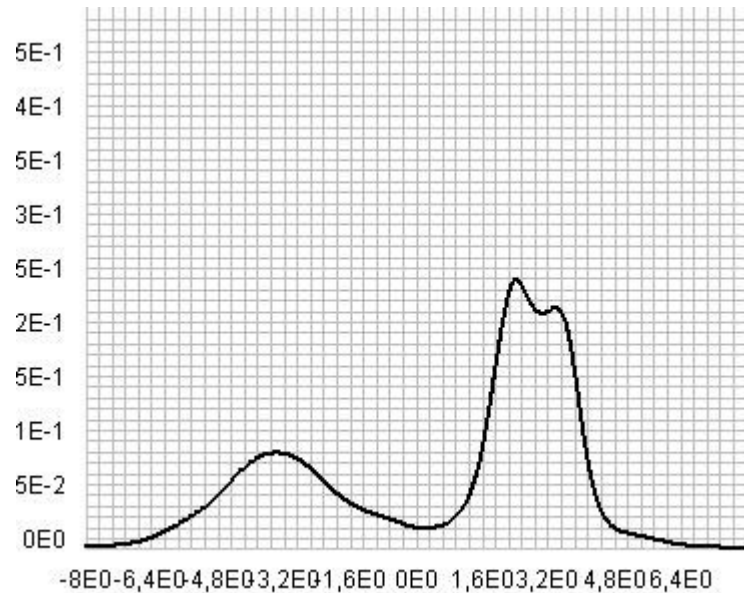# Transfer Price Analysis in Brazil:
The Role of New Technologies

Opportunities to use technology for transfer price analysis

- Detecting deviations from expected prices using machine learning
    - Also important for value fraud detection
    - We are currently working here
- Detecting relations among companies
- Finding comparable transactions
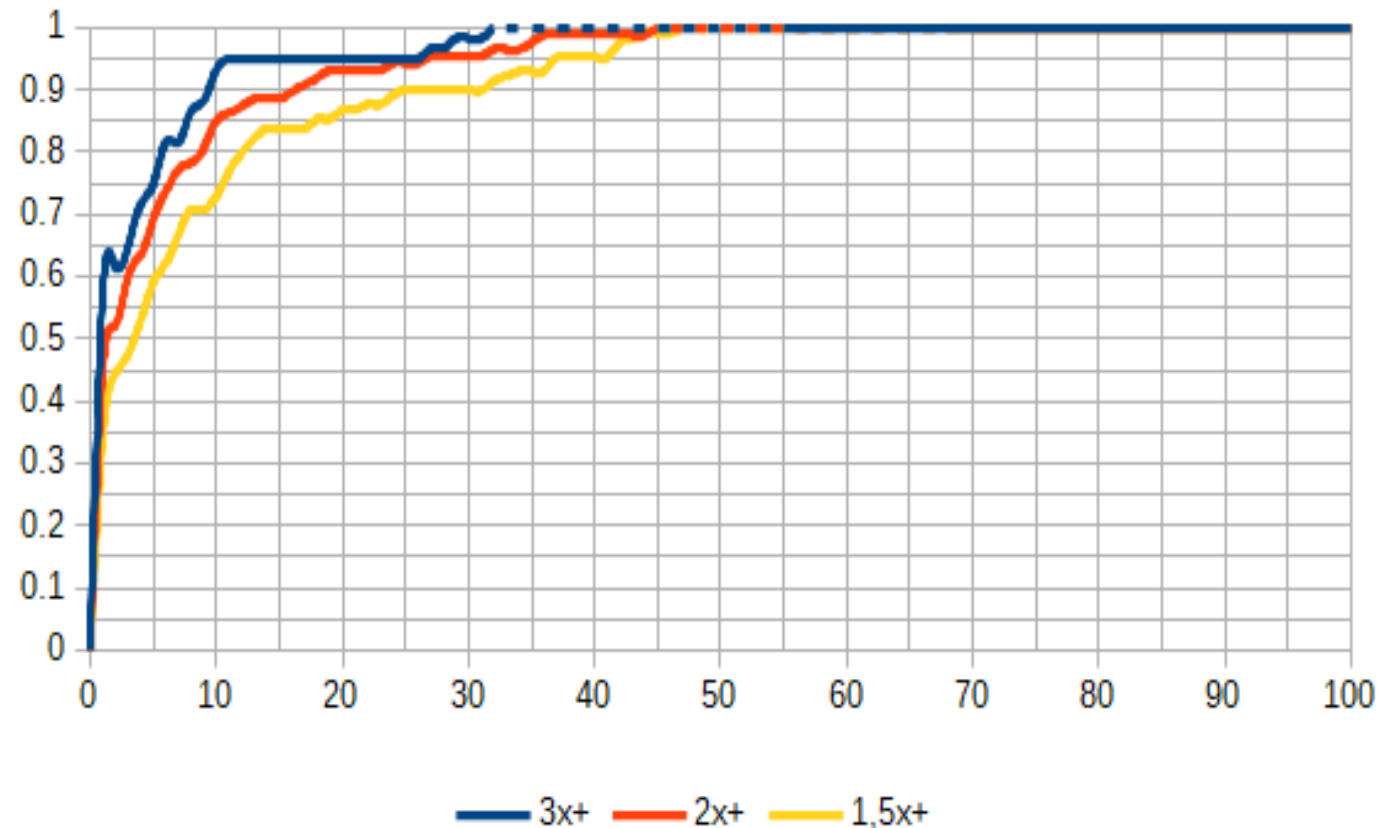- Exchanging information

