

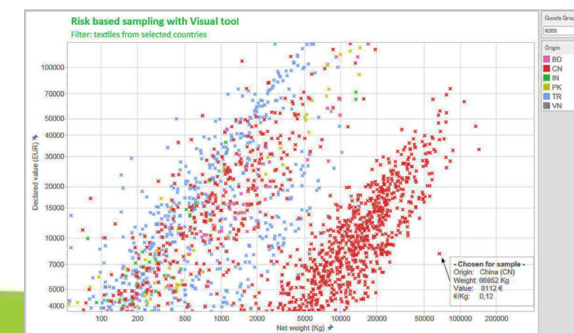
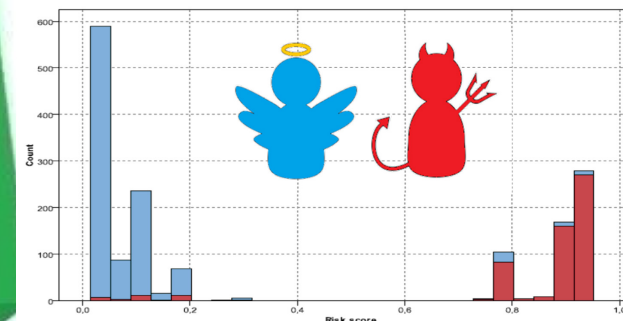


EUROPEAN  
COURT  
OF AUDITORS

# Finding risk and fraud in EU customs

## with Risk-Based Sampling and Visual Data Analysis

Carlos Soler – Head of task  
Jesús Nieto – Technical support  
European Court of Auditors



# Risk-based sampling

- I. Why risk-based sampling?
- II. How? – ECA examples
  - a) Risk models (data mining) – DAS pilot
  - b) Visual risk-based sampling – Customs

# Why Risk Based Sampling?

# 100% Audit automated work on digital info



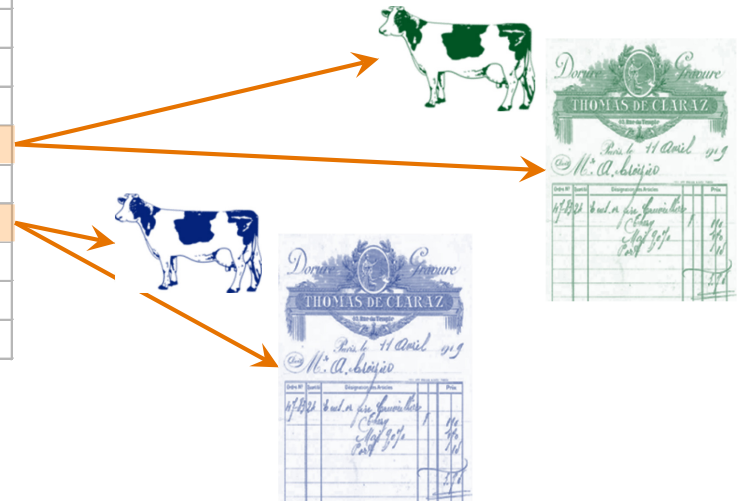
100%  
pop.

id	info	info €	digital signature xyz	digital bill
12	lorem	€ 389,90	[object]	[object]
93	ipsum	€ 585,65	[object]	[object]
128	dolor	€ 374,27	[object]	[object]
214	sit	€ 176,51	[object]	[object]
367	amet	€ 414,19	[object]	[object]
492	consectetur	€ 722,78	[object]	[object]
543	adipisci	€ 835,03	[object]	[object]
673	elit	€ 955,63	[object]	[object]
723	sed	€ 903,53	[object]	[object]
812	do	€ 653,55	[object]	[object]
902	eiusmod	€ 94,85	[object]	[object]
987	tempor	€ 895,57	[object]	[object]

**Manual / on the spot work**  
→ risk based **sample**

5 docs  
/person\*day!

id	info	info €
12	lorem	€ 389,90
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# Risk based sampling

- I. Why risk based sampling?
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# How? With Risk models – with Data Mining Tool

Experience  
findings



Risk model



Risk scores/predictions  
+ sample

Experience

year	id	info	Audit
2016	1	lorem	✓
2016	37	ipsum	✗
2016	128	dolor	✗
2016	378	sit	✓

1- train

2016	526	amet	✓
2016	812	consectetur	✗

2- test

New population

year	id	info
2017	1	adipiscing
2017	2	elit
2017	3	sed
2017	4	do
2017	5	eiusmod
2017	6	tempor

