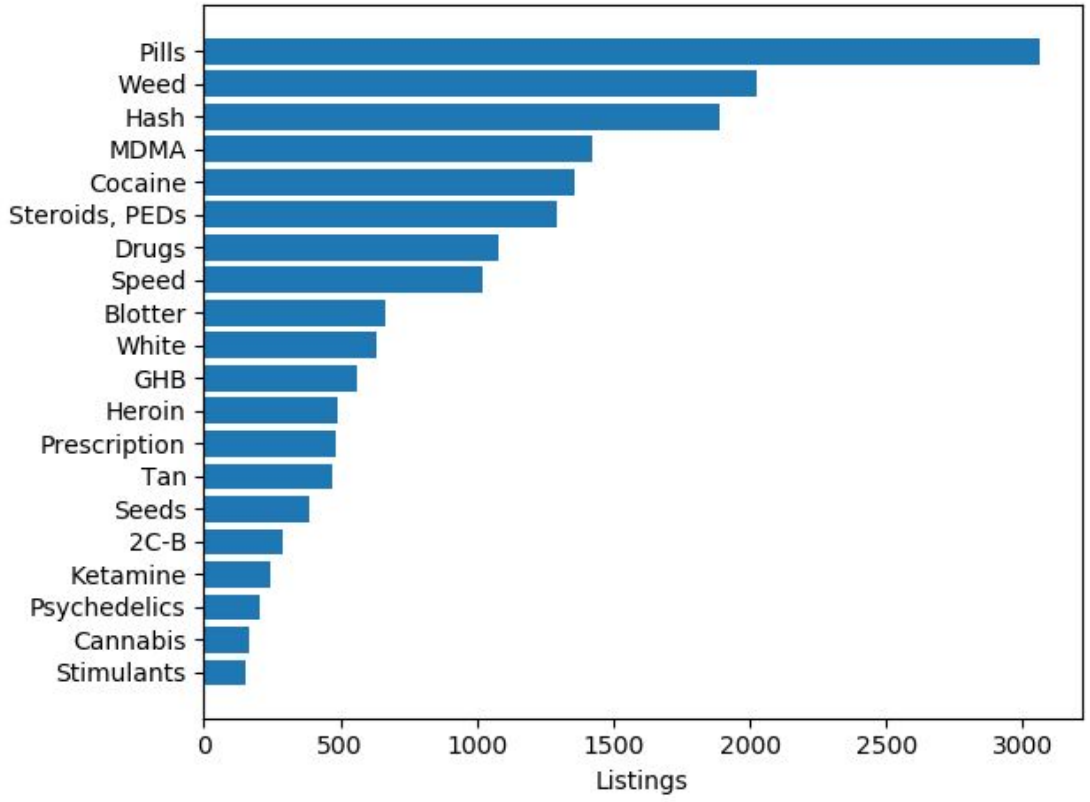
Top 10 Destinations (number of listings)



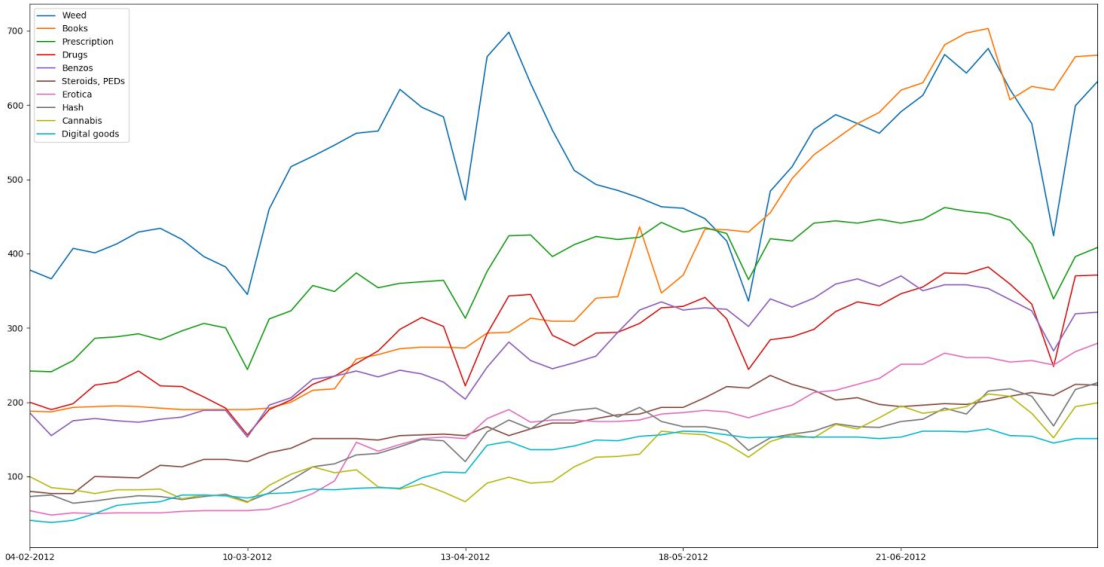
Top 20 Product categories (shipping from: anywhere)