Detecting deviations in prices

- We already have a machine learning systems that detects errors in HS codes, missing import licenses and errors in tax rates (SISAM)
- A new model produces a probability distribution for the price

- Outlier detection
- Supervised learning to avoid insisting on the same alerts if they are not being confirmed
- Distribution considers
  - HS Codes, manufacturers, suppliers, countries of origin, text description of goods, date of the operation and the credibility of importer

- Allows the generation of natural language explanations for the distributions

- Model is not in production yet

Recall curves for undervaluation or underinvoicing

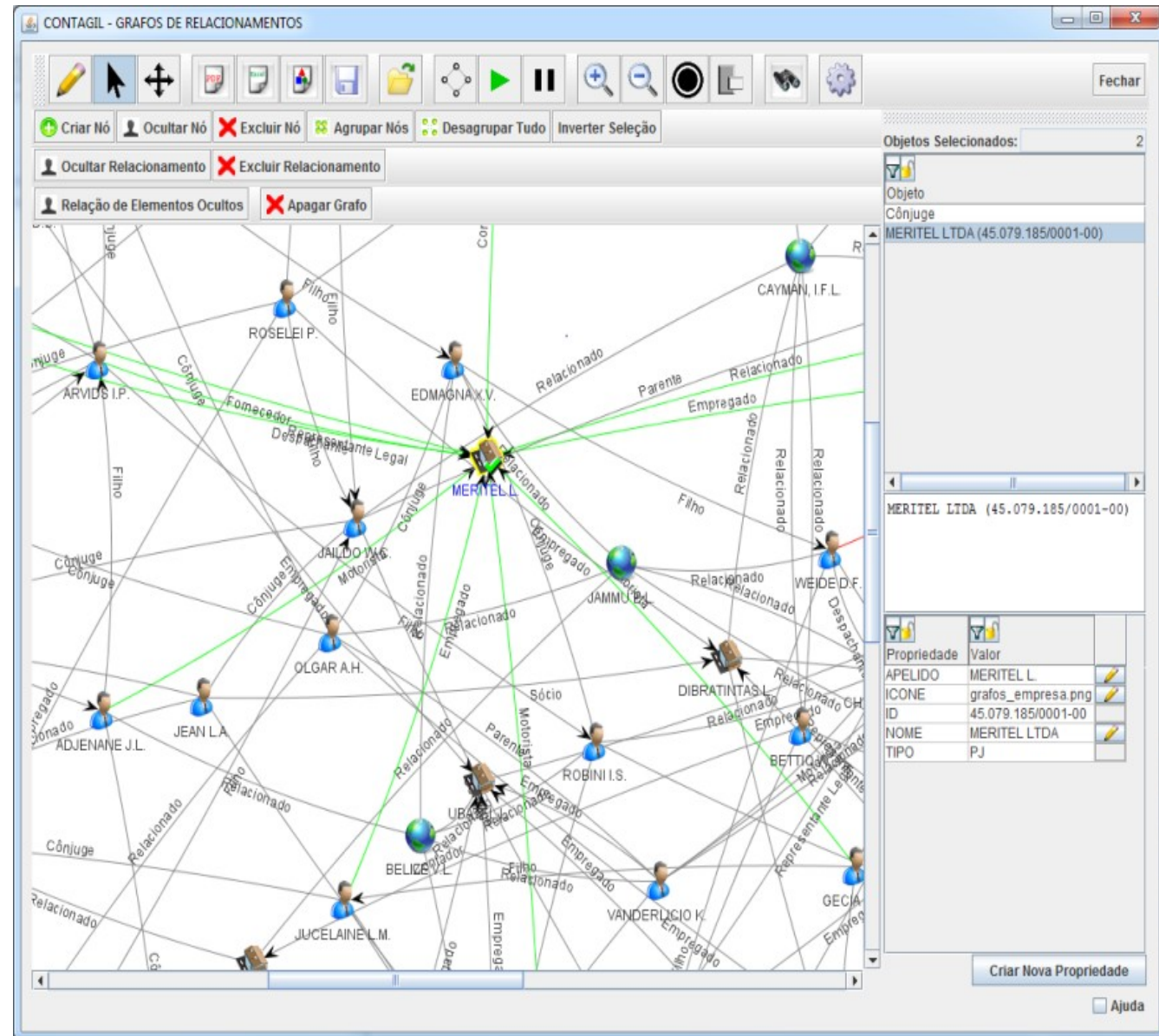| Selection rate	1%	2%	5%	10%	20%	50%	100%
3 fold	58%	62%	75%	93%	95%	100%	100%
2 fold	45%	52%	69%	85%	93%	100%	100%
1.5 fold	35%	45%	59%	73%	87%	100%	100%

Good results, but tests were run over poor data

Real results are probability not that good

We expect that, once the system starts to raise suspicions, we will have an active learning effect that will improve real results

Detecting relations among companies

- We have built a huge graph that shows relations among Brazilian companies

- We have a good tool for social networks analysis
  - ContÁgil – developed using neo4j.

- Our goal is to put foreign companies in this graph

- Foreign exporters which only sell goods to related companies are probably related too

- Similar company names also indicate relations

Finding reference prices automatically

- Search our database for products which bear some similarities with the target transaction
- For each candidate check if the commonalities are determinant for the price
  - Infer the price distribution using only the common features
  - IF
    - the resulting distribution has a small standard deviation and
    - the candidate price is in the middle of the distribution while the target price is not
  - THEN
    - The candidate is good

Information exchange with other countries

- bConnect
  - Blockchain project
  - Information exchange with Mercorsur members
  - Already operational
  - Amount of information exchanged is still small
    - Information about Authorized Economic Operators
  - Plans to integrate with Cadena
    - Pacific Alliance for Trade
    - Different blockchain technology
- Country-by-Country Report (CBC) about multinational enterprises

Obtaining more information

- Internal Revenue Service
  - Some companies inform different prices to customs and IRS
    - A low price reduces import duty, a high price reduces income tax
- Commercial data providers
  - Services are not cheap
  - We have received free, but limited access to a commercial system
  - We need much more