3- use

Data Mining Tool

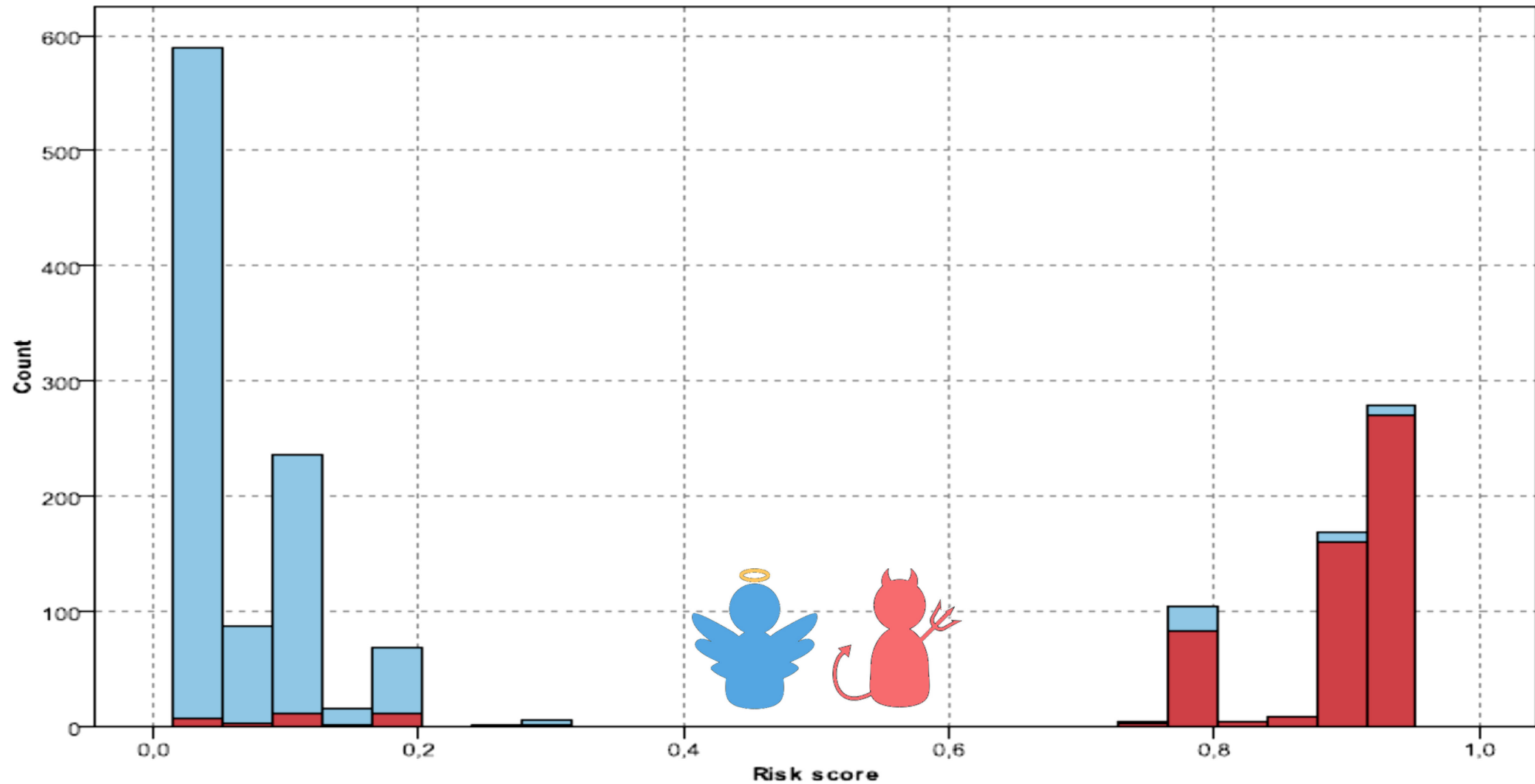
Risk  
model  
xx%  
accuracy

Risk prediction

year	id	info	Risk
2017	1	adipiscing	✓
2017	2	elit	✓
2017	3	sed	✗
2017	4	do	✓
2017	5	eiusmod	✓
2017	6	tempor	✗

+ sample

## II.a ECA FI audit - Pilot Risk Model - 94% accuracy!



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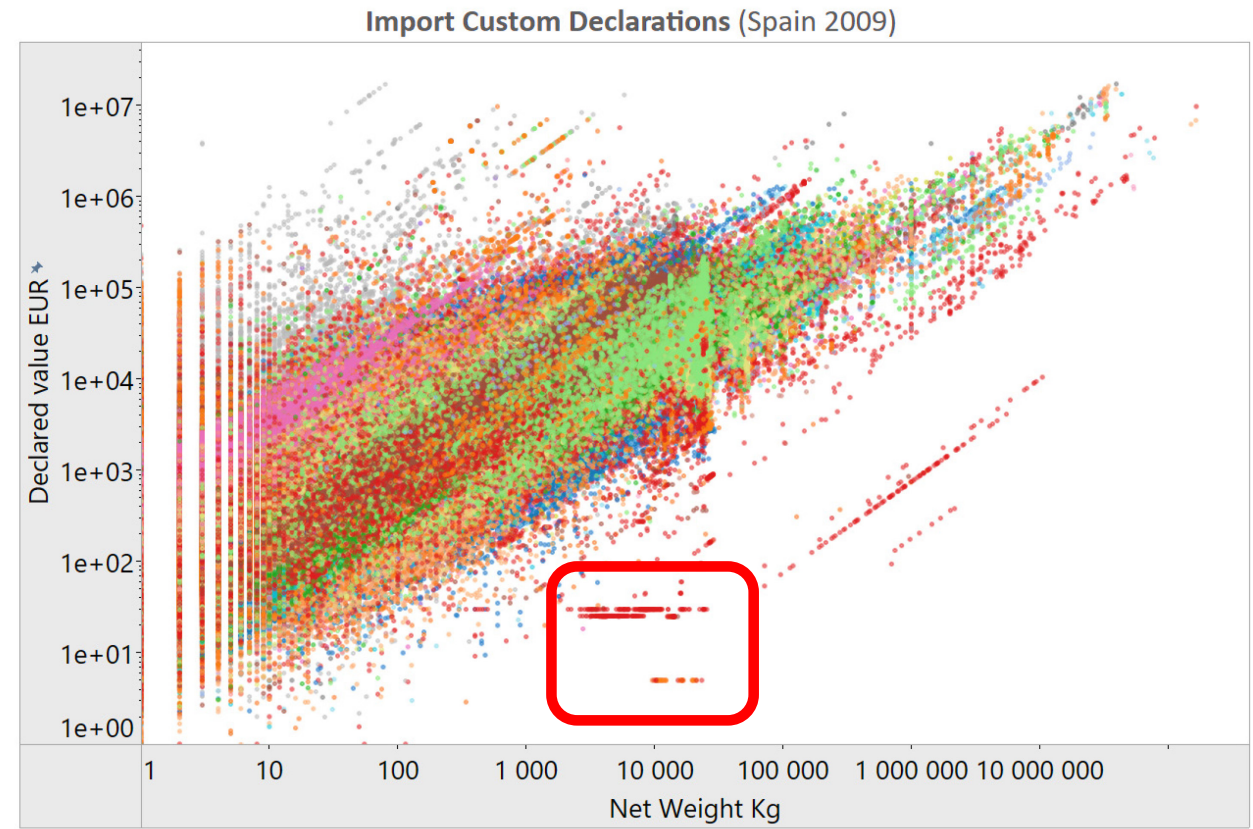
# EU Customs and VAT audits

Goal: NOT find all errors - assess control systems

- “Are the **import procedures** robust?” [SR 19/2017](#)  
“Are we tackling **VAT fraud**?” [SR 24/2015](#)

## Sampling

- Random samples ☹️
- 2014: data visualised ...