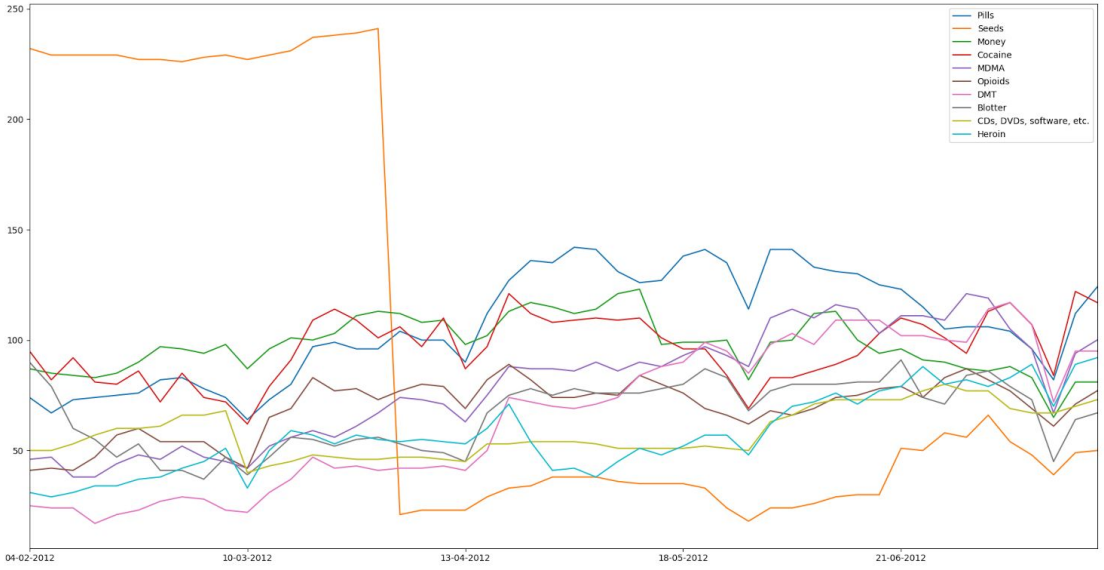
Top 20 Product categories (shipping from: the netherlands)



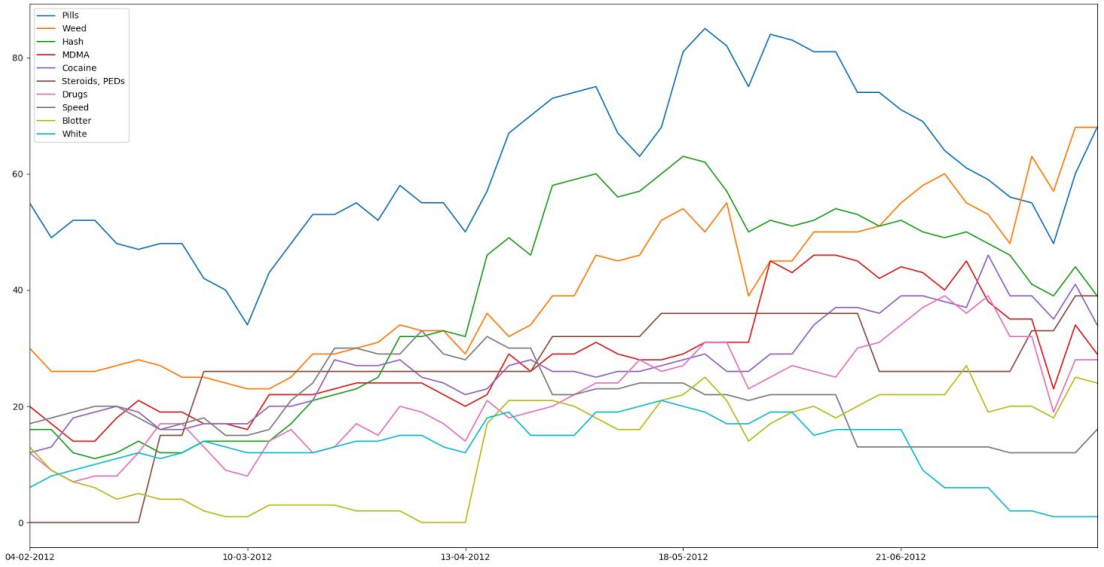
Progression of first half of top 20 categories (shipping from: anywhere)



Progression of second half of top 20 categories (shipping from: anywhere)



Progression of first half of top 20 categories (shipping from: the netherlands)



Progression of second half of top 20 categories (shipping from: the netherlands)