



Monetary words, Market Echoes

The power of ECB wording in shaping financial landscapes

A. Y. 2023/24
Group 9

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O. Introduction

Why

Desire to explore the relationship between language and monetary policy, understanding the strategic use of words in ECB's communication.

Our goal

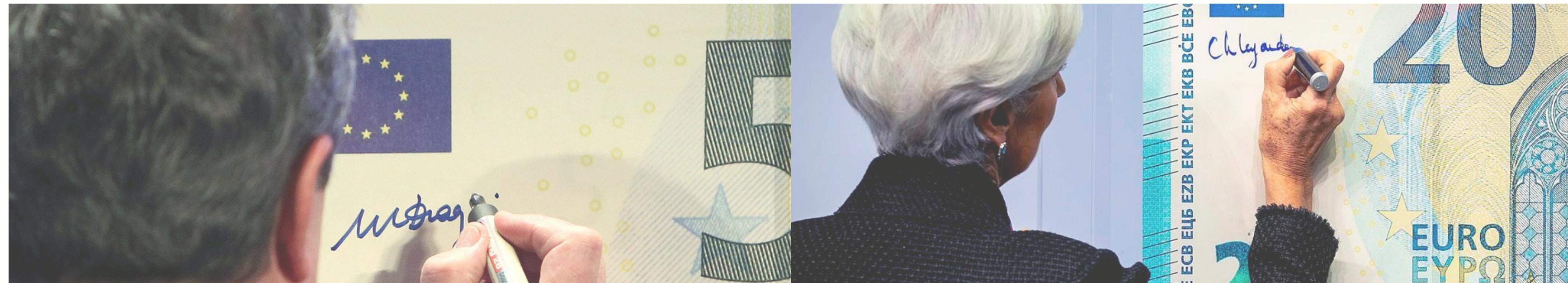
Analyze the correlation between the communication style of the ECB Chairperson and the impact on financial markets, observing 2-hour changes in interest and exchange rates in the period 11/2011 – 06/2023

Literature

"Central bank communication and monetary policy: A survey of theory and evidence", by Blinder et al. (2008): seminal work

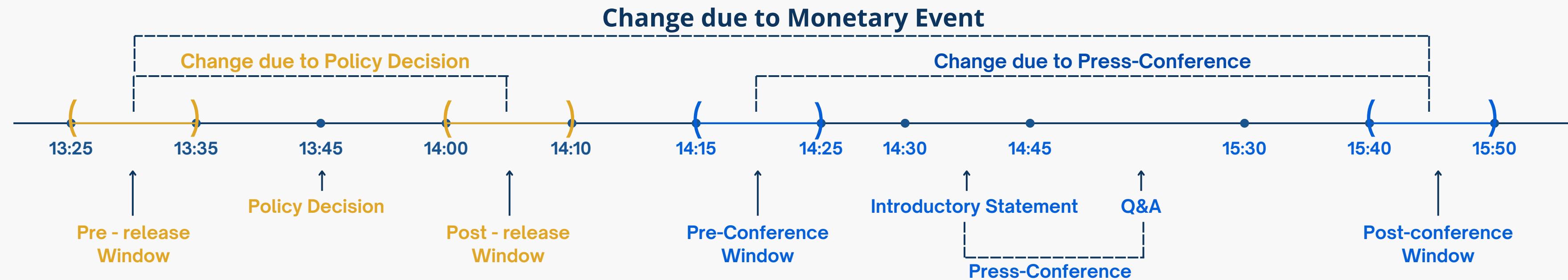
"An Assessment of the Consistency of ECB Communication Using Wordscores", by Jansen & de Haan (2010): introduction of Wordscores methodology

"The voice of monetary policy", by Gorodnichenko et al. (2023): introduction of non-verbal proxies