# Risk-based sample with Data Visualisation

Experience &  
professional judgement →

**Risk model**

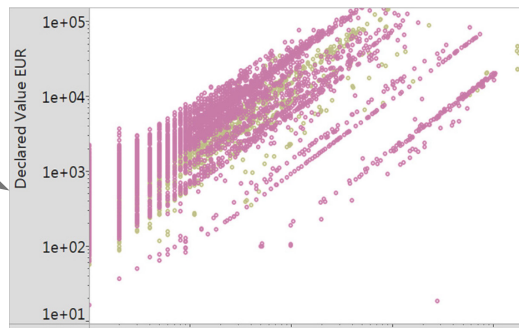


Risk predictions  
+ **sample**

New population

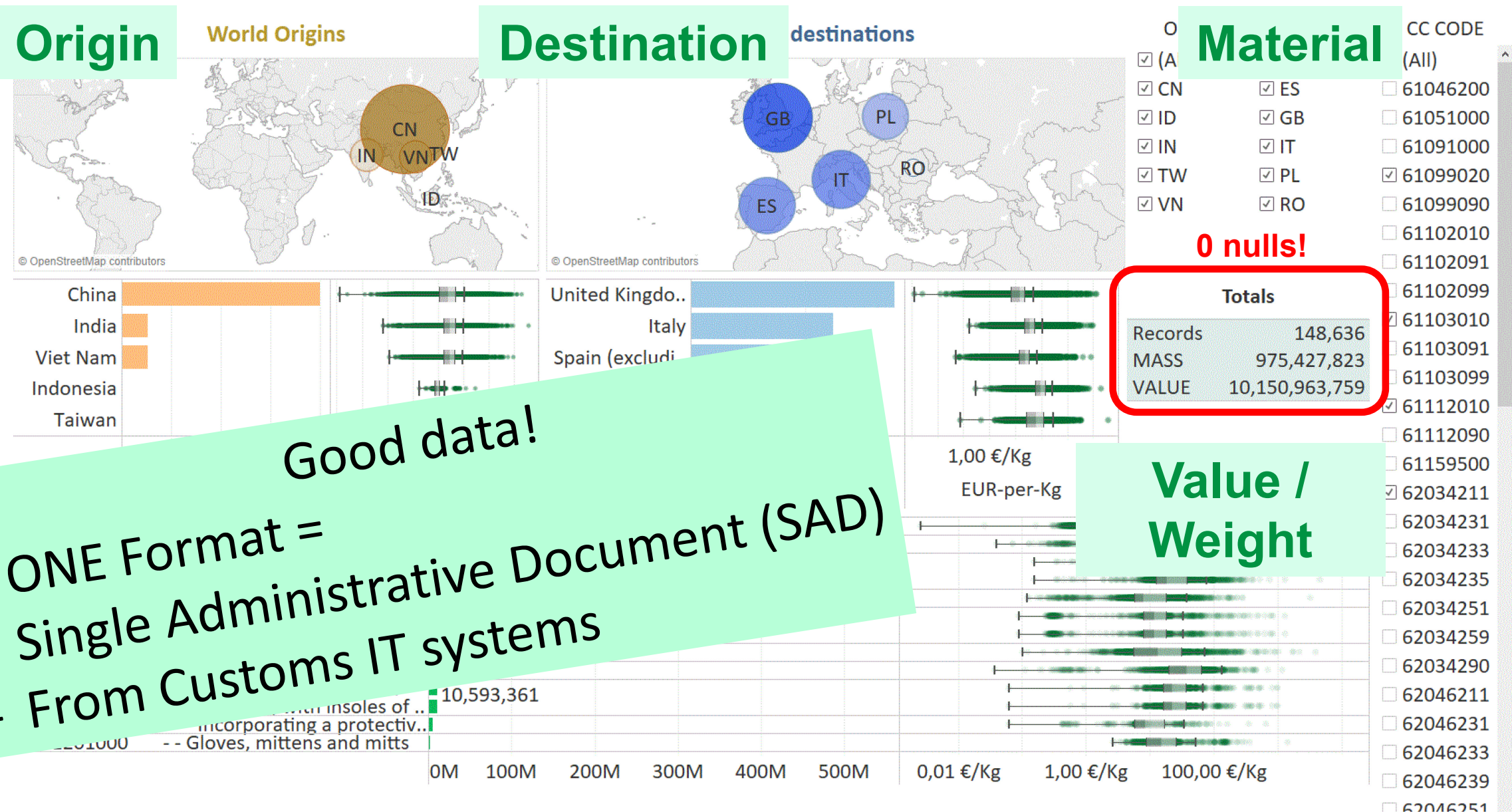
year	id	info
2017	1	adipiscing
2017	2	elit
2017	3	sed
2017	4	do
2017	5	eiusmod
2017	6	tempor

