The impact of COVID-19 on cybercrime trends

Prof. Dr. Fernando Miró-Llinares

The impact of COVID-19 on cybercrime trends

0. Introduction

1. What happened during pandemic

- Adaptation
- Shift of opportunities
- How cybercrime changed during pandemic?

2. Something new? A passing trend?

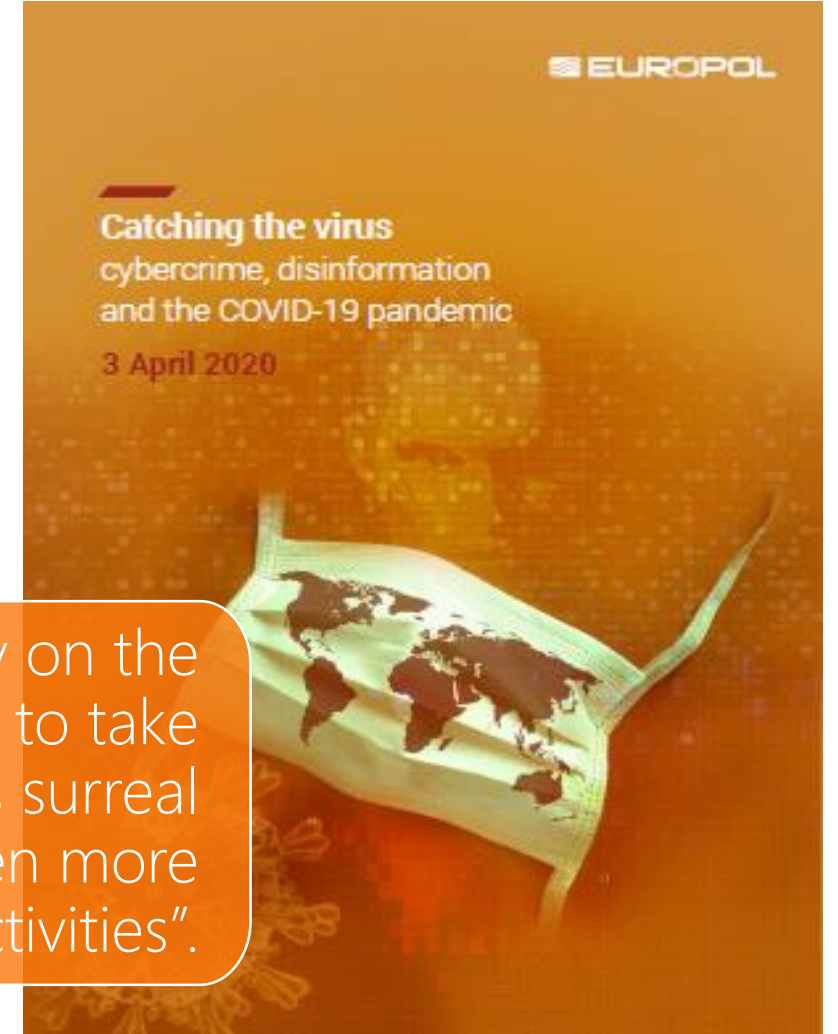# What happened during Pandemic?

First alerts on cybercrime during COVID-19

How cybercrime "should" change during Covid-19

Pandemic profiteering
how criminals exploit the COVID-19 crisis
March 2020

Catching the virus
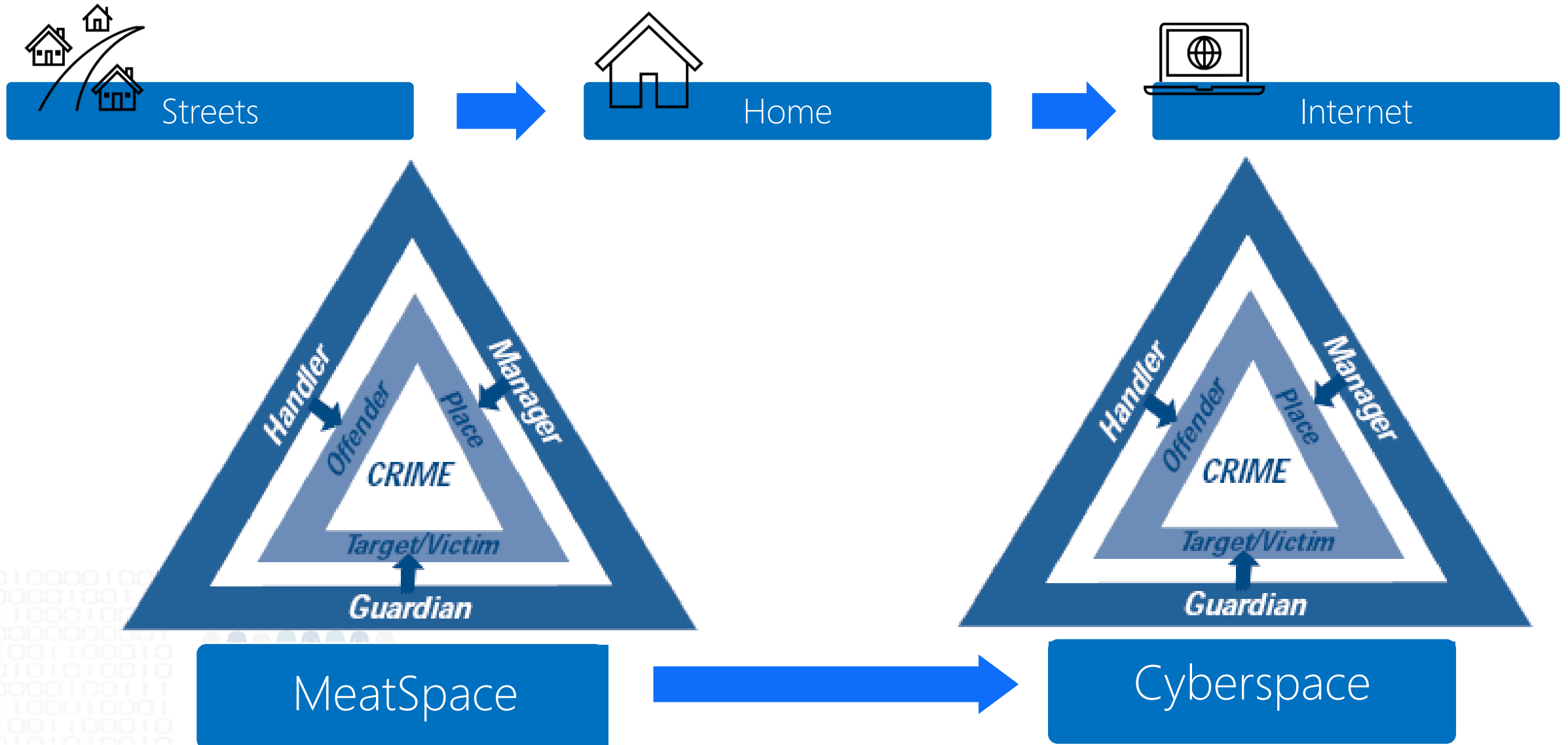cybercrime, disinformation and the COVID-19 pandemic
3 April 2020

"The number of cyber-attacks is significant and expected to increase further".

"Cybercriminals prey on the opportunity to take advantage of this surreal situation and focus even more on cybercriminal activities".

4

But why?

Streets → Home → Internet

MeatSpace → Cyberspace

Crime triangle: Handler, Manager, Offender, Place, Target/Victim, Guardian — CRIME
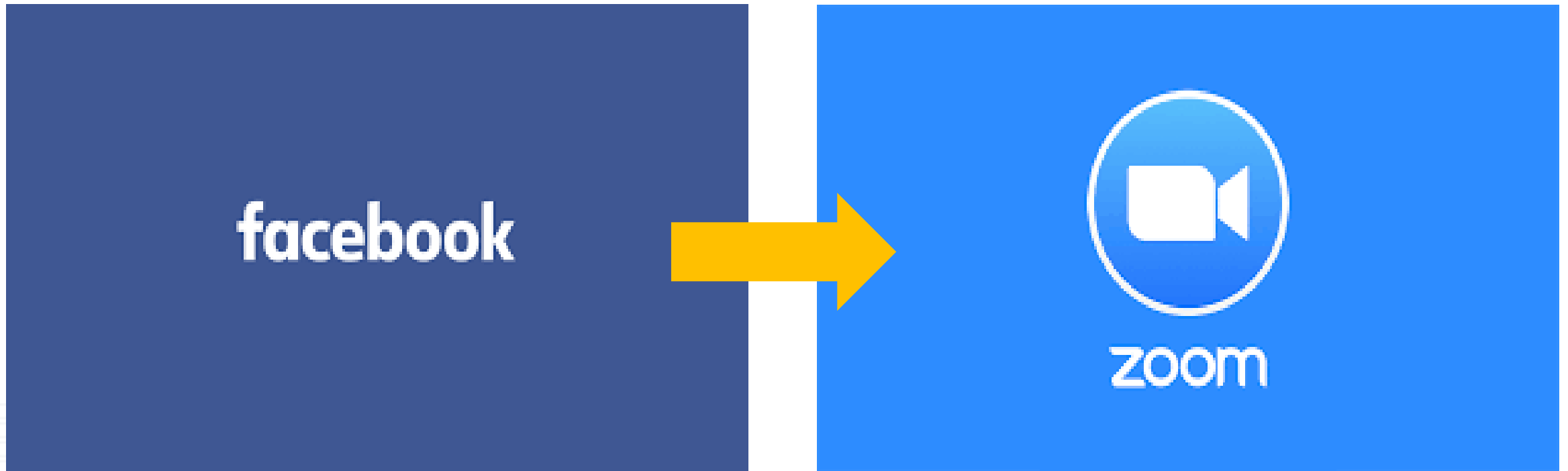
5

From streets to cyberspace?

If offenders and victims spend their time on the Internet, it will be where they converge and where opportunities to offend will arise.
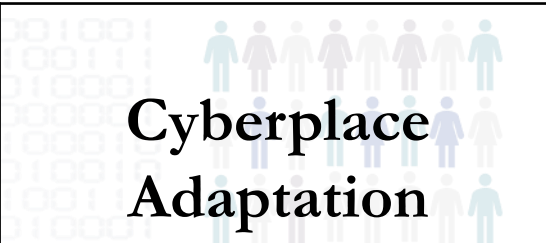
Opportunity and opportunism inside the Internet

Adaptation

Adaptation

How do cybercriminals adapt?

Typological Adaptation	Cybercriminals respond to the blockage of a certain type of criminal activity by committing completely different crimes.
Target Adaptation	Cybercriminals are discarding attacks on well-protected targets and focusing their efforts on more vulnerable ones.
Technical Adaptation	Cybercriminals improve their attacks and use new tools to overcome the new barriers.
Cyberplace Adaptation	Cybercriminals change the place in cyberspace from which they carry out the attack or the name of the website from which they act criminally.

9

Adaptation
How do cybercriminals adapt?

What kind of adaptations can be facilitated by the pandemic?

Target Adaptation	Cybercriminals are discarding attacks on well-protected targets and focusing their efforts on more vulnerable ones.
Cyberplace adaptacion	Cybercriminals change the place in cyberspace from which they carry out the attack or the name of the website from which they act criminally.