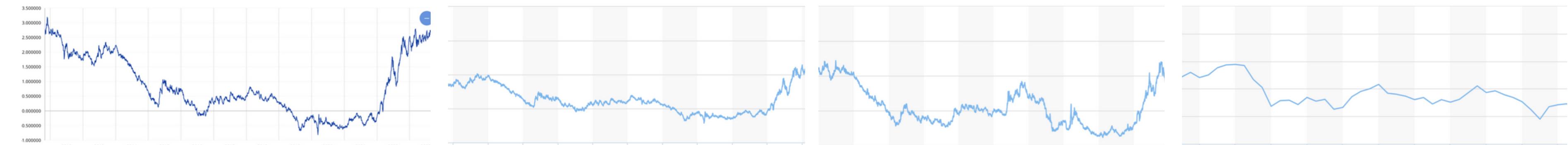


1. Financial Data review

PRESS RELEASE AND PRESS CONFERENCE - TEMPORAL WINDOWS



Timeline: November 2011 to October 2023



OVERNIGHT INDEXED SWAP CURVE



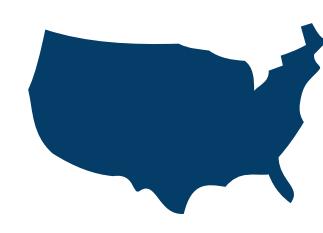
GERMANY 10Y BUND



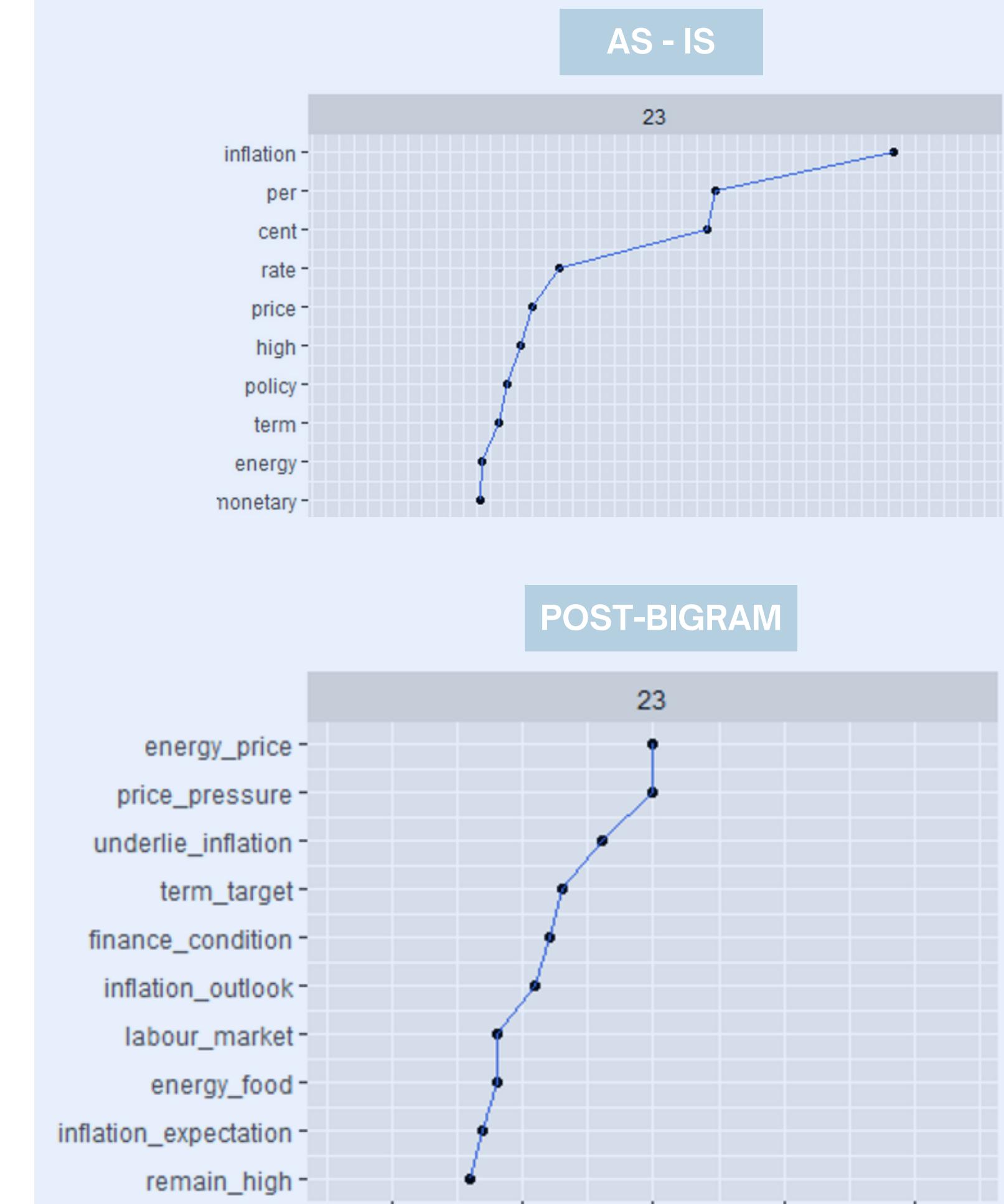
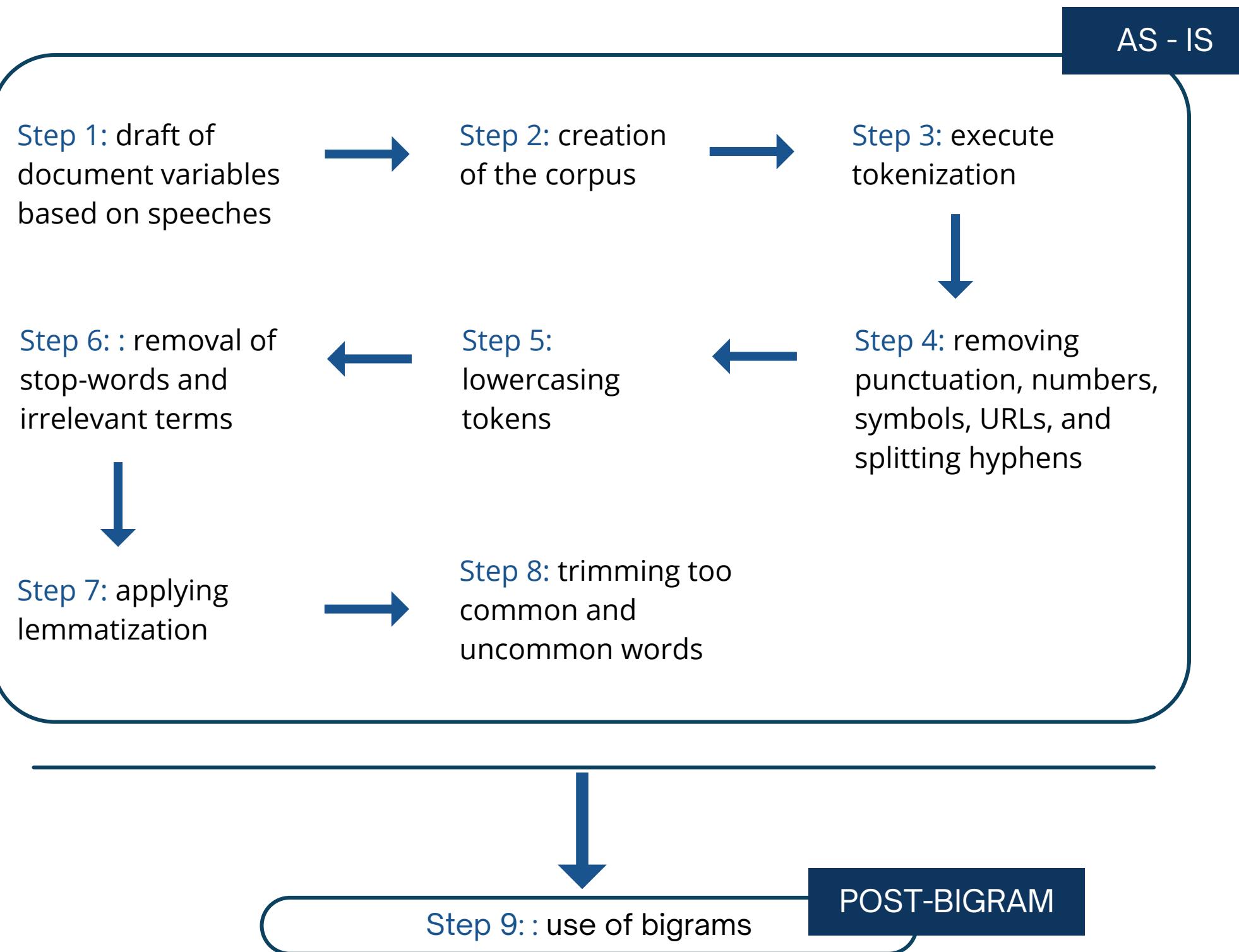
ITALY 10Y BTP