**Data  
Visualisation**

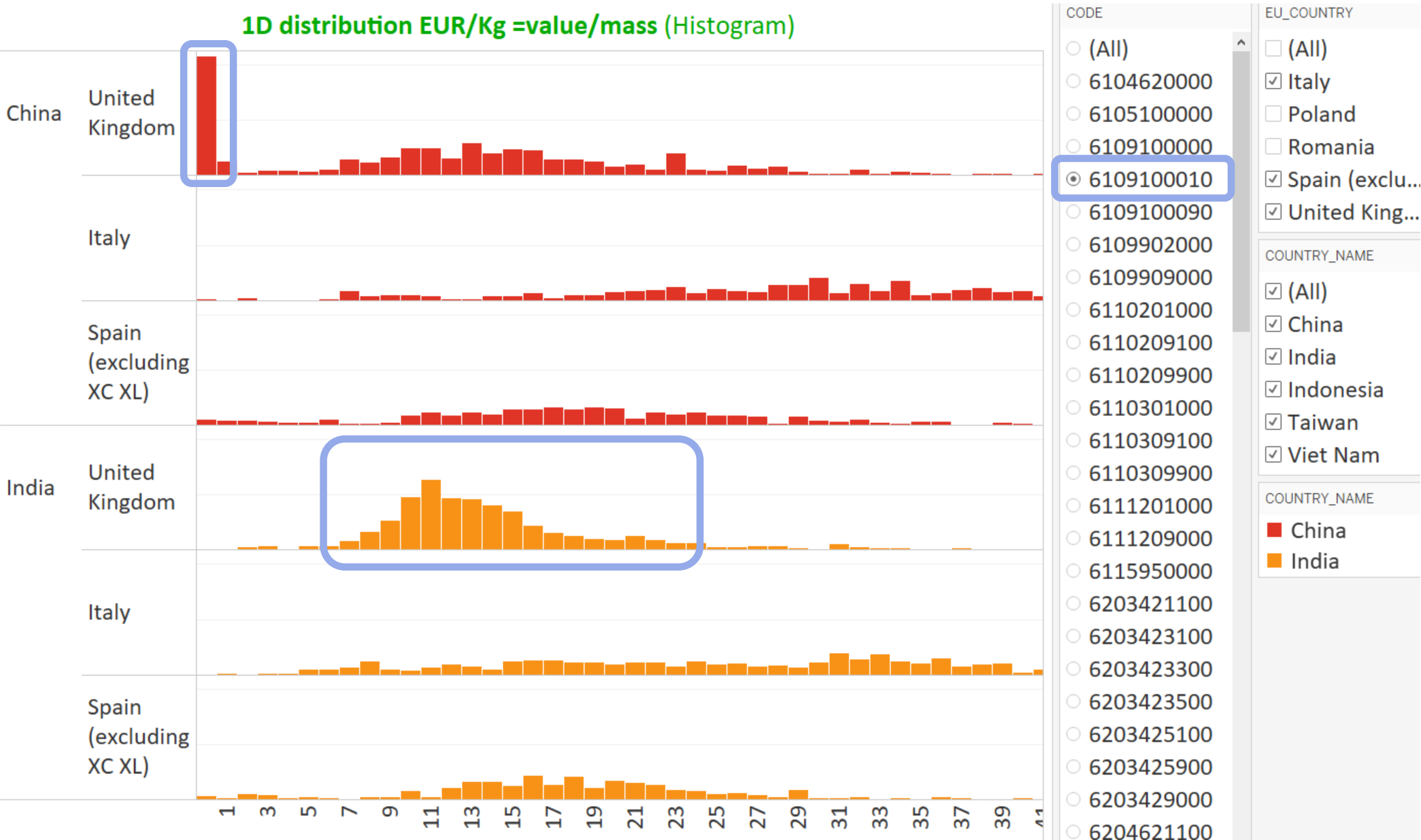




# 1. Understand + prepare Data [Auditor + technician]

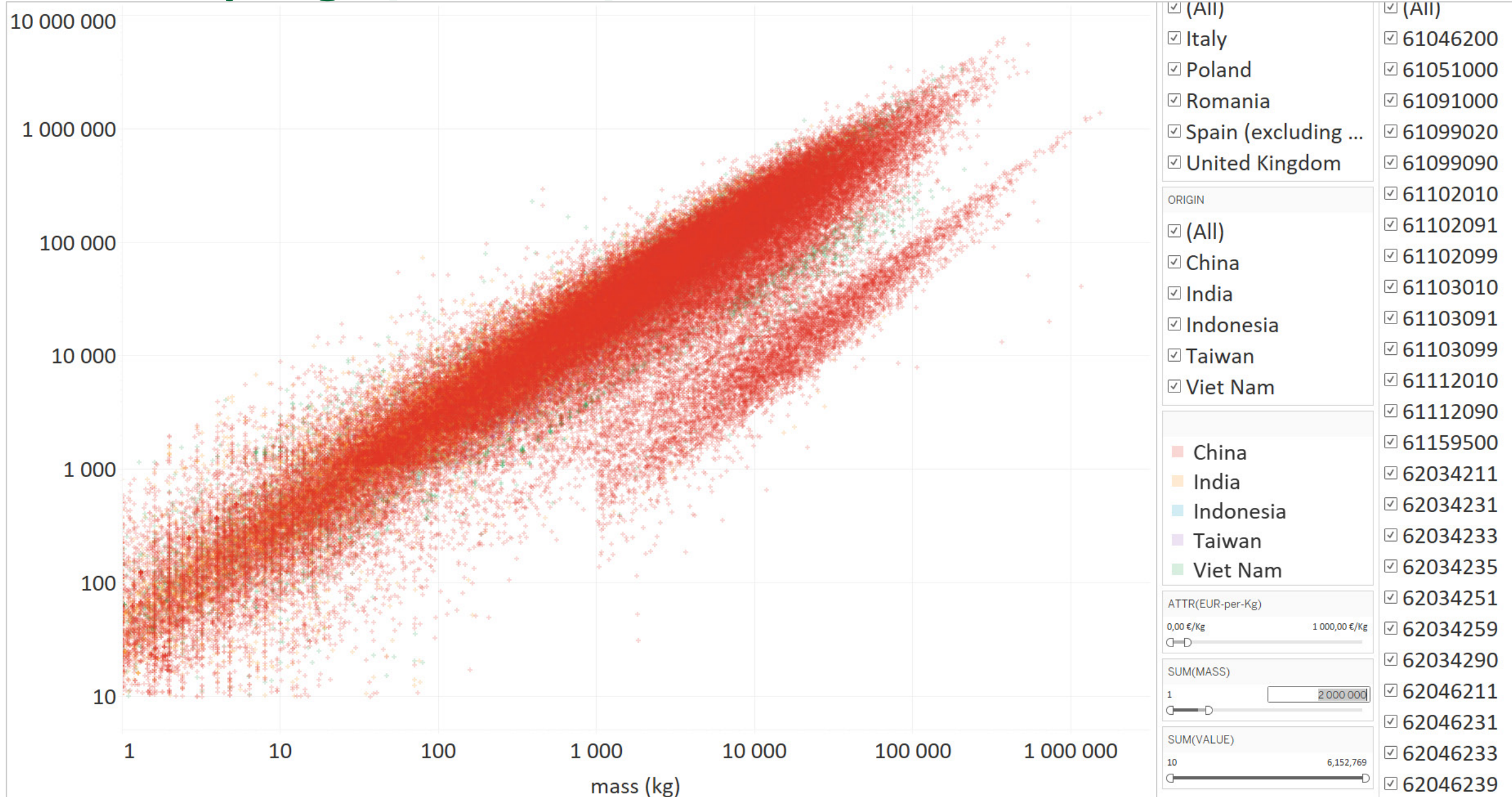


# 2. Visual data exploration [auditor]



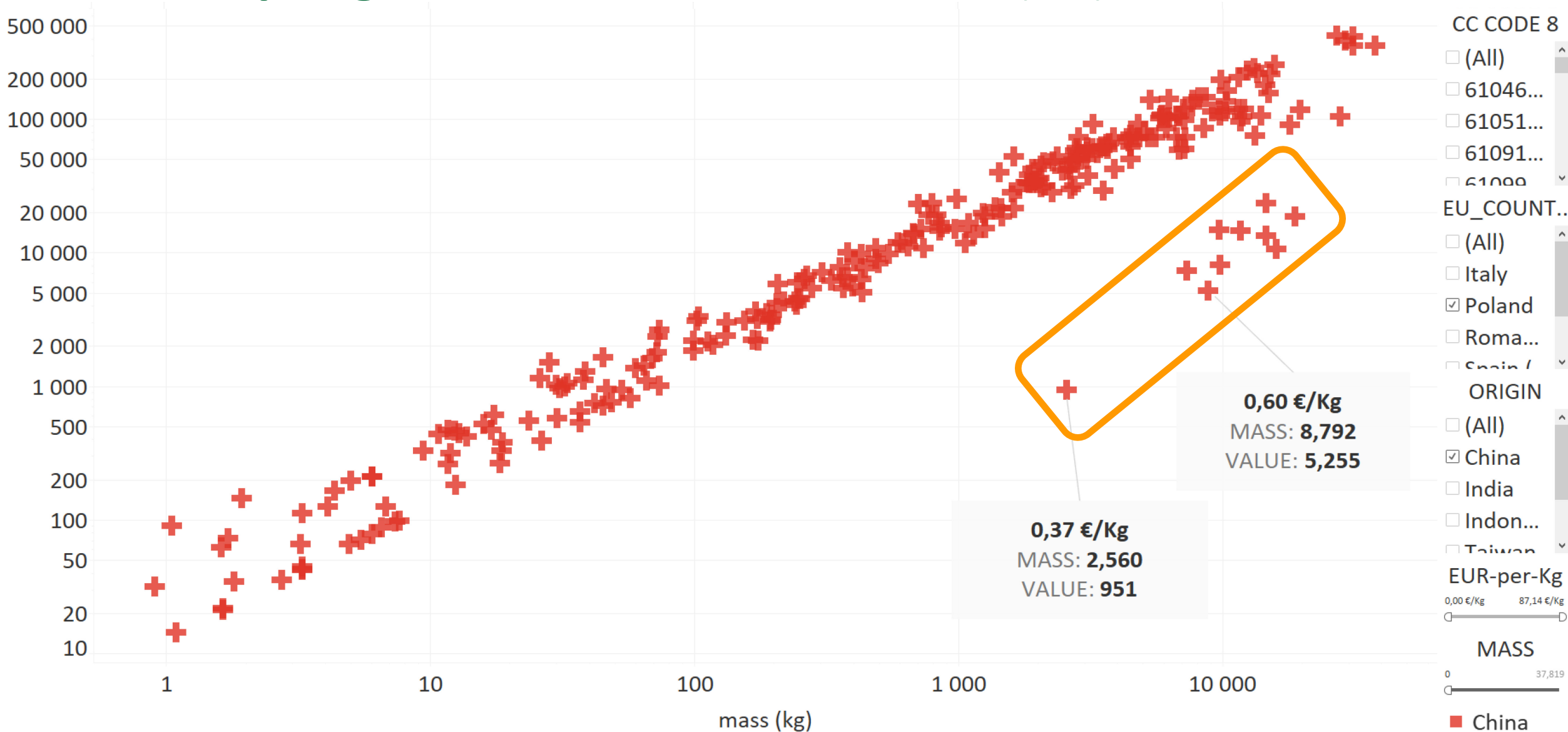


