BANQUE DE FRANCE
EUROSYSTÈME

BIZMAP : A DECISION MAKING TOOL TO HELP ENTERPRISES TO EXPORT

2020 Banca d'Italia and Federal Reserve Board Joint Conference on Nontraditional Data & Statistical Learning with applications to macroeconomics

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BANQUE DE FRANCE

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1. Genesis and development
2. Overview
3. Methodology and results
4. Conclusion

1. GENESIS AND DEVELOPMENTS

Birth

- Lack of information as a major obstacle to SME's internationalization (30% of exports)
- VS economic weight of SMEs (95% of all companies, 50% of employment)
- Potential for productivity, employment, growth
- EU Datathon 2019

Development

- Within the Quantitative Analysis and Advanced Methods division of the Data and Analytical Services directorate of Banque de France
- Uses cases:
  - BdF's services to entreprises
  - Enterprises and sectoral associations
  - Policy makers

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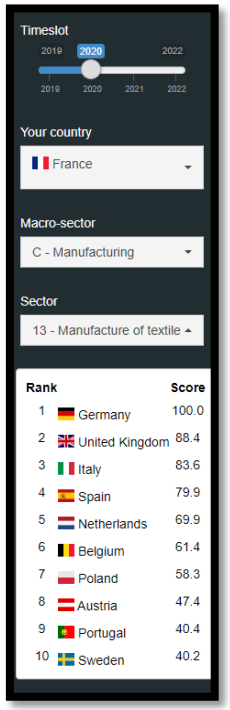
2. BIZMAP : DATA, MODEL & APP

DATA	MODEL	APP
Multidimensional harmonized database	Post lasso OLS gravity model	Index of attractivity of European territories
• 7 open access data base providers • Missing values imputation	• Machine learning + economic modelling • Index of attractivity of european territories	• Ranking and map of the countries • Analytics • Information access

eurostat · European Investment Bank · OECD · European Commission · THE WORLD BANK IBRD • IDA | WORLD BANK GROUP · EUROPEAN CENTRAL BANK · CEPII RECHERCHE ET EXPERTISE SUR L'ÉCONOMIE MONDIALE

- Institutional environment
- Economic perspectives
- Infrastructures
- Quality of life
- Financial conditions
- (Distance)



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IMPUTATION FOR A GIVEN VARIABLE

	2015	2016	2017	2018	2019	2020
AT					Kalman filtering	Kalman filtering
BE					Kalman filtering	Kalman filtering
DE					Kalman filtering	Kalman filtering
ES					Kalman filtering	Kalman filtering
FR					Kalman filtering	Kalman filtering
IT					Kalman filtering	Kalman filtering
NL					Kalman filtering	Kalman filtering

1. Completion **between countries** using missForest

2. (For each country) completion **through time** using Kalman filtering

	available
	missing
	imputed

EQUATION ESTIMATED

- Gravity model augmented with economic variables

$$Y_{ij}^{k} = \beta_0 + \sum_{p} G_{ijp} + GDP_i + GDP_j + \sum X_j^k$$

Y_{ij}^{k}: export from ***i*** to ***j*** for sector ***k***

G_{ijp} & $GDP_{i\ or\ j}$: standard gravity model variables

X_j^k : economic variable for country ***j*** and sector ***k*** (if available)