Target adaptation

Health system as a new target

Target Adaptation

Shifts of main targets

Percentage change in number of violations by sector affected,
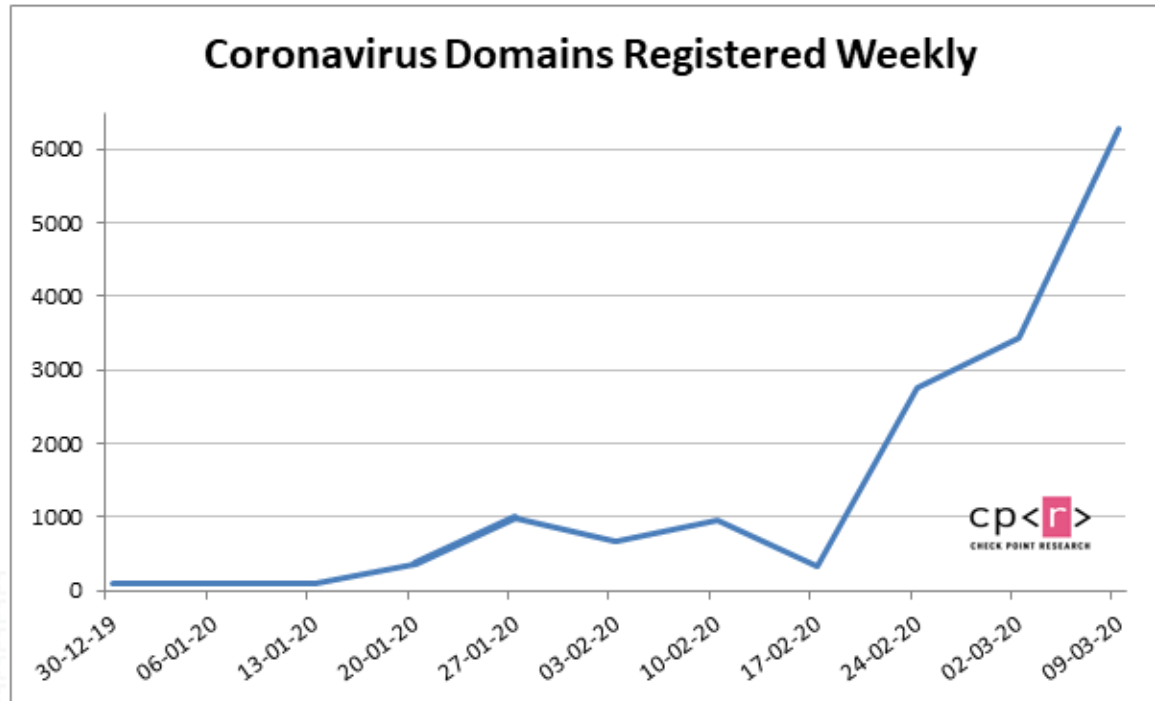2019 Q1 vs. 2020 Q1
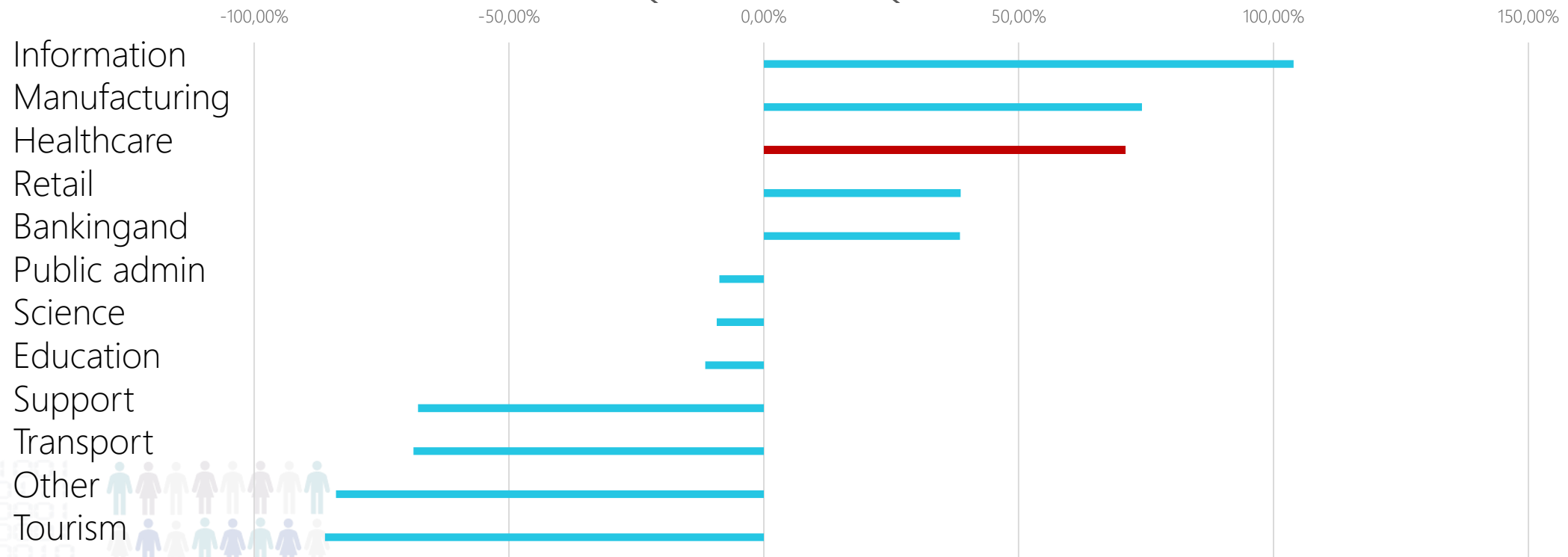
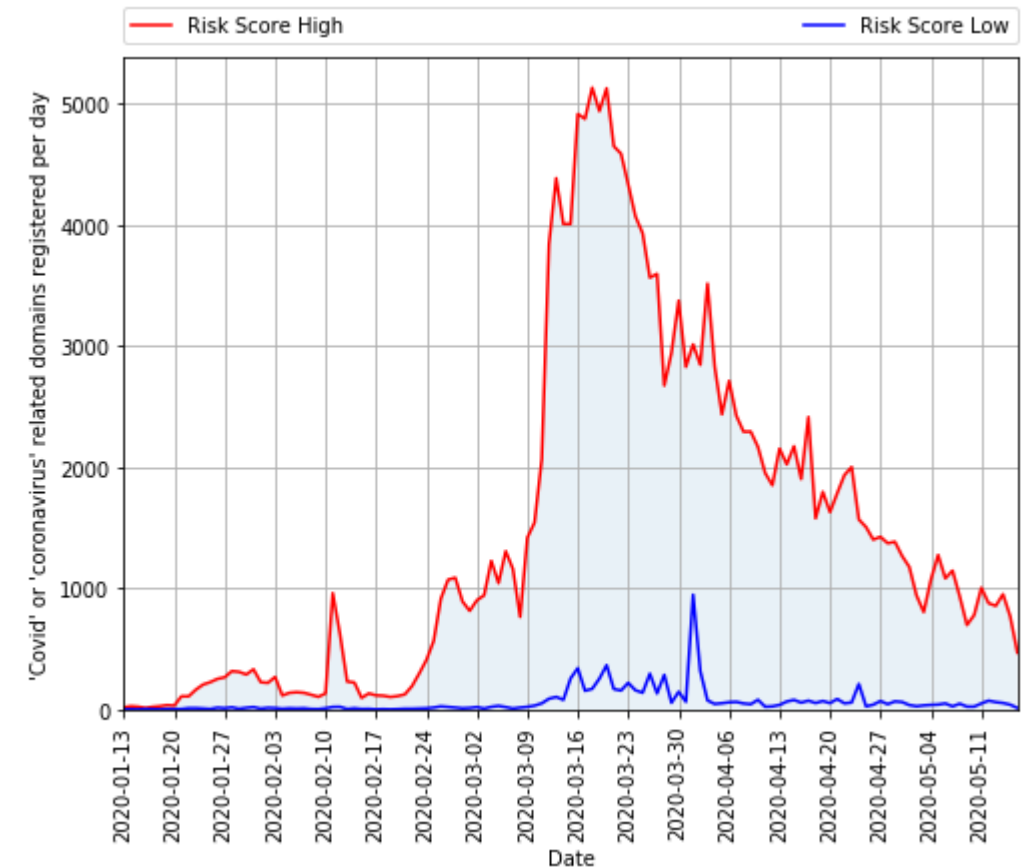Source: Own elaboration from the atlasvpn

12

Cyberplace adaptation

New covid-19 related domains

The growing interest in the virus was reflected in the creation of domains related to Covid-19.

The creation of legitimate domains was accompanied by the creation of malicious domains.

Coronavirus Domains Registered Weekly

Source: Checkpoint

Source: Domaintools

Cyberplace adaptation

Thematic Covid-19 scam, spam and malicious domains

Emails categorised as Spam that have covid or corona in embedded URLs
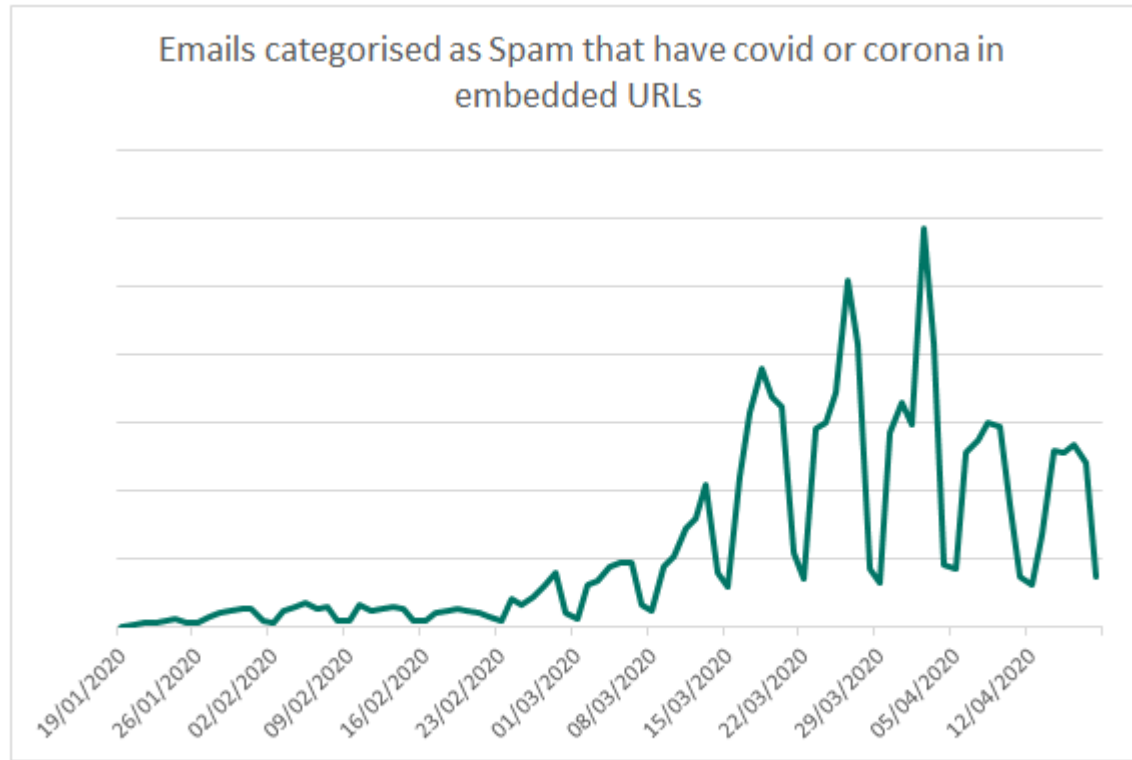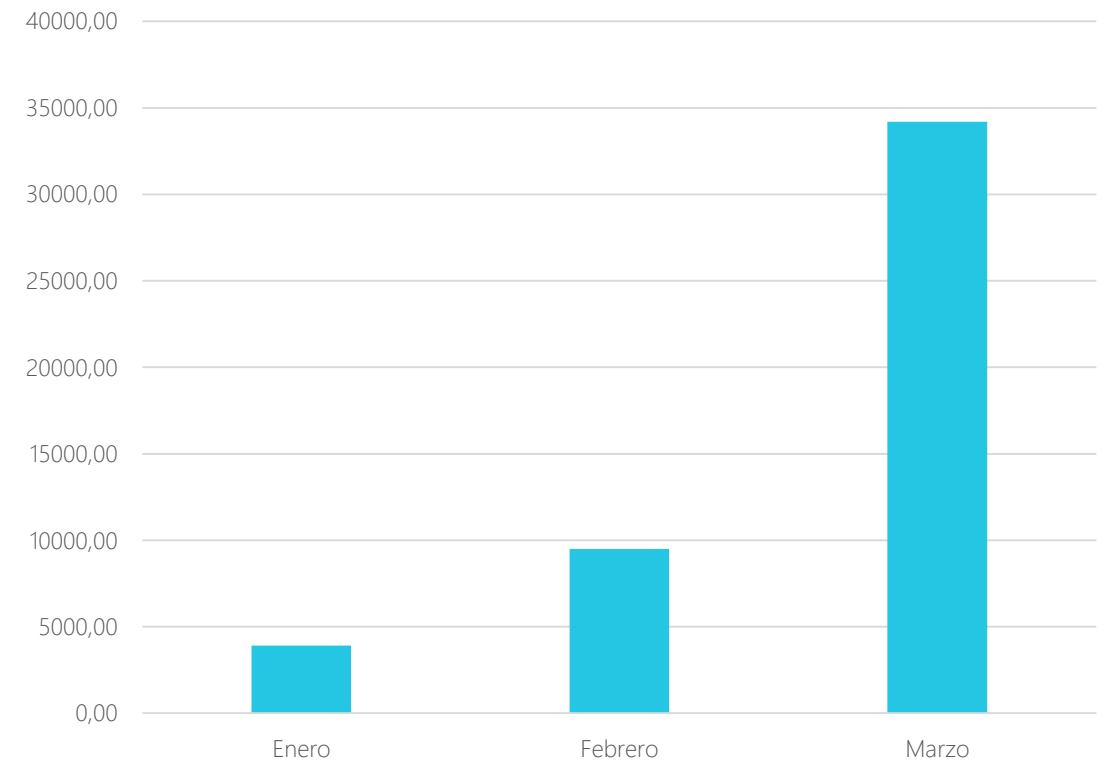
Spam emails that included COVID or Coronavirus-themed embedded URLs

Source: Forcepoint

Acess to malicious domains related wirh "covid-19"
Source: Trendmicro Enero-Marzo 2020
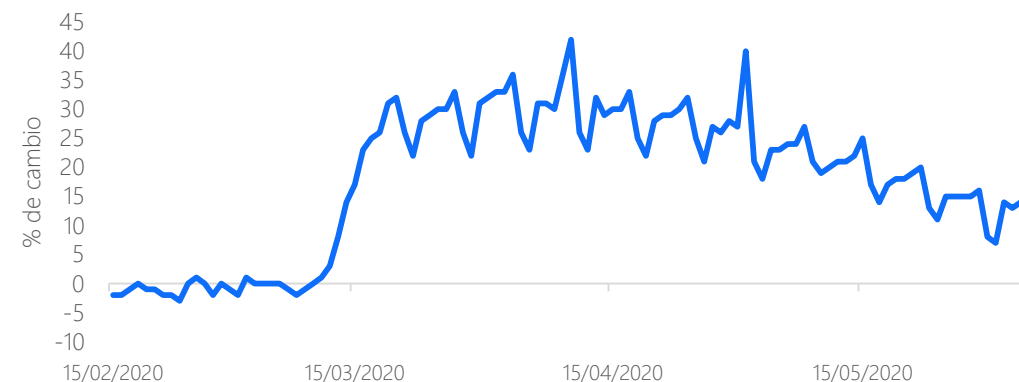
Source: Own elaboration (Data Trendmicro)

Shift of opportunities

Shift of opportunities
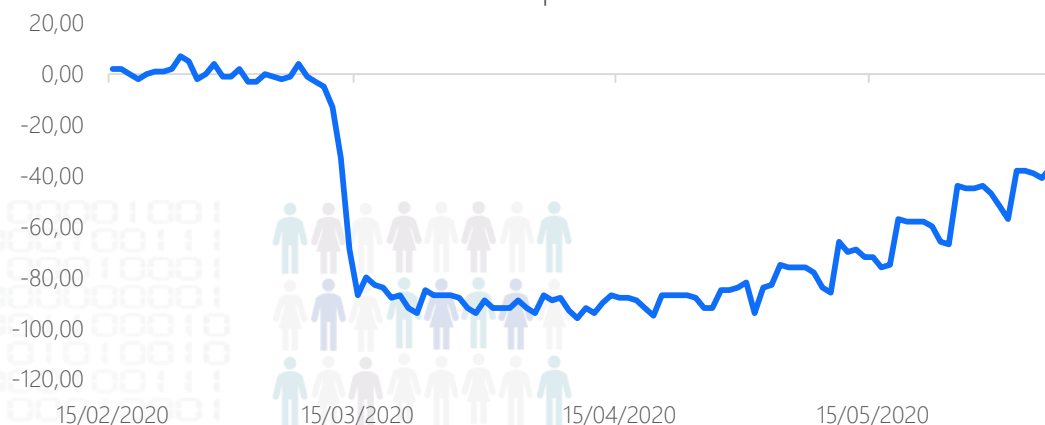## Changes in mobility

Percentage change in mobility in residential areas in Spain from baseline

Source: own elaboration (data from Google Trends)

Percentage of change in mobility in commercial and leisure areas in Spain from baseline

Source: own elaboration (data from Google Trends)

Shift of opportunities

Changes in work, education, entertainment, shopping...