## 2. Sampling [ auditor ]

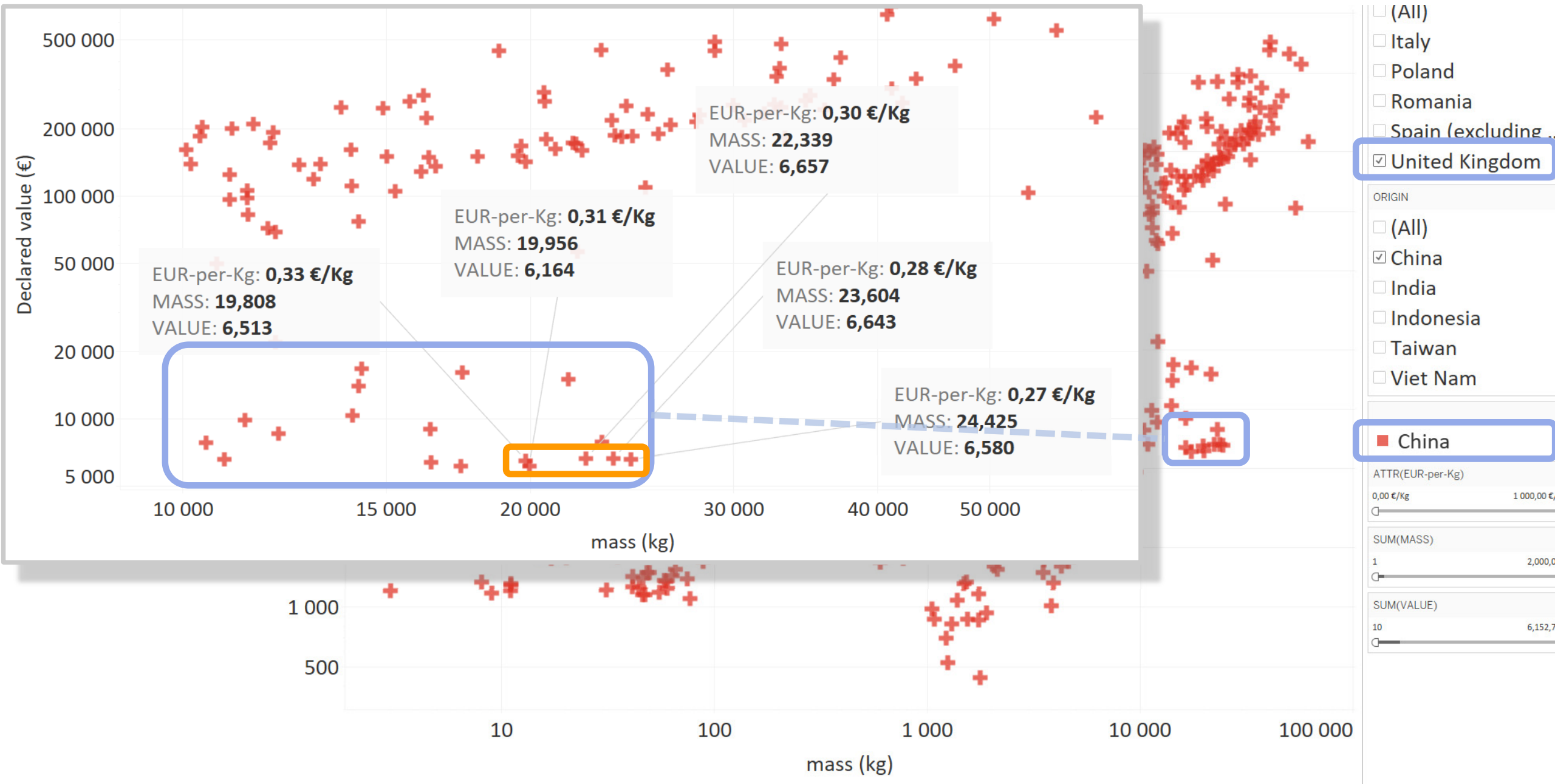




## 2. Sampling - Poland, Cotton trousers (10)

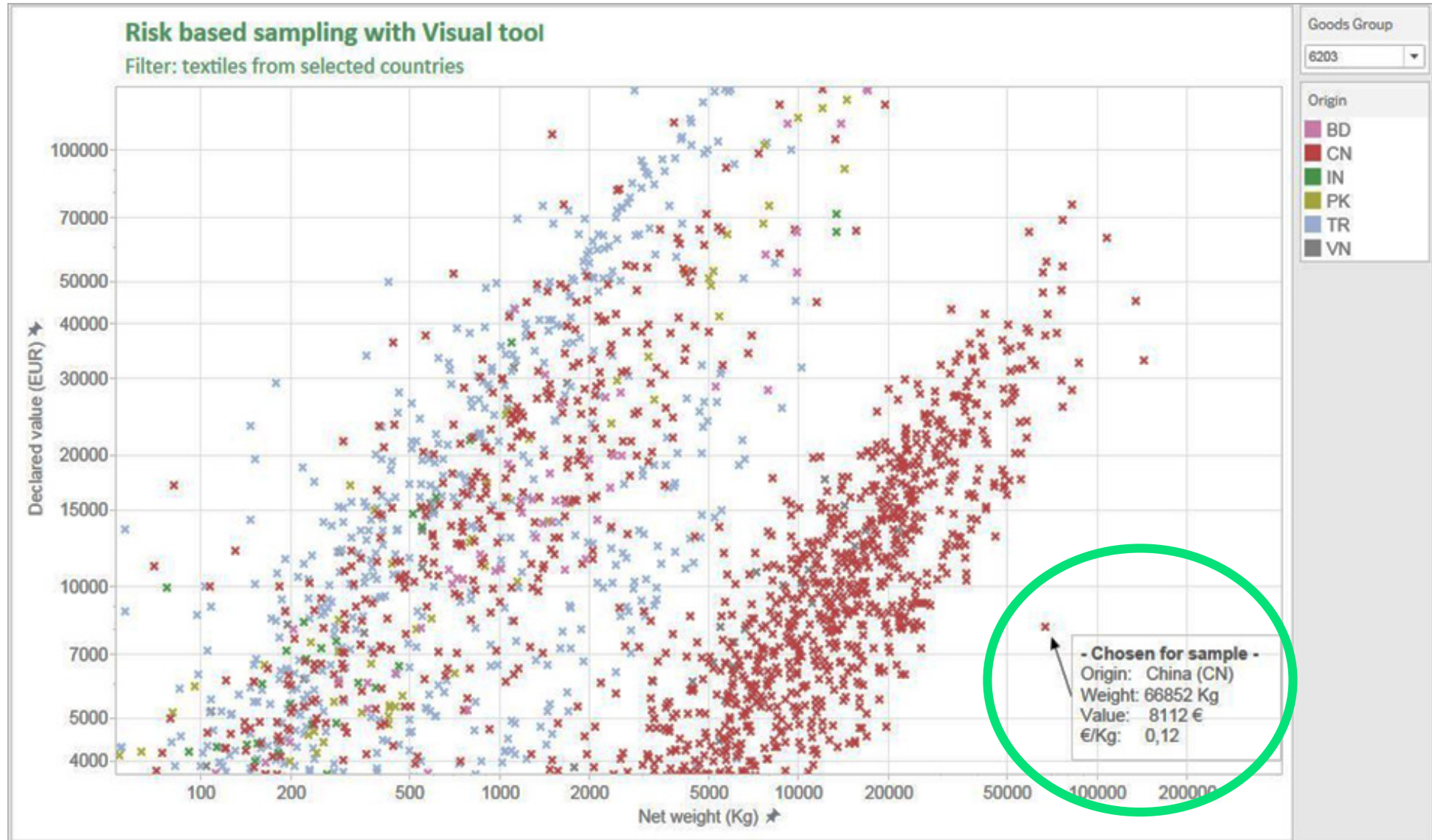


## 2. Sampling - UK, Other footwear (5)

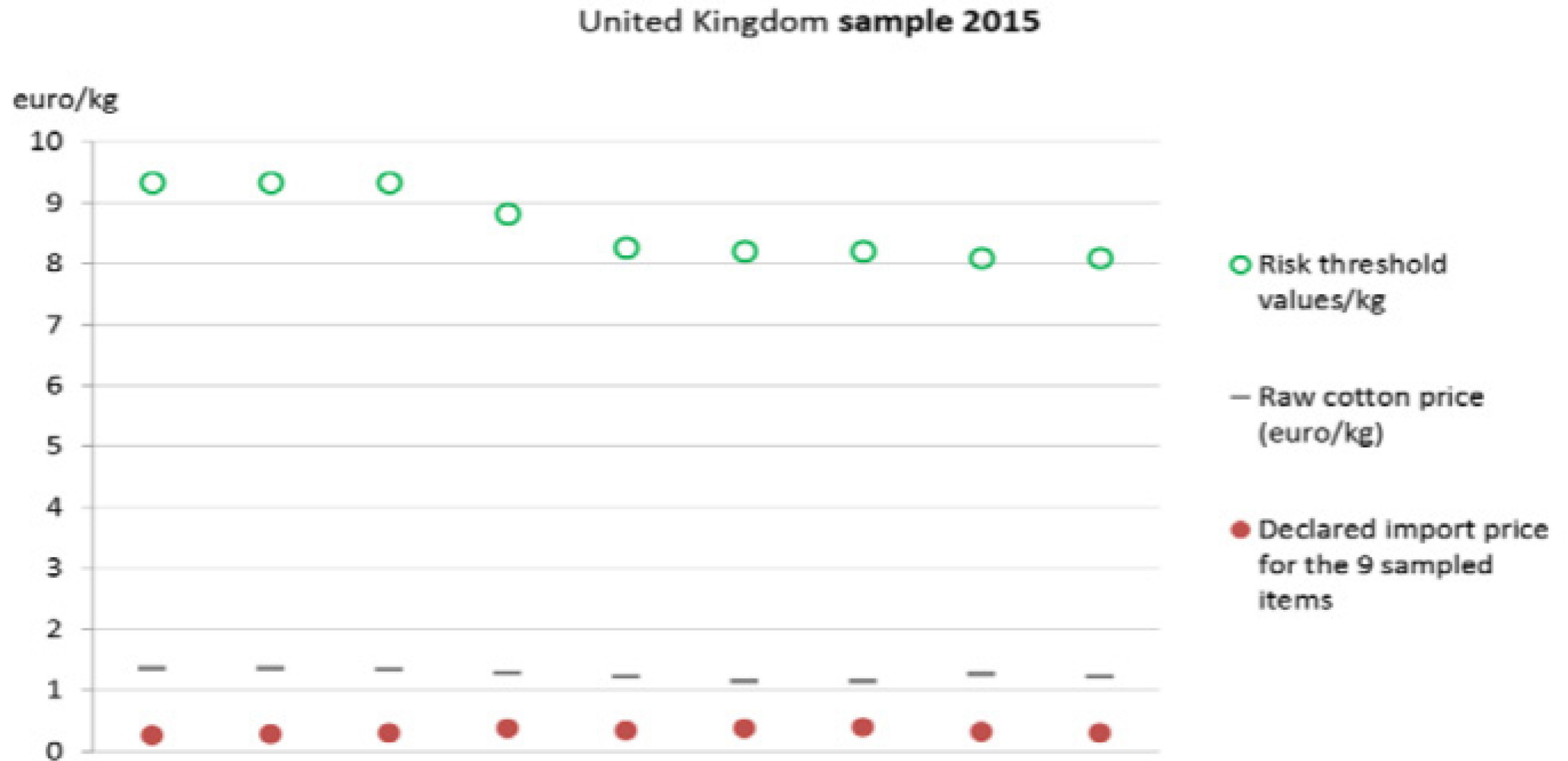