ESTIMATION USING OLS-POST LASSO ESTIMATOR

Variables from gravity (G) + about 80 economic variables (X) selected by expert

G1	G2	G3	X1	X2	X3	X4	…	Xp-1	Xp

Variable selection for economic variables using LASSO regression

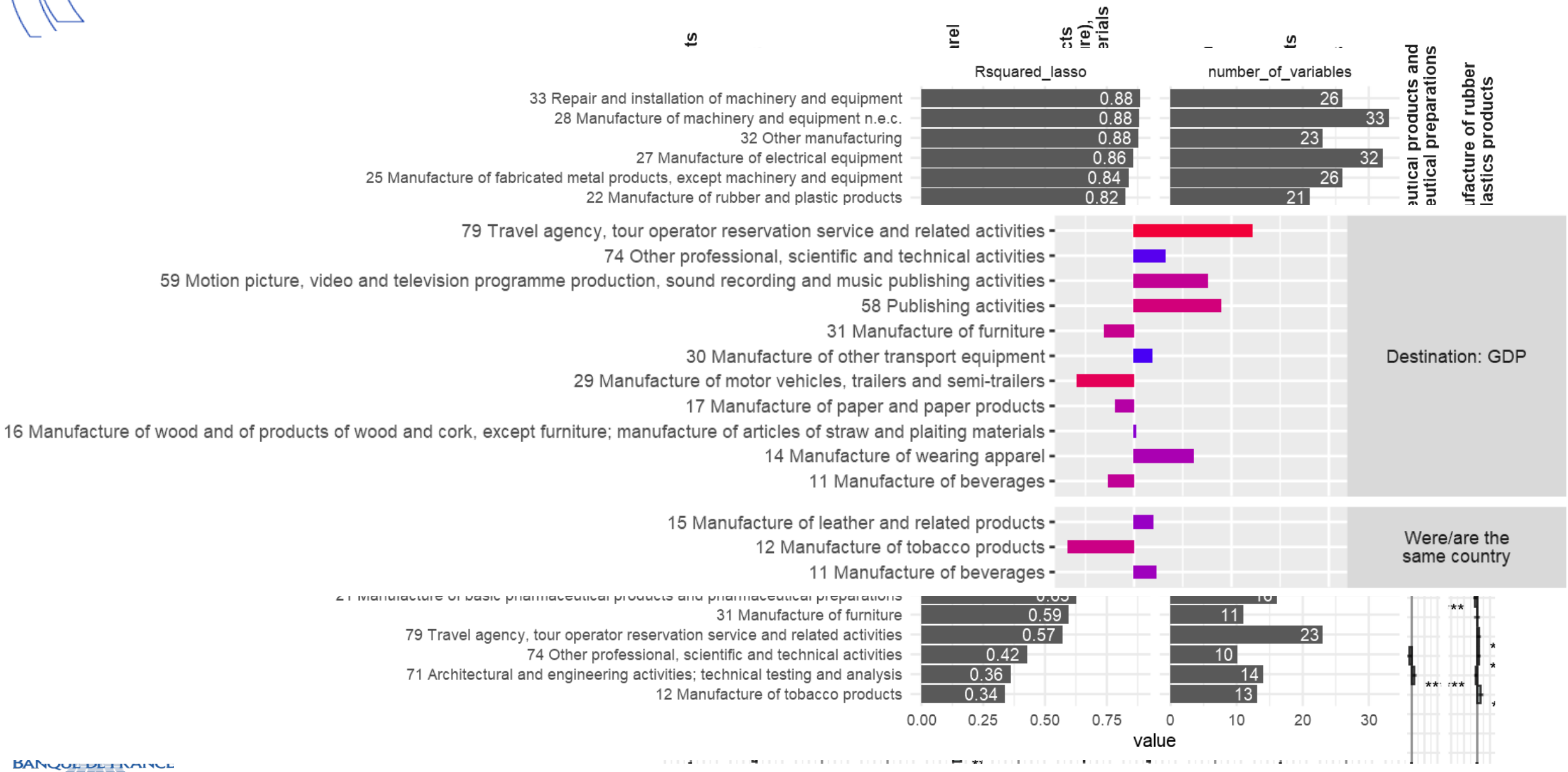
G1	G2	G3	X1	X2	X3	X4	…	Xp-1	Xp

OLS regression on ***all*** the gravity variables and selected economic variables

G1	G2	G3	X1	X2	X3	X4	…	Xp-1	Xp

Ref : Least squares after model selection in high-dimensional sparse model (BELLONI and CHERNOZHUKOV, 2013)
https://www.jstor.org/stable/23525734?seq=1

RESULTS


Rsquared_lasso
number_of_variables
33 Repair and installation of machinery and equipment
28 Manufacture of machinery and equipment n.e.c.
32 Other manufacturing
27 Manufacture of electrical equipment
25 Manufacture of fabricated metal products, except machinery and equipment
22 Manufacture of rubber and plastic products
0.88
0.88
0.88
0.86
0.84
0.82
26
33
23
32
26
21
79 Travel agency, tour operator reservation service and related activities
74 Other professional, scientific and technical activities
59 Motion picture, video and television programme production, sound recording and music publishing activities
58 Publishing activities
31 Manufacture of furniture
30 Manufacture of other transport equipment
29 Manufacture of motor vehicles, trailers and semi-trailers
17 Manufacture of paper and paper products
16 Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
14 Manufacture of wearing apparel
11 Manufacture of beverages
Destination: GDP
15 Manufacture of leather and related products
12 Manufacture of tobacco products
11 Manufacture of beverages
Were/are the same country
31 Manufacture of furniture
79 Travel agency, tour operator reservation service and related activities
74 Other professional, scientific and technical activities
71 Architectural and engineering activities; technical testing and analysis
12 Manufacture of tobacco products
0.59
0.57
0.42
0.36
0.34
11
23
10
14
13
0.00
0.25
0.50
0.75
0
10
20
30
value