The New York Times

Websites

Facebook.com +27.0%

170M

Feb. 29
First U.S. Covid-19 death

Average daily traffic

120M Jan. 15 — March 24

Netflix.com +16.0%

26M

16M

YouTube.com +15.3%

200M

160M

Apps

Facebook +1.1%

348M

340M

Netflix +0.3%
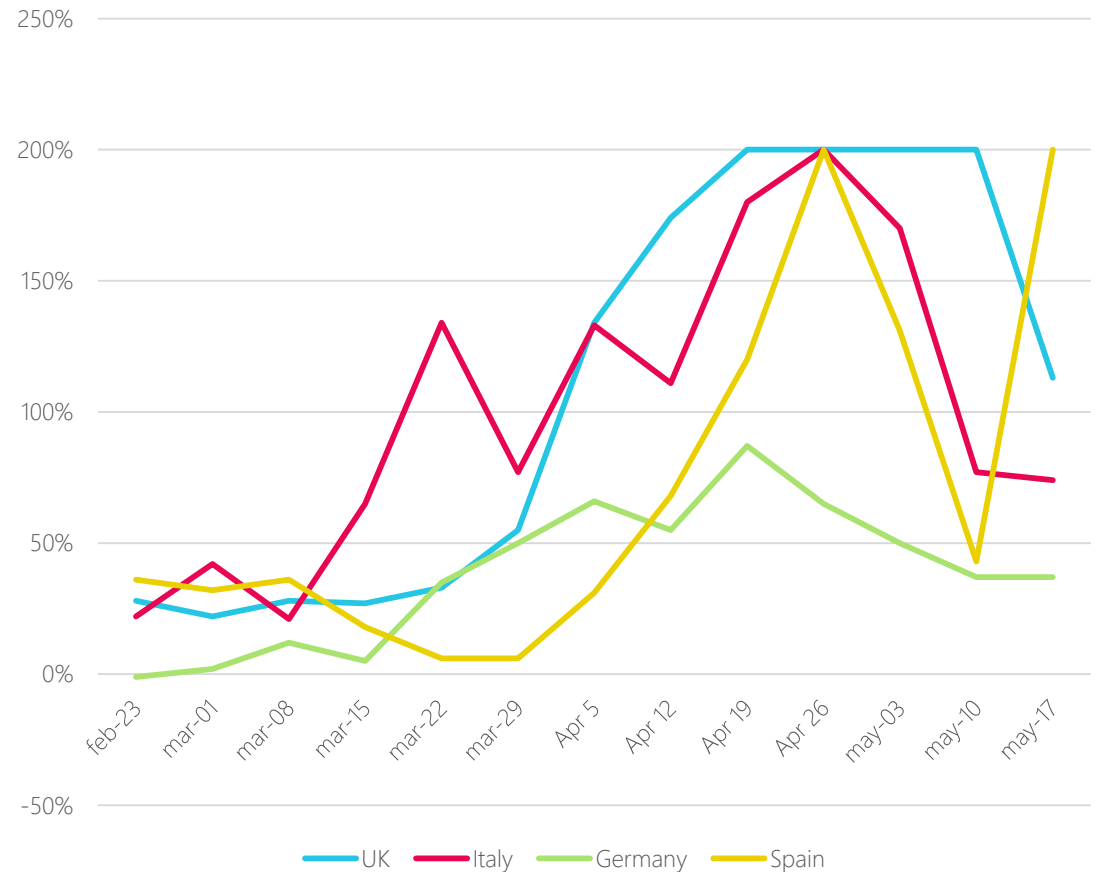
120M

118M

YouTube -4.5%

32M

29M

Source: The New York Times

Shift of opportunities

Changes in work, education, entertainment, shopping...

Growth in weekly online orders in the retail industry.

UK — Italy — Germany — Spain

Source: own elaboration (data from Statista)

The expansion of cyberspace

Today we are witnessing a shift of social relations and everyday activities from physical space to cyberspace.

More and more activities are taking place in cyberspace.

Some activities are starting to take place only in cyberspace.

Opportunities in physical space are reduced

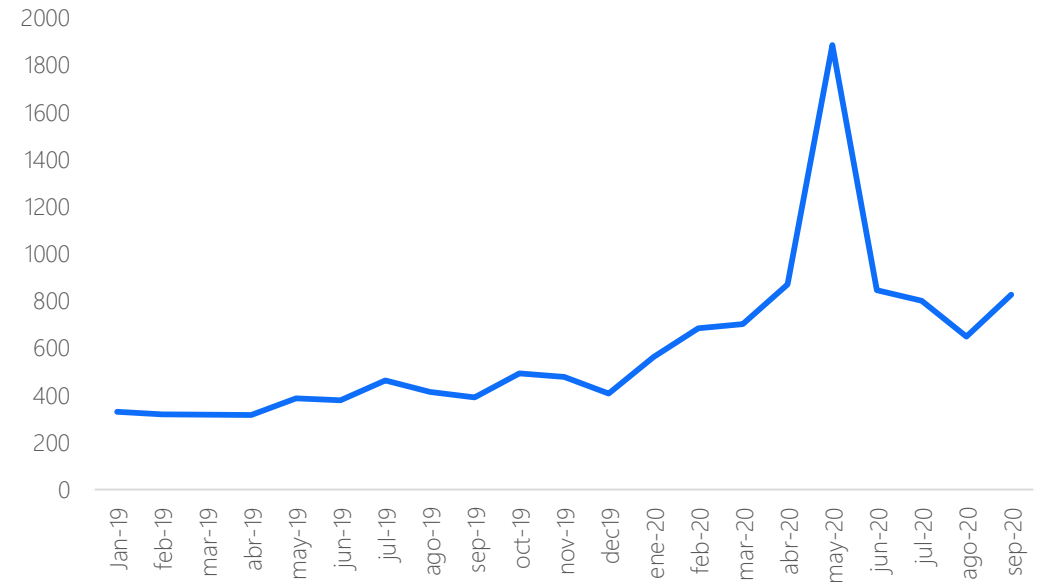Criminal opportunities in cyberspace are expanding

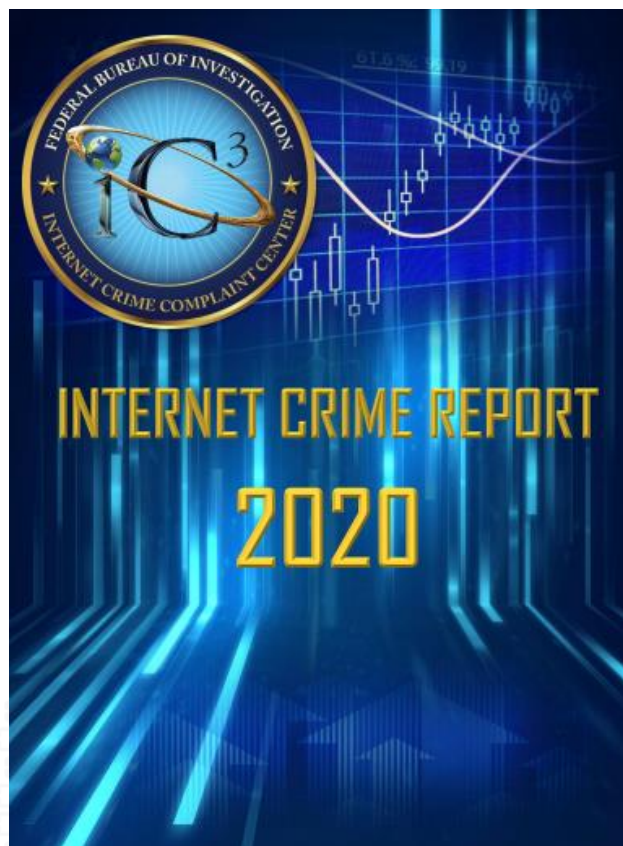# How cybercrime changed during pandemic?

Covid-19 national reports and monthly statistics

Registered cybercrime in the Netherlands

Annual reports

CRIME	2020	2019	2018	2017	2016	2015	RC 15-20	RC 19-20
Confidence Fraud/Romance	23751	19473	18493	15372	14546	12509	90%	22%
Crimes Against Children	3202	1312	1394	1301	1231	1348	138%	144%
Extortion	76741	43101	51146	14938	17146	17804	331%	78%
Harassment/Threats of Violence	20604	15502	18415	16194	16385	14812	39%	33%
Health Care Related	1383	657	337	406	369	465	197%	111%
IPR/Copyright and Counterfeit	4213	3892	2249	2644	2572	1931	118%	8%
Misrepresentation	24276	5975	5959	5437	5436	5458	345%	306%
Non-Payment/Non-Delivery	108869	61832	65116	84079	81029	67375	62%	76%

Academic papers

Violent and property crime

- PAYNE, J; MORGAN, A. (2020).
- PAYNE, J.; MORGAN, A.; PIQUERO, A. R. (2020
- ASHBY, M. PJ. (2020)
- HODGKINSON, T.; ANDRESEN, M. A. (2020)
- MOHLER, G., et al. (2020)
- HALFORD, E., et al. (2020)
- PIQUERO, A. R., et al. (2020).
- FELSON, M; JIANG, S; XU, Y. (2020)

Cybercrime

- HAWDON, J.; PARTI, K.; DEARDEN, T. E. (2020). Cybercrime in America amid COVID-19: the Initial Results from a Natural Experiment.
- BUIL-GIL, D, et al. Cybercrime and shifts in opportunities during COVID-19: a preliminary analysis in the UK
- KEMP, S, et al. Empty streets, busy Internet. A time series analysis of cybercrime and fraud trends during COVID-19. 202

Has cybercrime increased during COVID-19?

Cybercrime and shifts in opportunities during COVID-19: a preliminary analysis in the UK

David Buil-Gil ✉ iD, Fernando Miró-Llinares iD, Asier Moneva iD, Steven Kemp iD &
Nacho Díaz-Castaño iD

	Count in May 2019	Count in May 2020	Relative change (%)
Computer virus/malware/spyware	742	648	−12.67*
Denial of Service attack	14	18	28.57
Hacking – Server	24	25	4.17
Hacking – Personal	270	479	77.41***
Hacking – Social media and email	939	1,449	54.31***
Hacking – PBX/Dial Through	9	7	−22.22
Hacking combined with extortion	313	251	−19.81*
Online fraud – online shopping and auctions	5,619	8,482	50.95***
All cybercrimes	7,930	11,359	43.24***

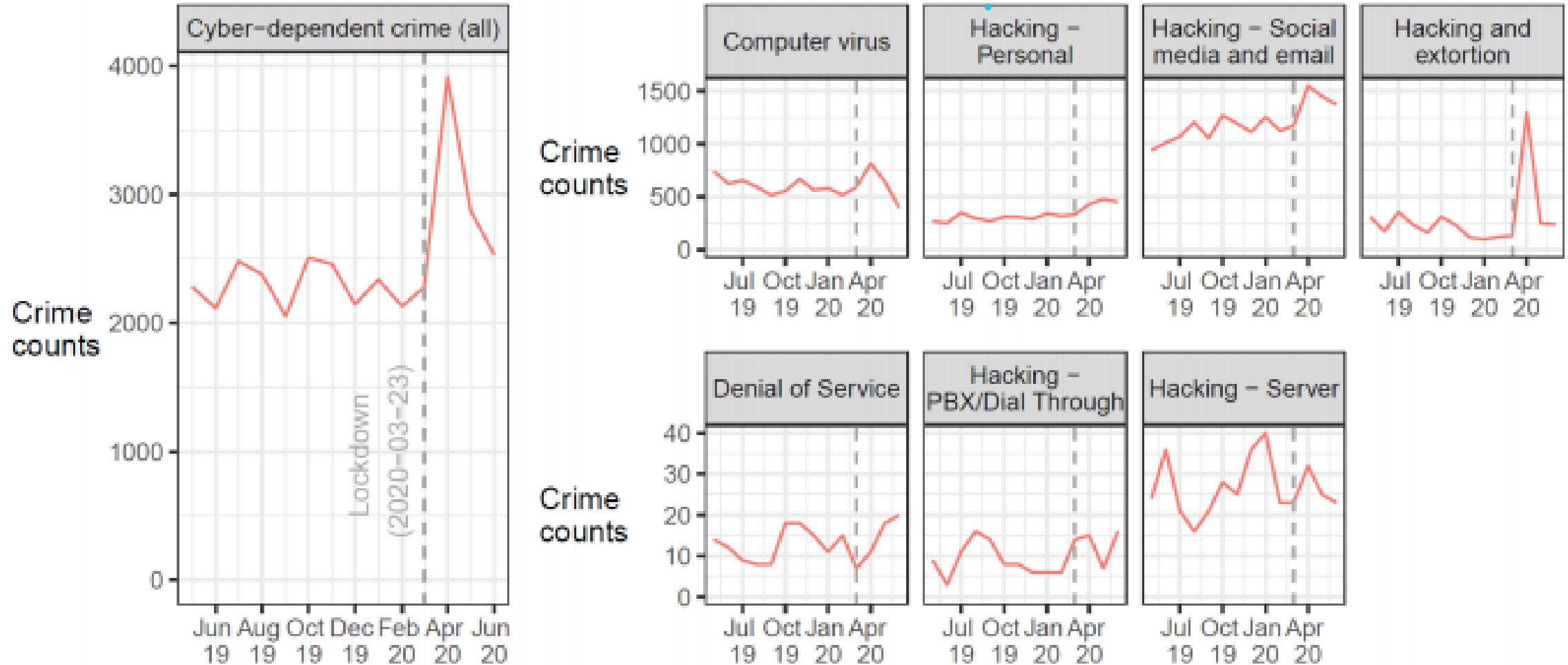***p-value < 0.001, **p-value < 0.01, *p-value < 0.05.
Source: own elaboration (data from Action Fraud UK).