# Results

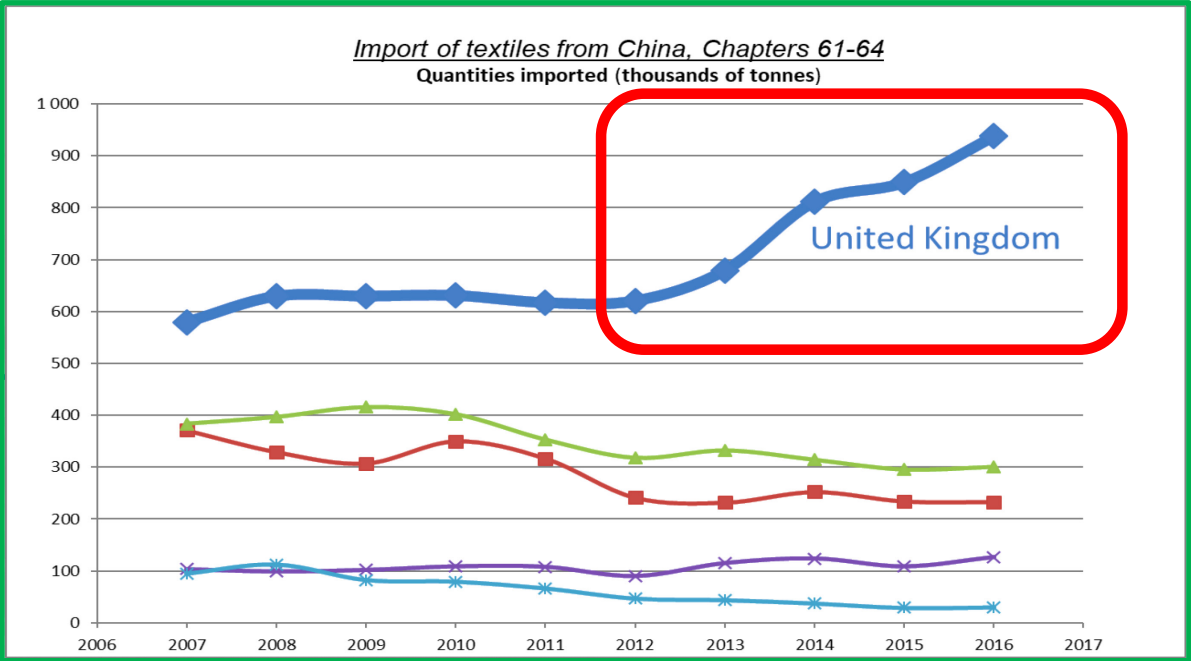
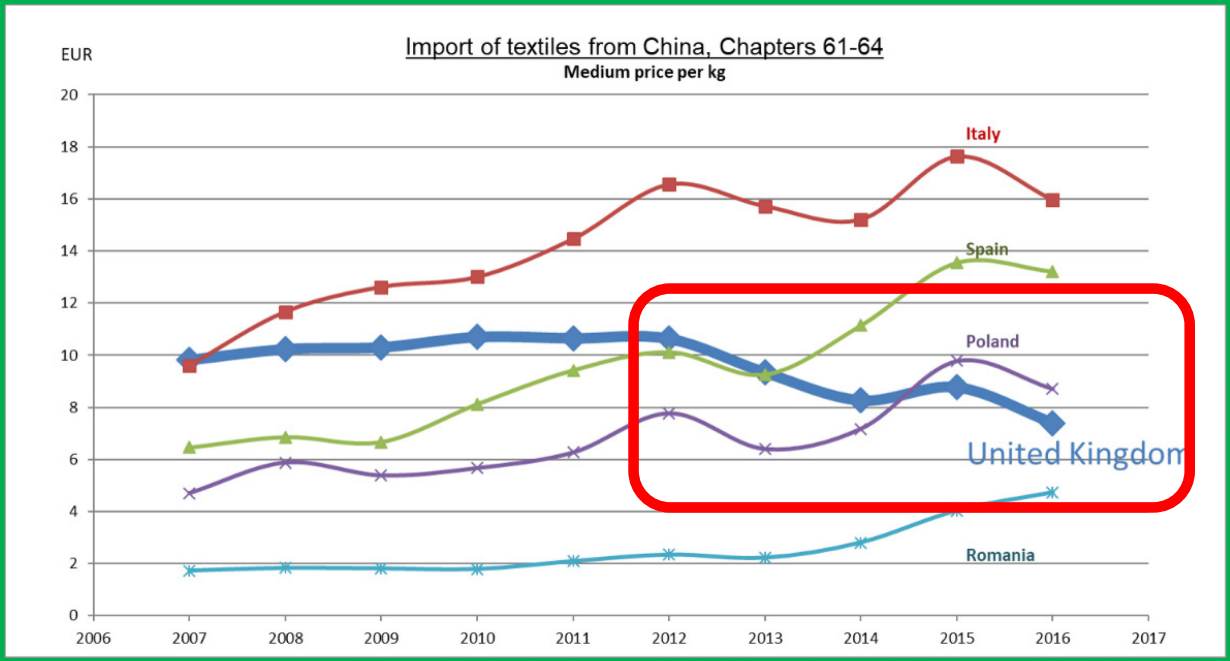
Samples are **100% hits!** Some on serious fraud



# Under-priced goods – risk threshold values and guarantees

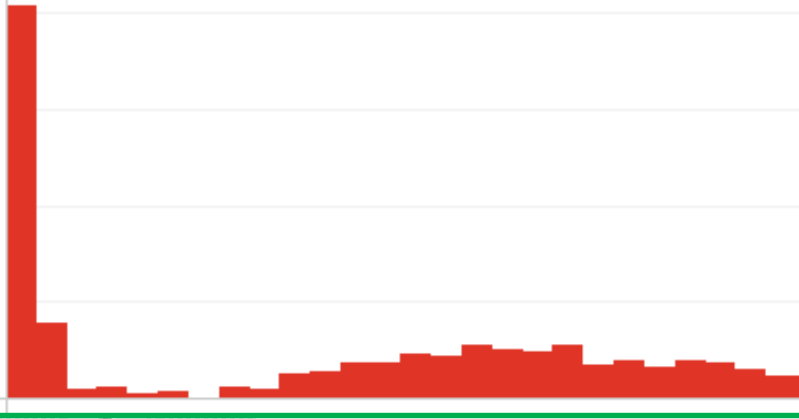