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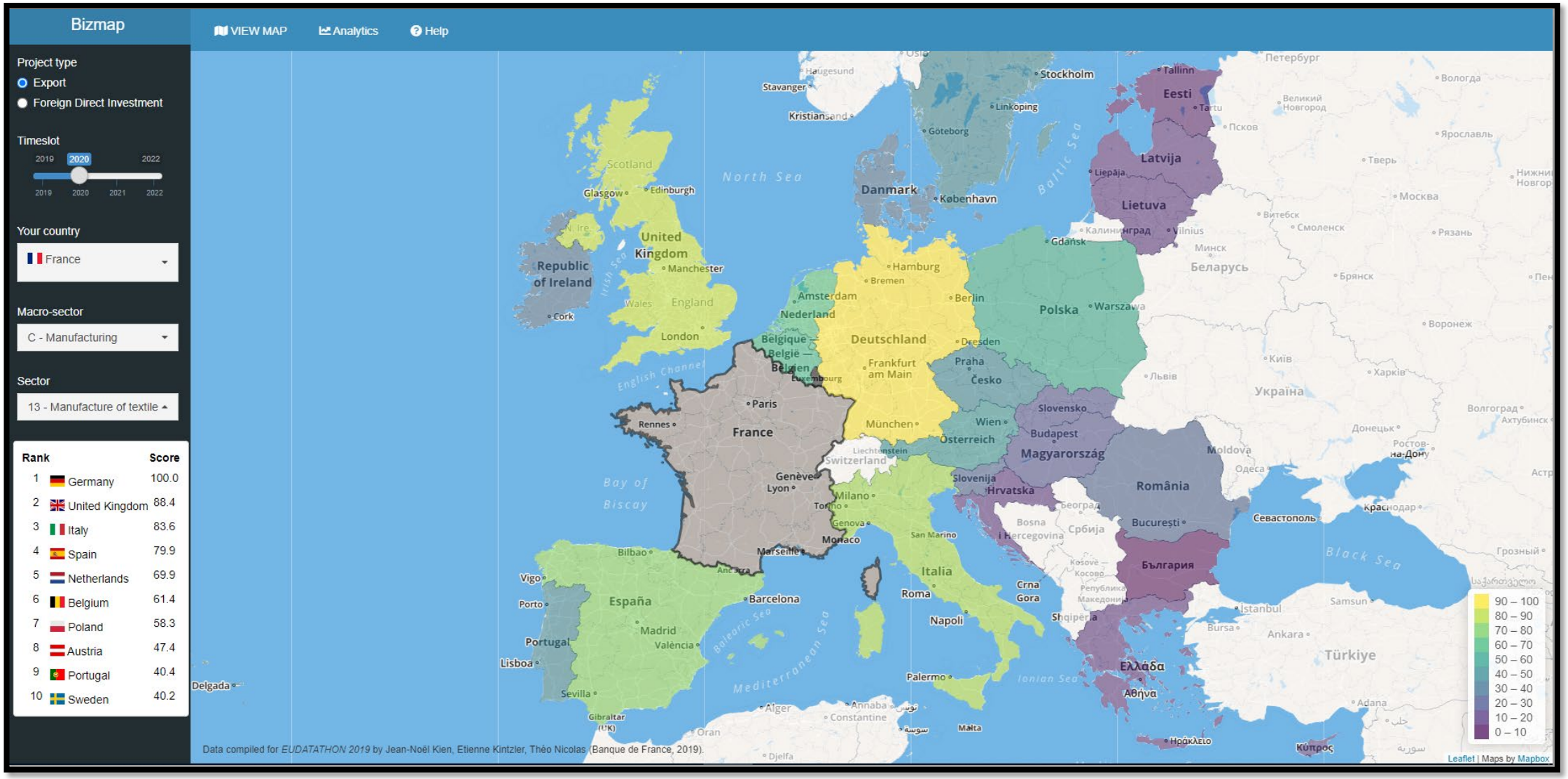
CONCLUSION

- Extensions
  - Exchanges with firms and business specialists to improve the user interface
  - Adding new variables : business competition/profitability
  - Automate data update with APIs
  - Post estimation analysis: future potential for exports vs estimation based on past trade flows
  - Model re-estimation including observations over the pandemic

DEMONSTRATION



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