Source: Buil-Gil et al, 2020

24

How has cybercrime changed during Covid-19?
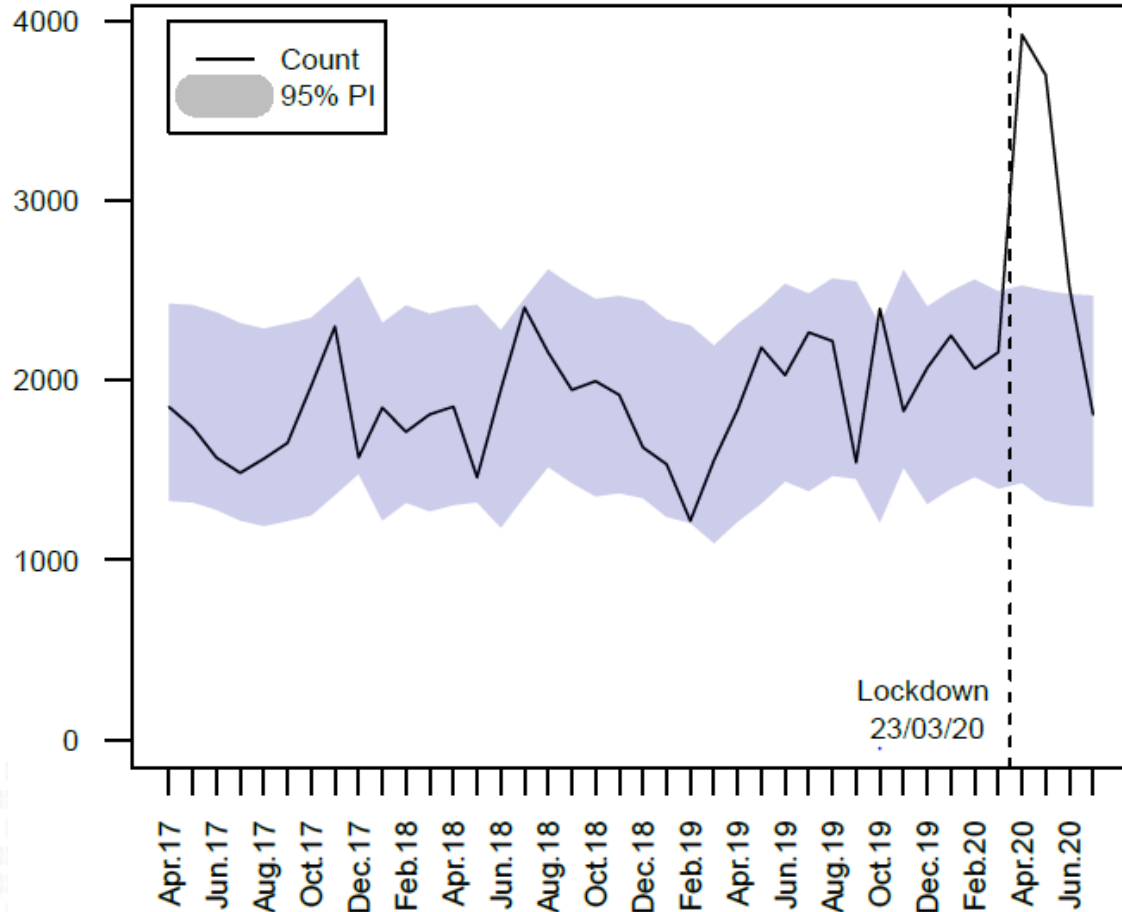

Fig.1
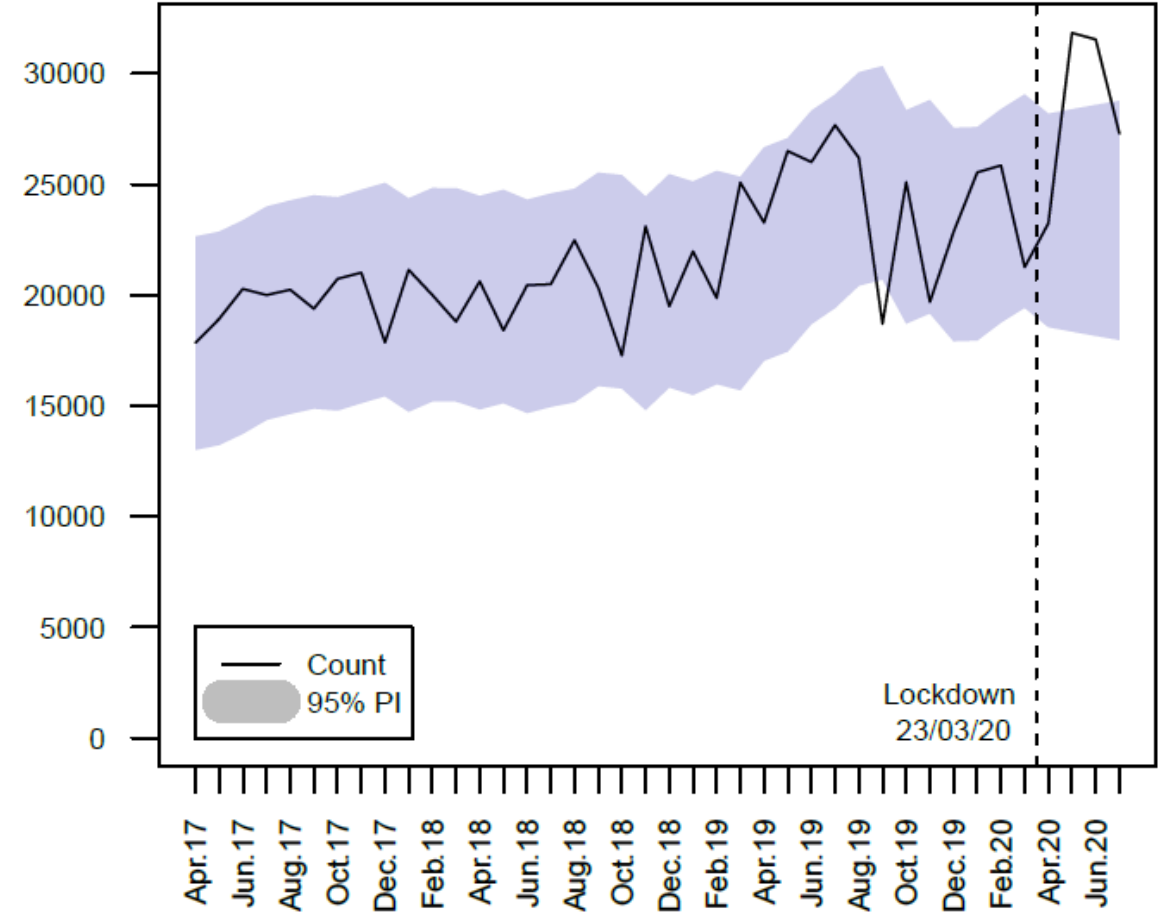
Trends in cyber-dependent crimes by crime type

How has cybercrime changed during Covid-19?

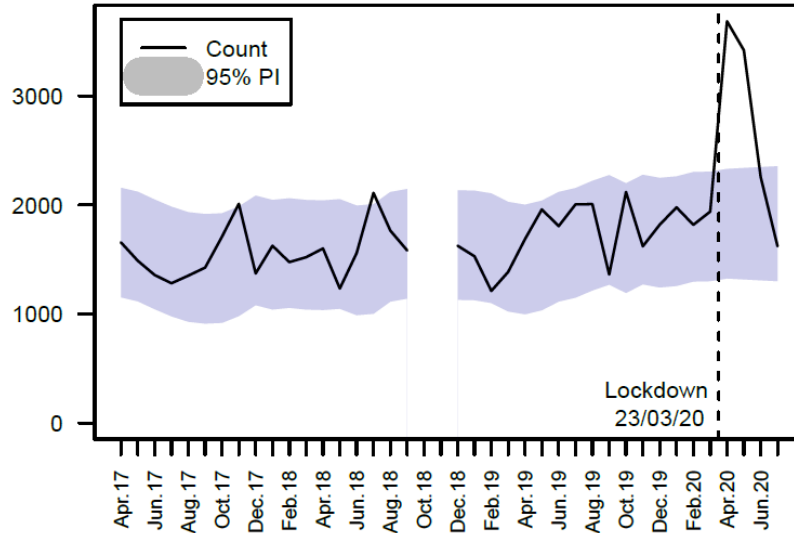**2a – Recorded Cybercrime and 95% Prediction Intervals**

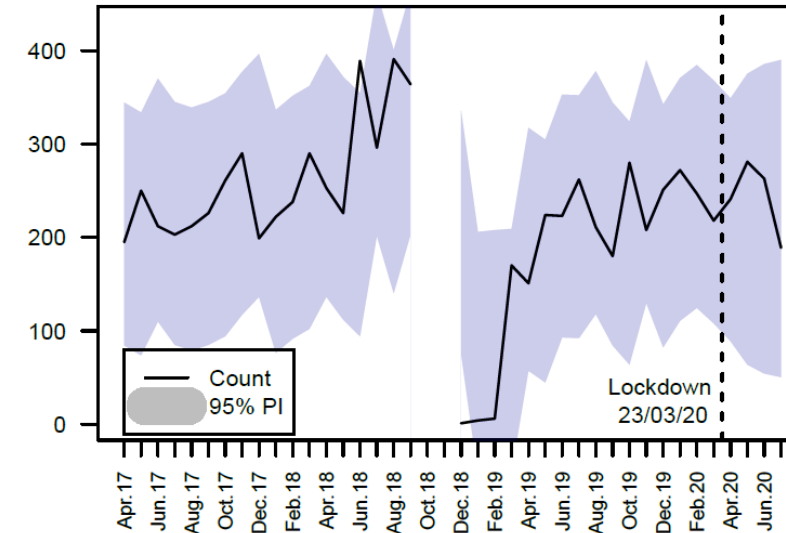**2b – Recorded Fraud and 95% Prediction Intervals**

Source: Kemp, S et al, 2021
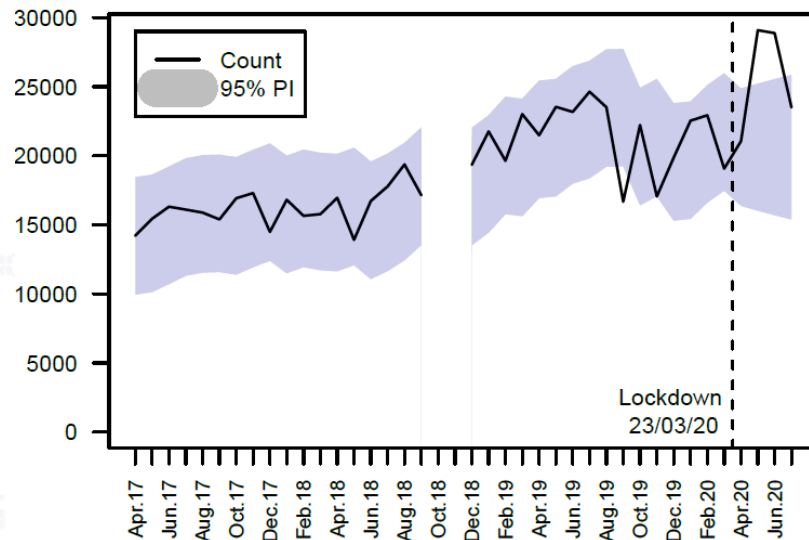
How has cybercrime changed during covid-19?

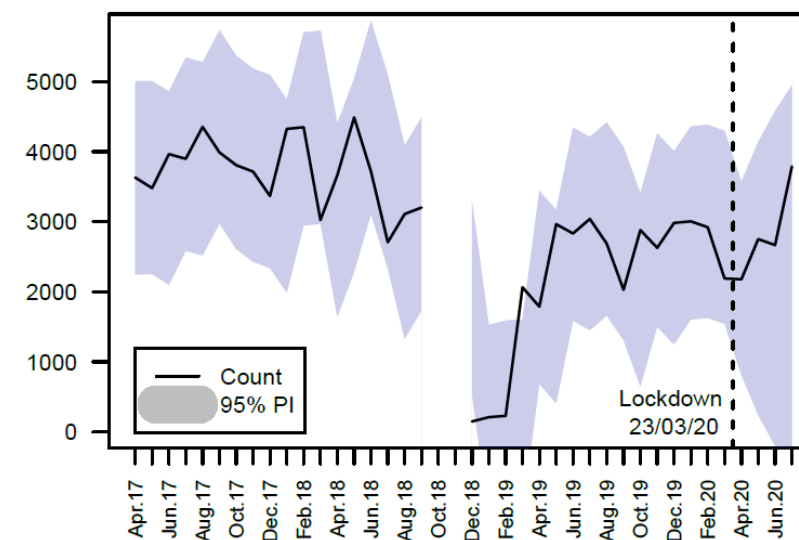**5a − Cybercrime (Individual Victims)**

5b − Cybercrime (Organisation Victims)