# More than sampling: Fraud seen in the data



(3) ✓ EU import under CP 42  
Dover, UK  
→ Custom duty underpaid

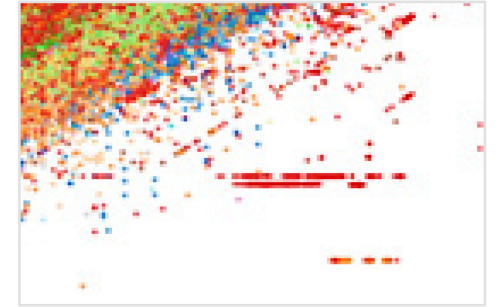
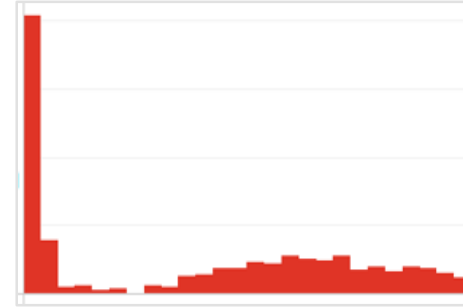
China United Kingdom



# Conclusions

## Technical

1. **Data Visualisation**  
can show risks



2. **Visual Risk-Based Sampling** can be very effective

## Business

3. **Hits** increase the

**CREDIBILITY** of  
“you should improve controls”



# Contacts

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**European Court of Auditors**  
**Luxembourg**