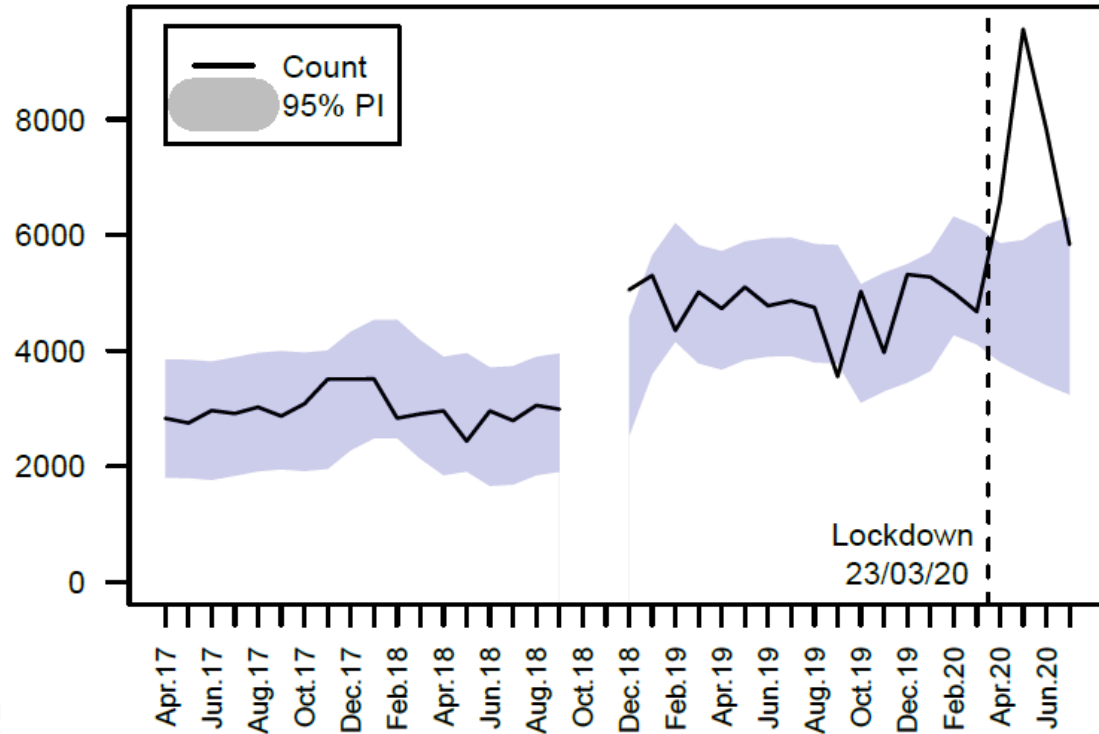**5c − Fraud (Individual Victims)**

5d − Fraud (Organisation Victims)
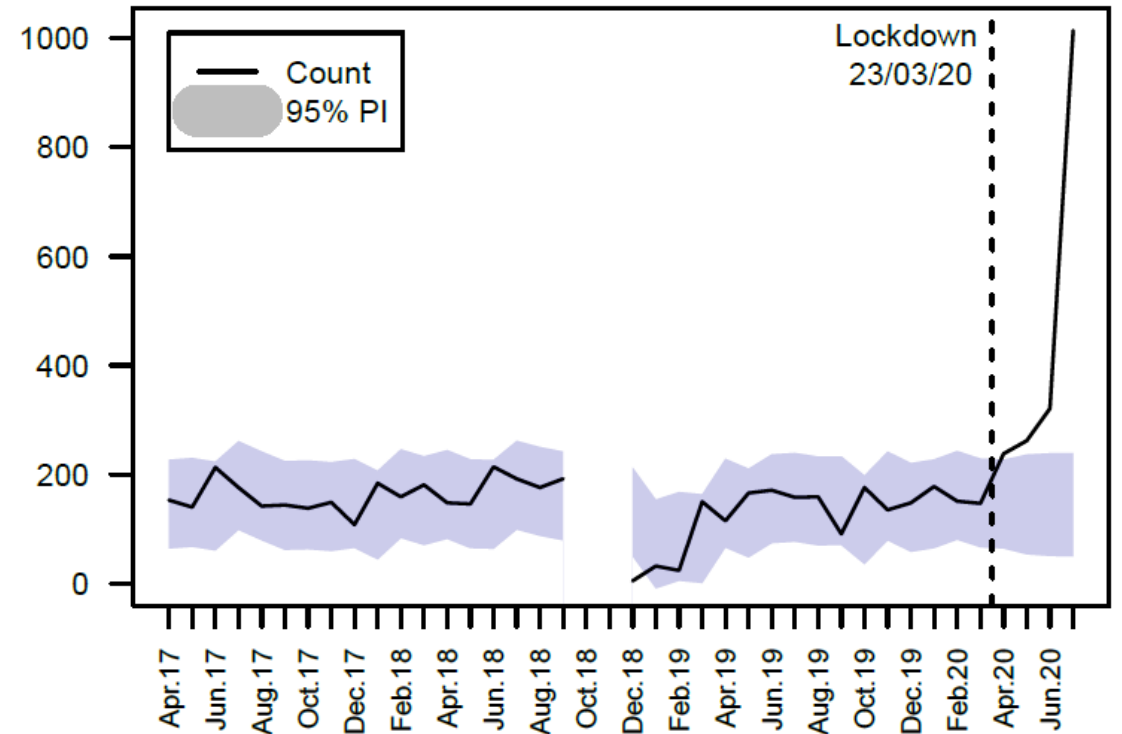
Source: Kemp, S et al, 2021

How has cybercrime changed during covid-19?

5e – Online shopping Fraud (Individual Victims)
— Count
95% PI
Lockdown
23/03/20

5f – Online shopping Fraud (Organisation Victims)
— Count
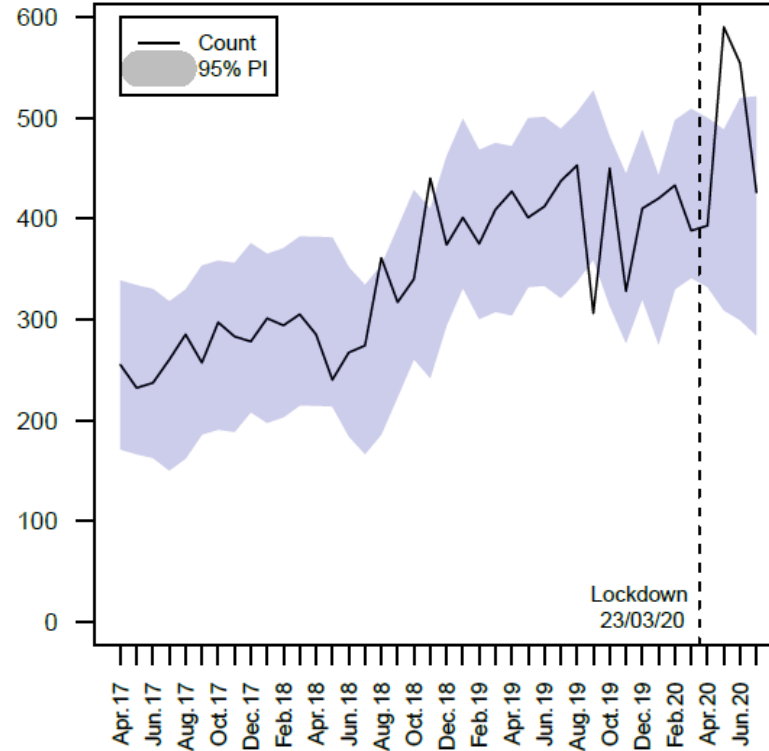95% PI
Lockdown
23/03/20

Source: Kemp, S et al, 2021

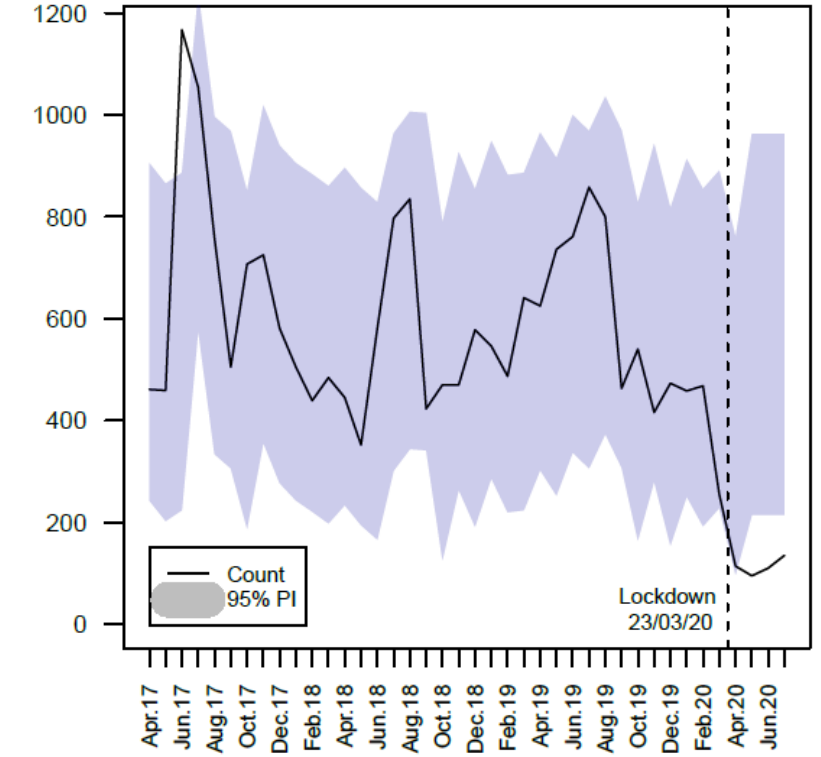# How has cybercrime changed during Covid-19?

3a – Online Shopping Fraud, 95% PI
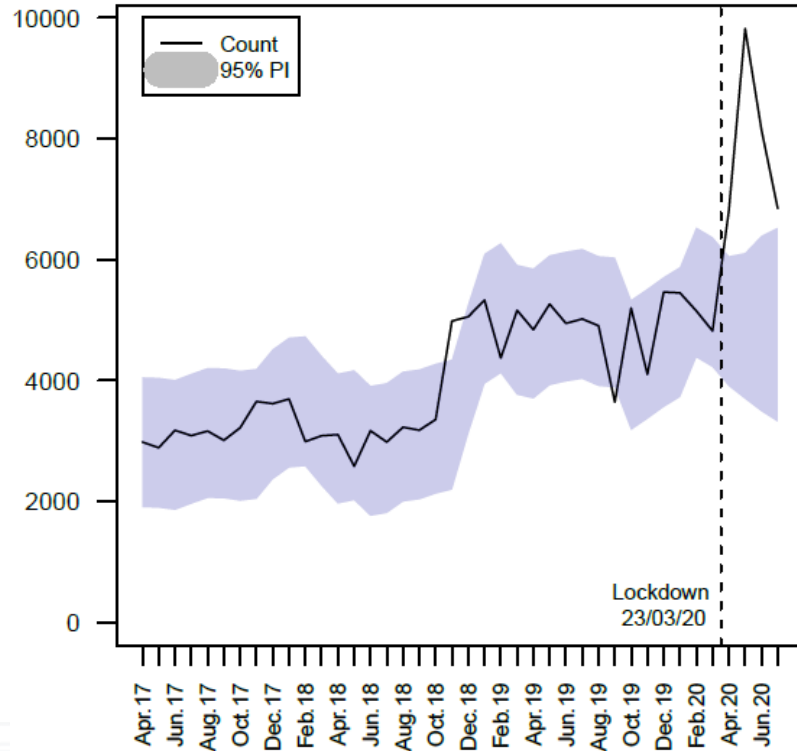
3b – Dating Fraud, 95% PI

3c – Ticket Fraud, 95% PI

Source: Kemp, S et al, 2021

Is this trend totally new? Is it a passing trend?

An increasingly digital world

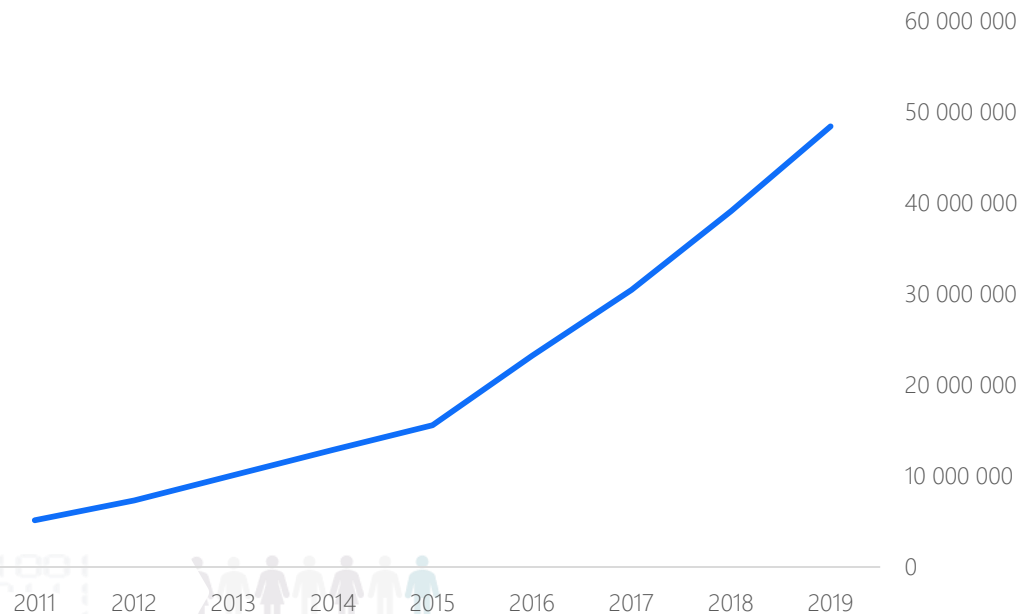The shift from physical to digital is not new.

An increasingly digital world

The shift from physical to digital is not new.

Growing spending in video streaming platforms

Netflix revenue per 1.000.000 hinhabitants

Self-elaboration. Source. businessofapps.com

Reduced spending in cinemas.

cinema revenue per 1.000.000 inhabitants
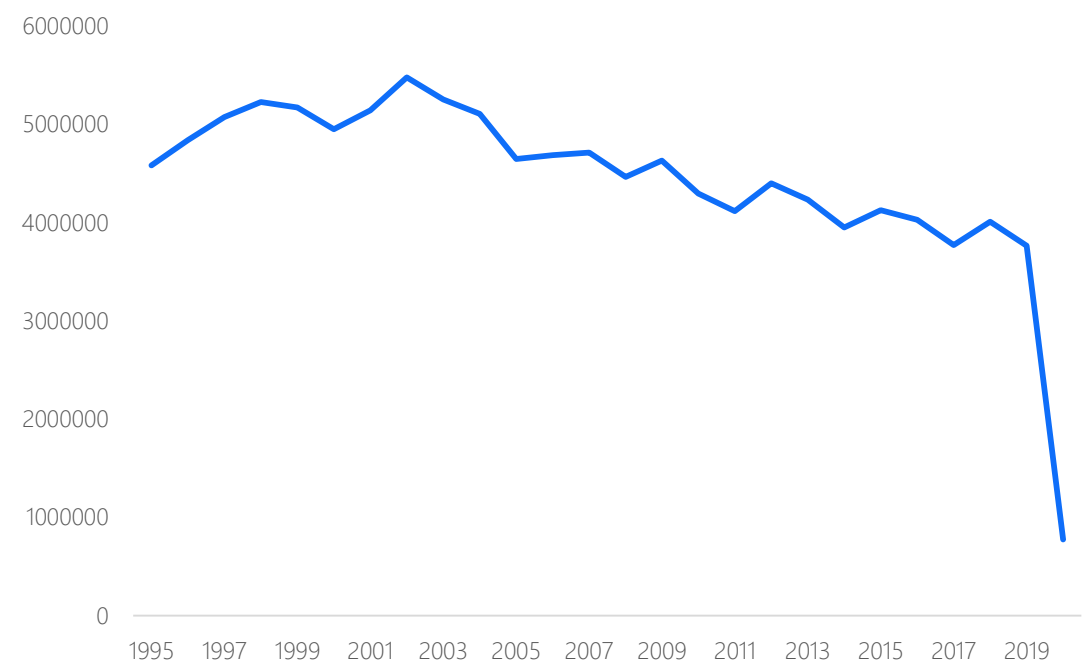
Self-elaboration. Source.the-numbers.com

Crime drop and technology

The crime drop is not new either.

CRIMINA
crimina.es

Vandalismo — Robo en vivienda — Abuso de drogas — Homicidio — Violación

Tasa de arrestos

Nintendo 64, Game Boy Colour, PlayStation 2, Facebook, YouTube, Wii, Instagram, Snapchat, Xbox One

1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016

Miró, Moneva & Medina, 2018
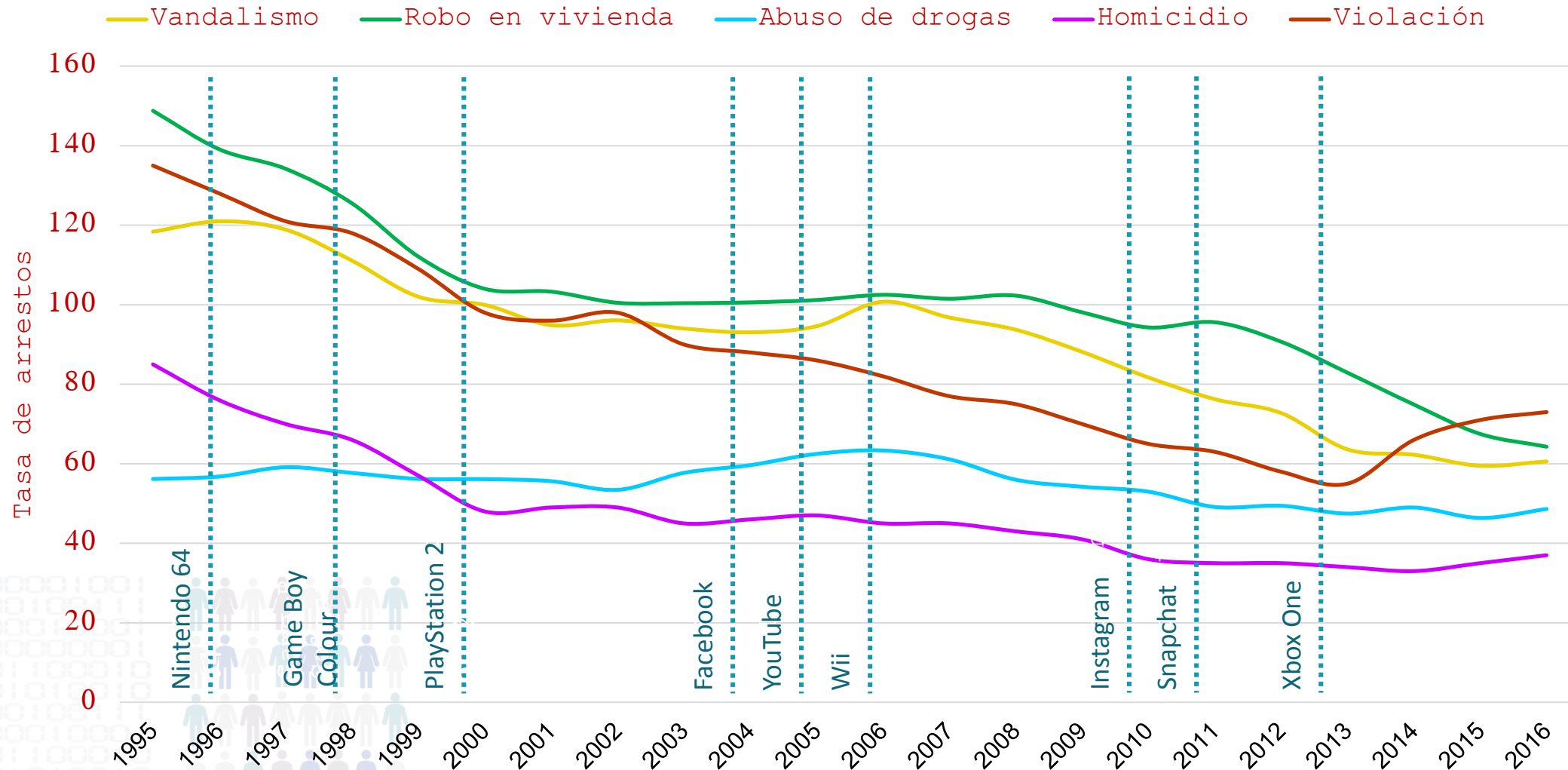
Crime drop and technology

The crime drop is not new either.

Short Contribution | Open Access | Published: 21 October 2019

What about cyberspace (and cybercrime alongside it)? A reply to Farrell and Birks "Did cybercrime cause the crime drop?"
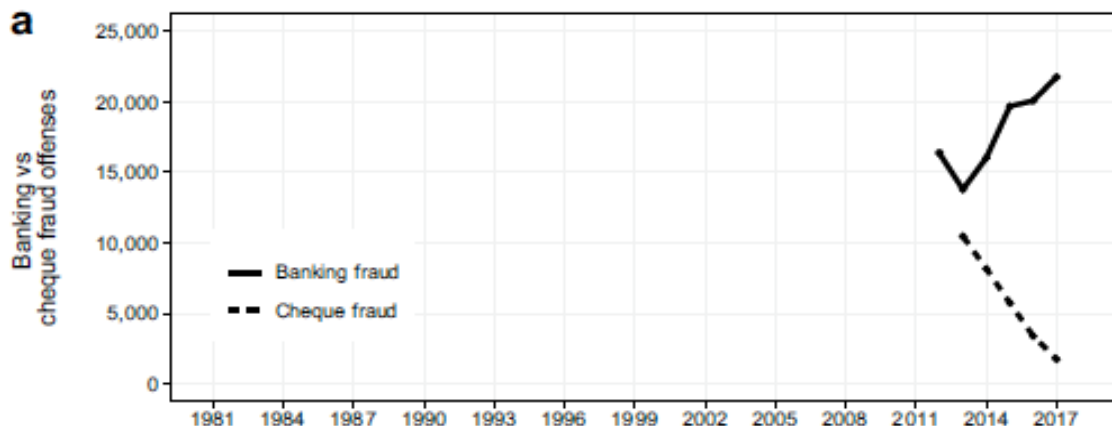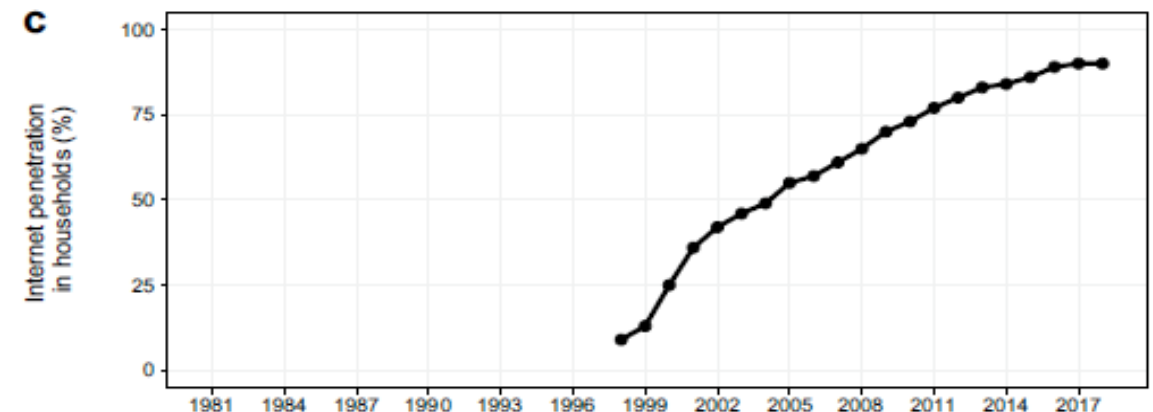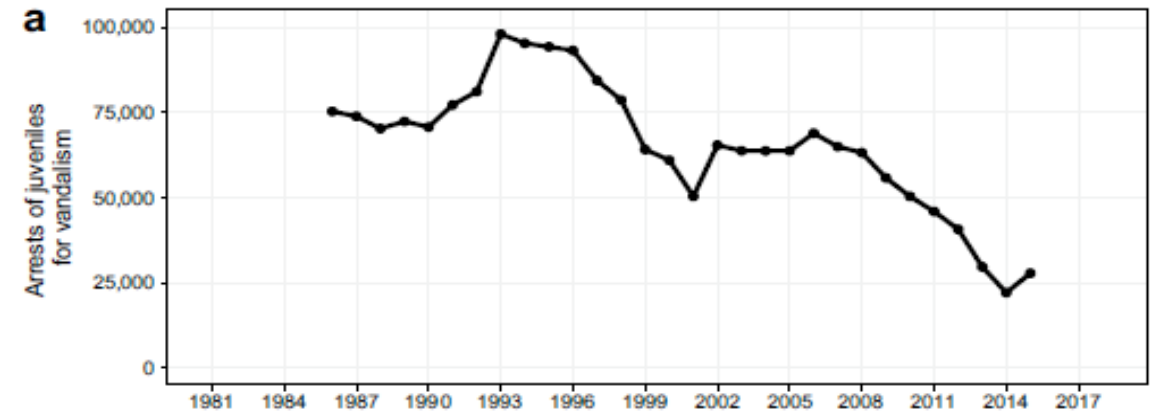
Fernando Miró-Llinares & Asier Moneva ✉

Crime Science **8**, Article number: 12 (2019) | Cite this article

20 years of digitalization and its impact on crime sentences about dual crimes in Spain

Trends in different crimes that can occur in the physical and online space based on the sentences available in the **Aranzadi** database analyzing the presence and evolution of the cyber component in them.

The cyber component has been conceptualized as the presence of any of the following keywords:

Internet - smartphone - computer - cyberspace - online - email - WhatsApp - Facebook - .Instagram - Twitter - Google - digital - YouTube - web - forum - electronic - link – chat
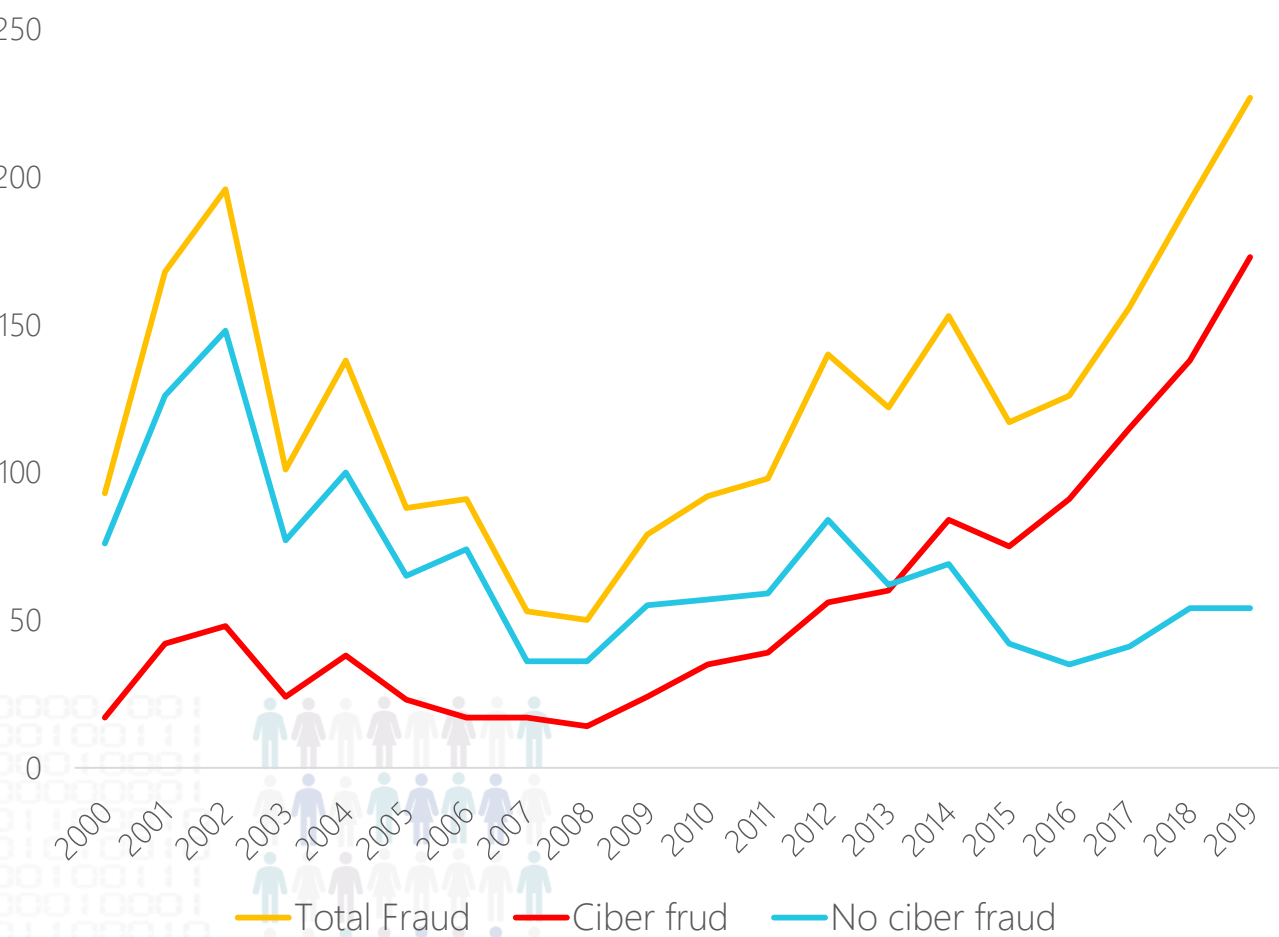
We are currently conducting a manual analysis of the sentences to confirm the cyber component.

Defamation	343
Duress	1155
Sex abuse	1825
Privacy	535
Copyright	2570
Fraud	2576
Total	9004

Research on sentencing trends for dual crimes

Fraud

Count of fraud sentences

Legend: Total Fraud — Ciber frud — No ciber fraud

% of cyber and non cyber fraud sentences

Legend: Ciber fraud ■ No ciber fraud ■
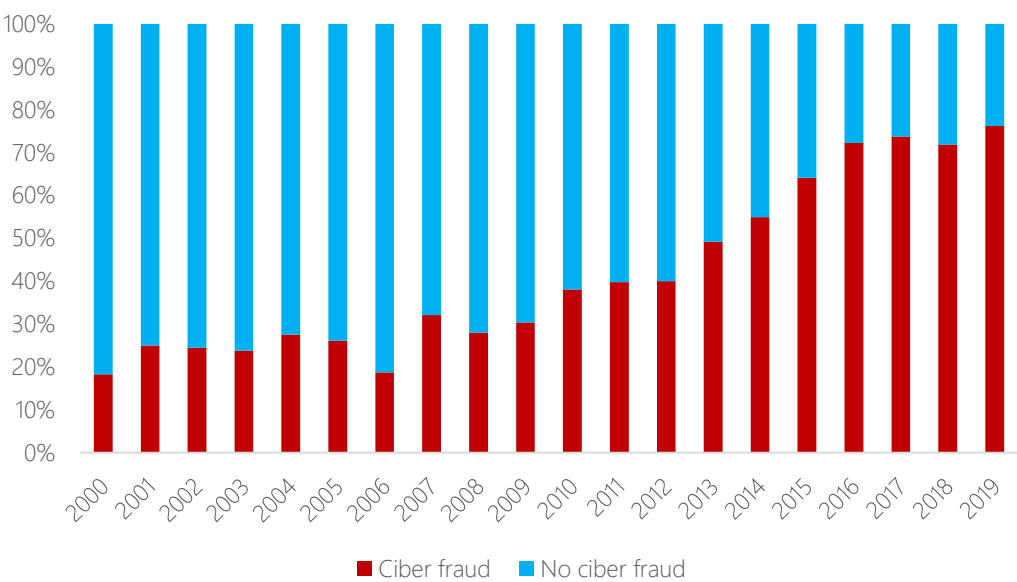
	2000	2019	Relative change
Total	93	227	144%
Ciber	17	173	918%
No ciber	76	54	-29%

	Mean 00s	Mean 10s	Relative change
Total	105,7	142,3	35%
Ciber	26,4	86,6	228%
No ciber	79,3	55,7	-30%

Self-elaboration. Source: Aranzadi

36

Research on sentencing trends for dual crimes

Coertion (threats of violence)

Count of duress sentences

Legend: Total Threats — Ciber Threats — No ciber Threats

% of cyber and non cyber threat sentences

Legend: ■ Ciber threats ■ No ciber threats
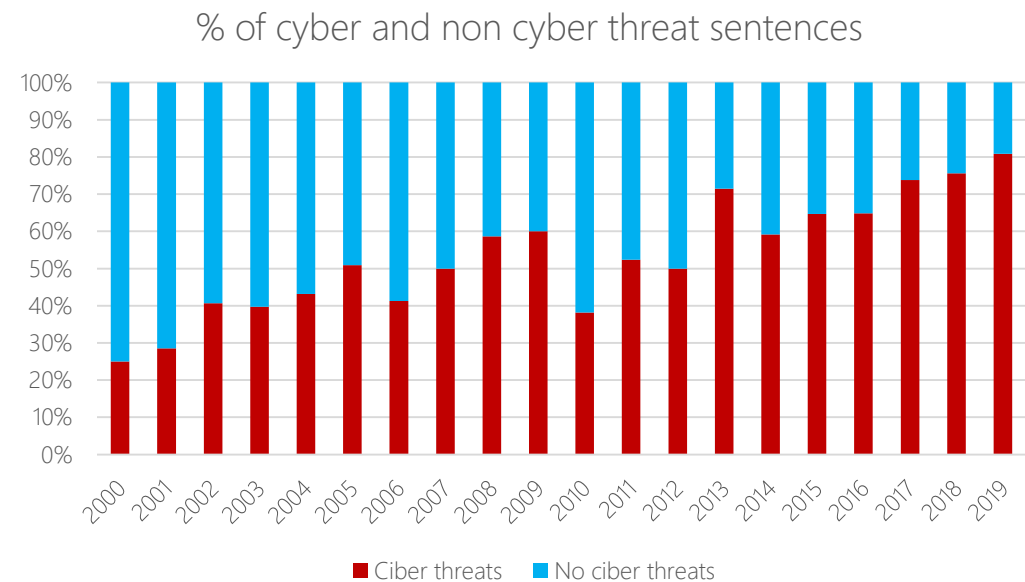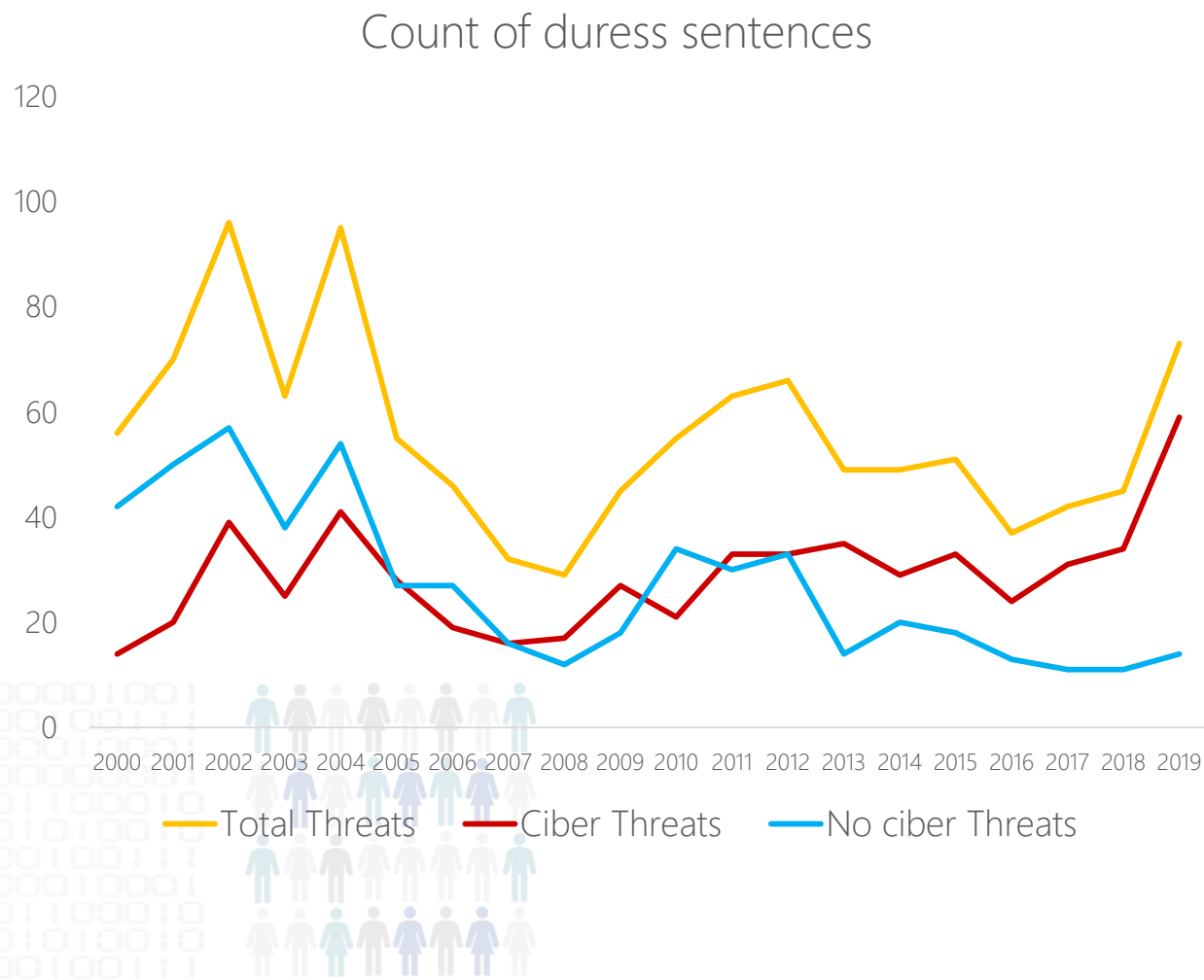
	2000	2019	Relative change
Total	56	73	30%
Ciber	14	59	321%
No ciber	42	14	-67%

	Mean 00s	Mean 10s	Relative change
Total	58,7	53	-10%
Ciber	24,6	33,2	35%
No ciber	34,1	19,8	-42%

Self-elaboration. Source: Aranzadi

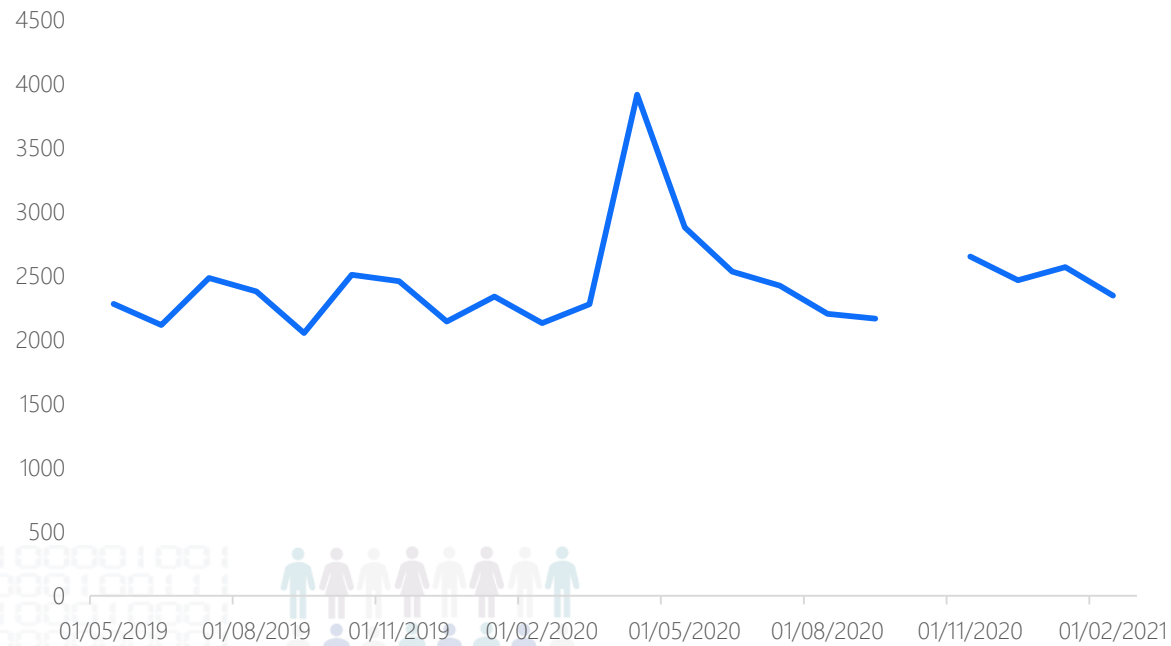# COvid19 as an accelerator of digitization and its consequences

Changes ?

changes in crime will depend on whether we return to doing everyday activities as we did in the past.
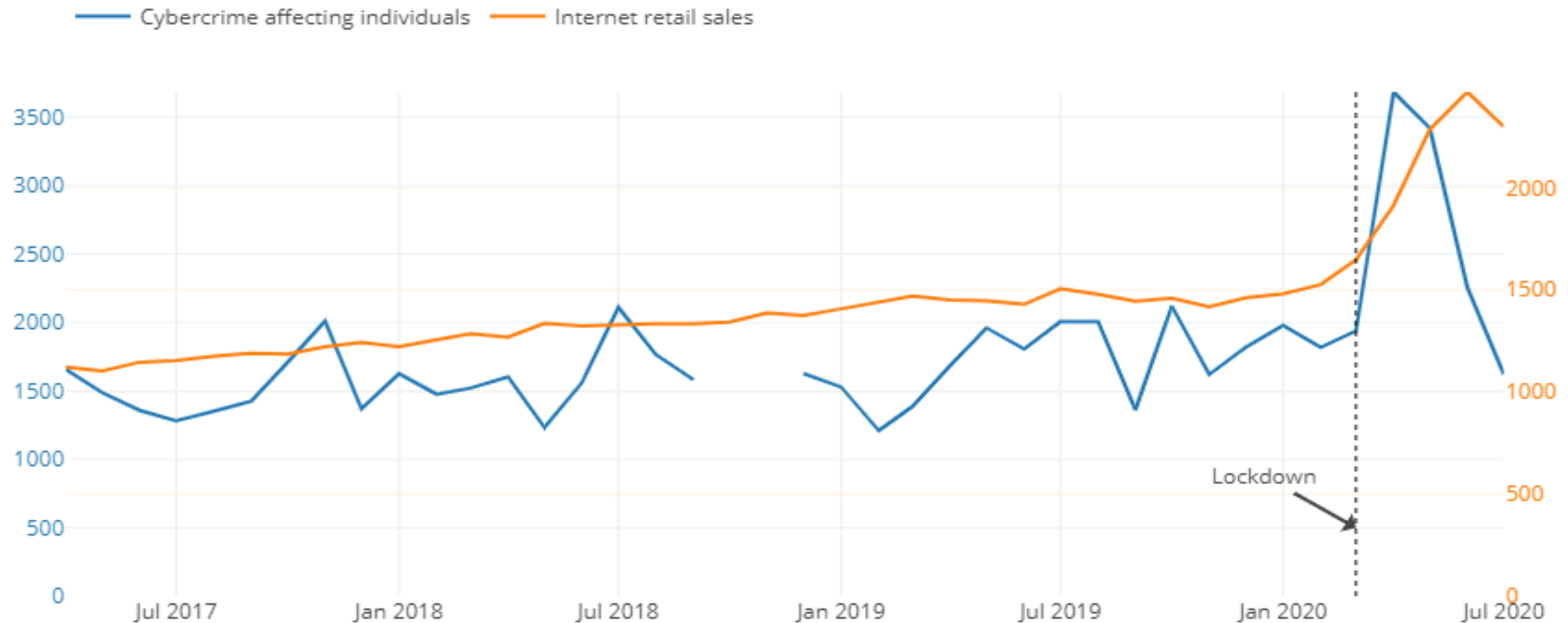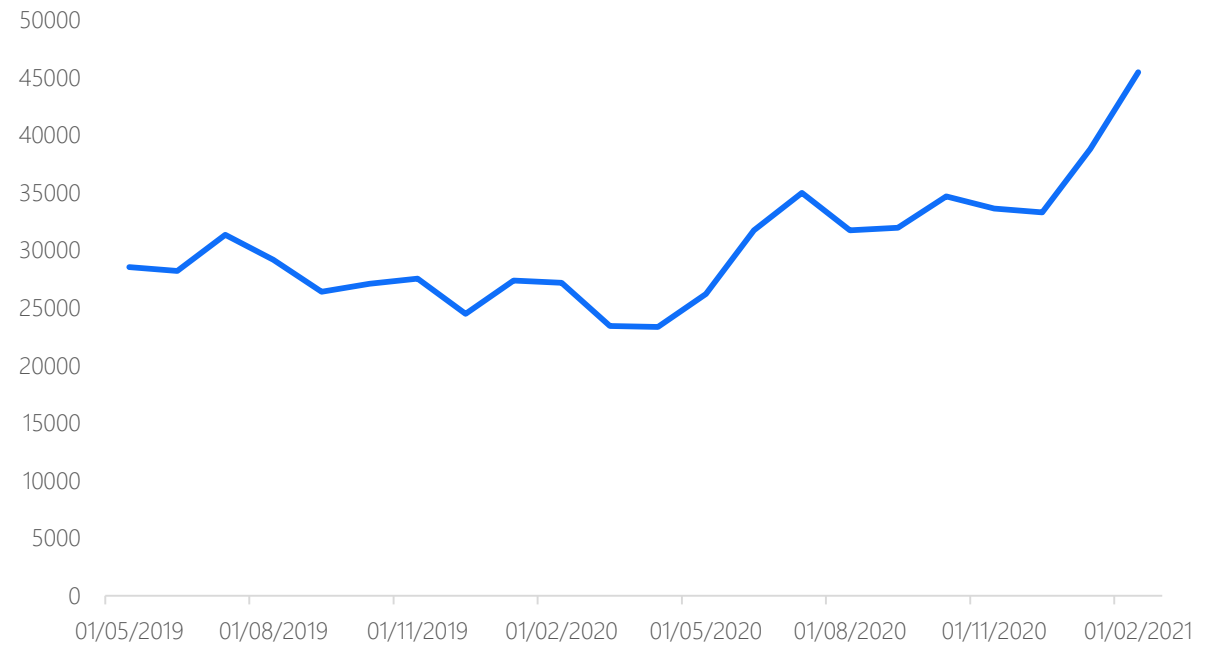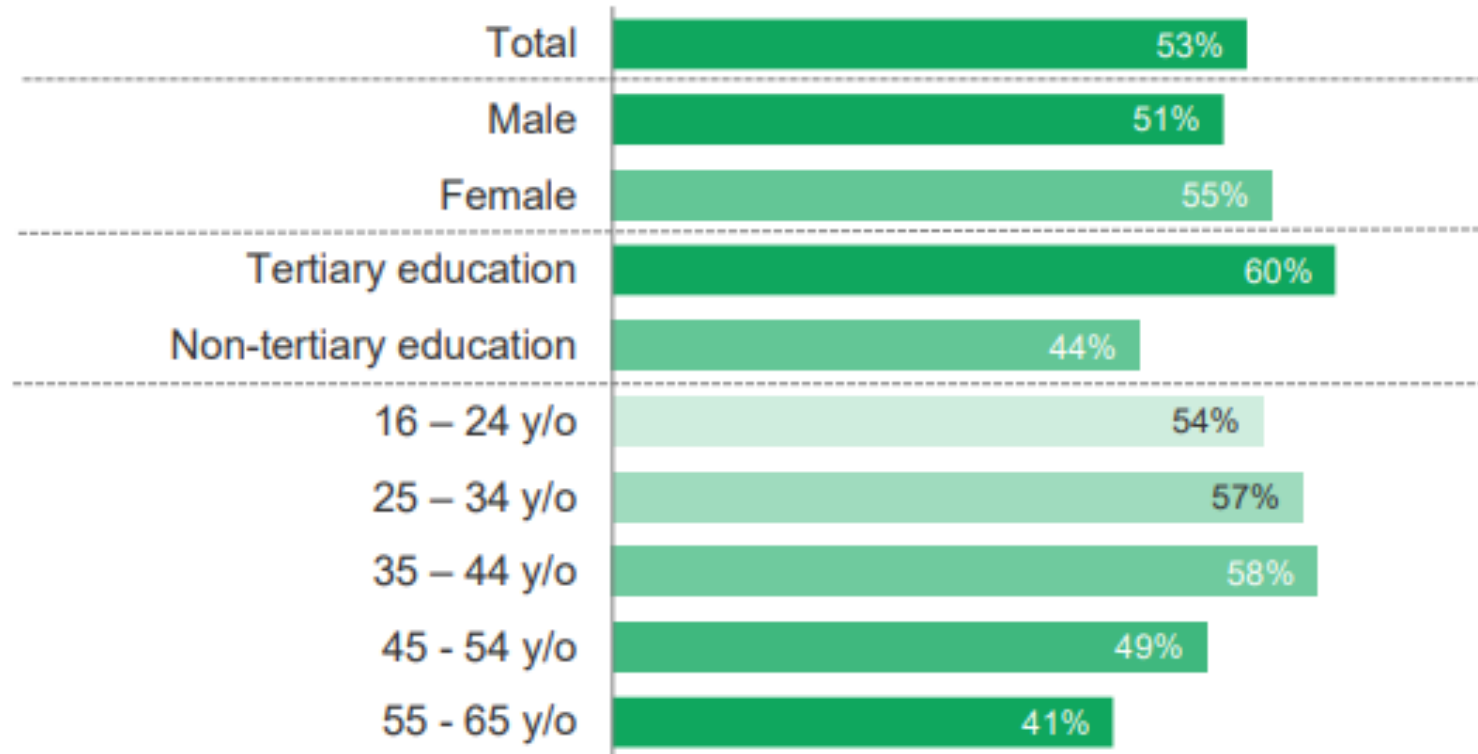
What is happening now?

Cyber dependant (all)

Cyber Fraud (all)

Self-elaboration. Source: ActionFraud

40

Change in online shopping are expected to continue

Q: How likely do you think it is that you will continue to adopt the habits adopted during the COVID-19 emergency outbreak after this period?

Category	Percentage
Total	53%
Male	51%
Female	55%
Tertiary education	60%
Non-tertiary education	44%
16 – 24 y/o	54%
25 – 34 y/o	57%
35 – 44 y/o	58%
45 - 54 y/o	49%
55 - 65 y/o	41%

Source: unctad.org

Will routine activities change in the long term?
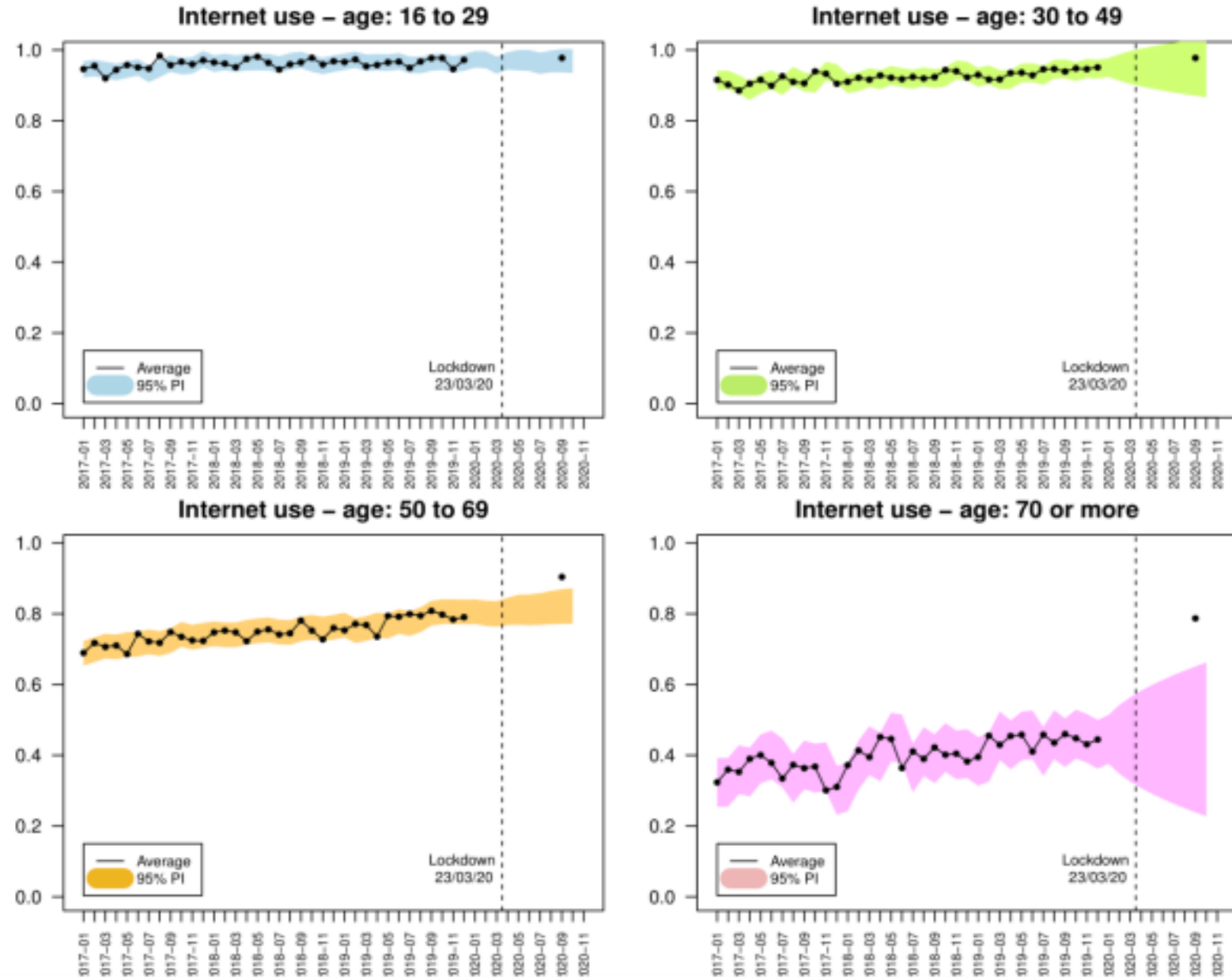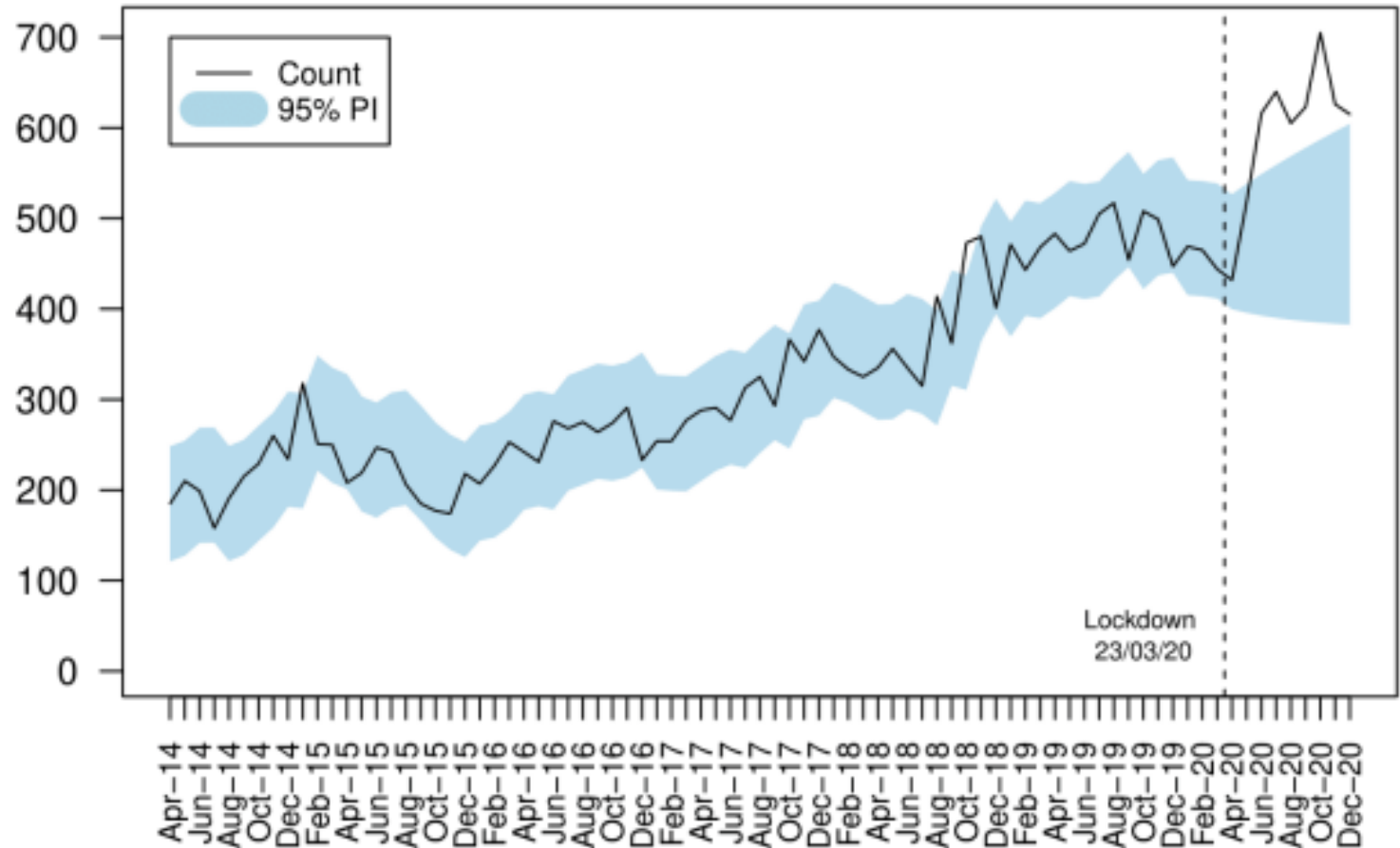

Figure 4. Proportion of respondents who use the internet daily and 95% prediction intervals

Will routine activities change in the long term?

Romance fraud and 95% Prediction Intervals

Legend: Count — 95% PI

Lockdown 23/03/20

Source: Buil-Gil,D and Zeng, Y (2021)

43

Thank you
for your attention

F.MIRO@CRIMINA.ES
@FERNANDOQPH