EURO-DOLLAR EXCHANGE RATE



2. Visualization



2. Visualization

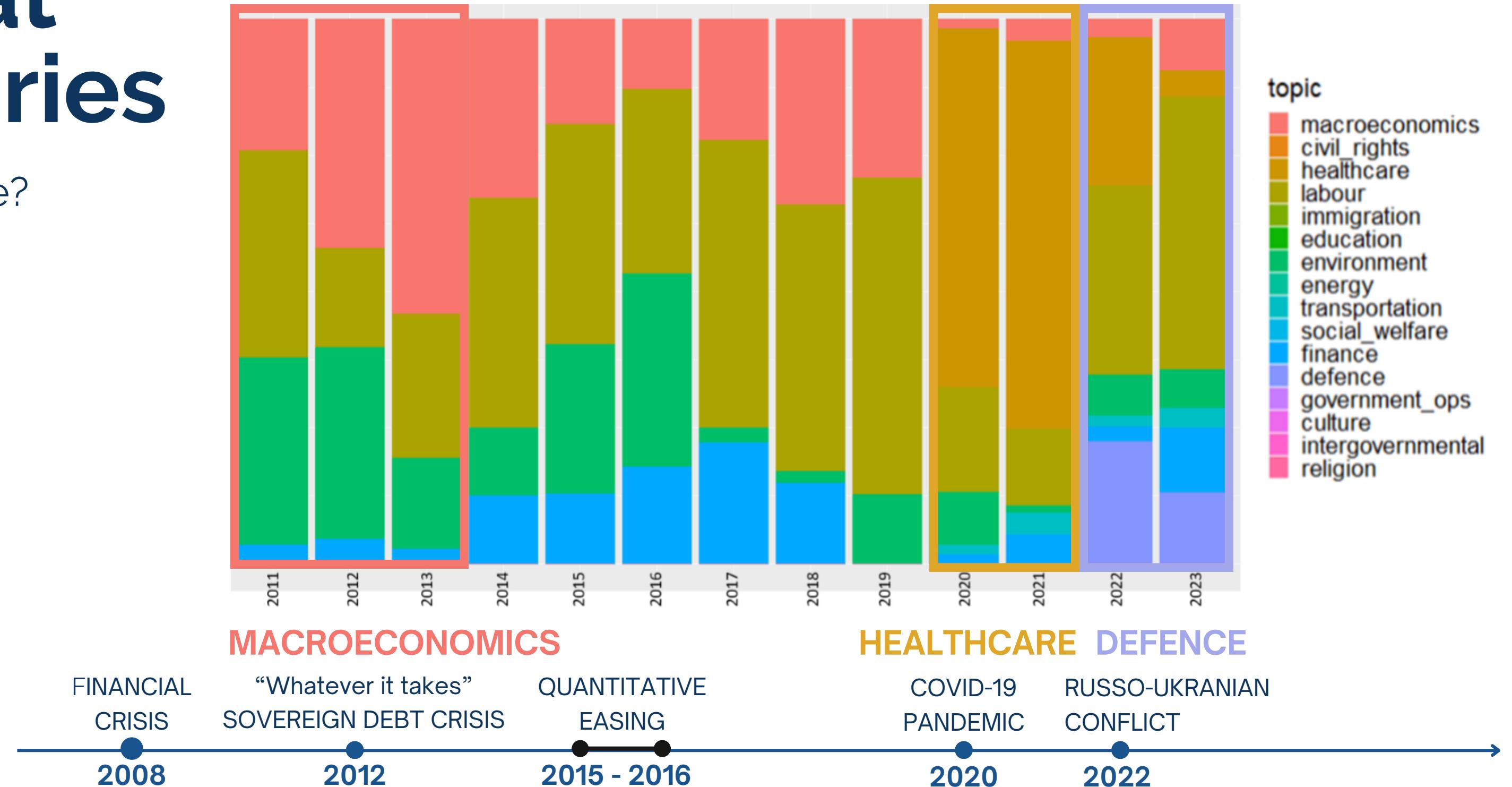


Observations

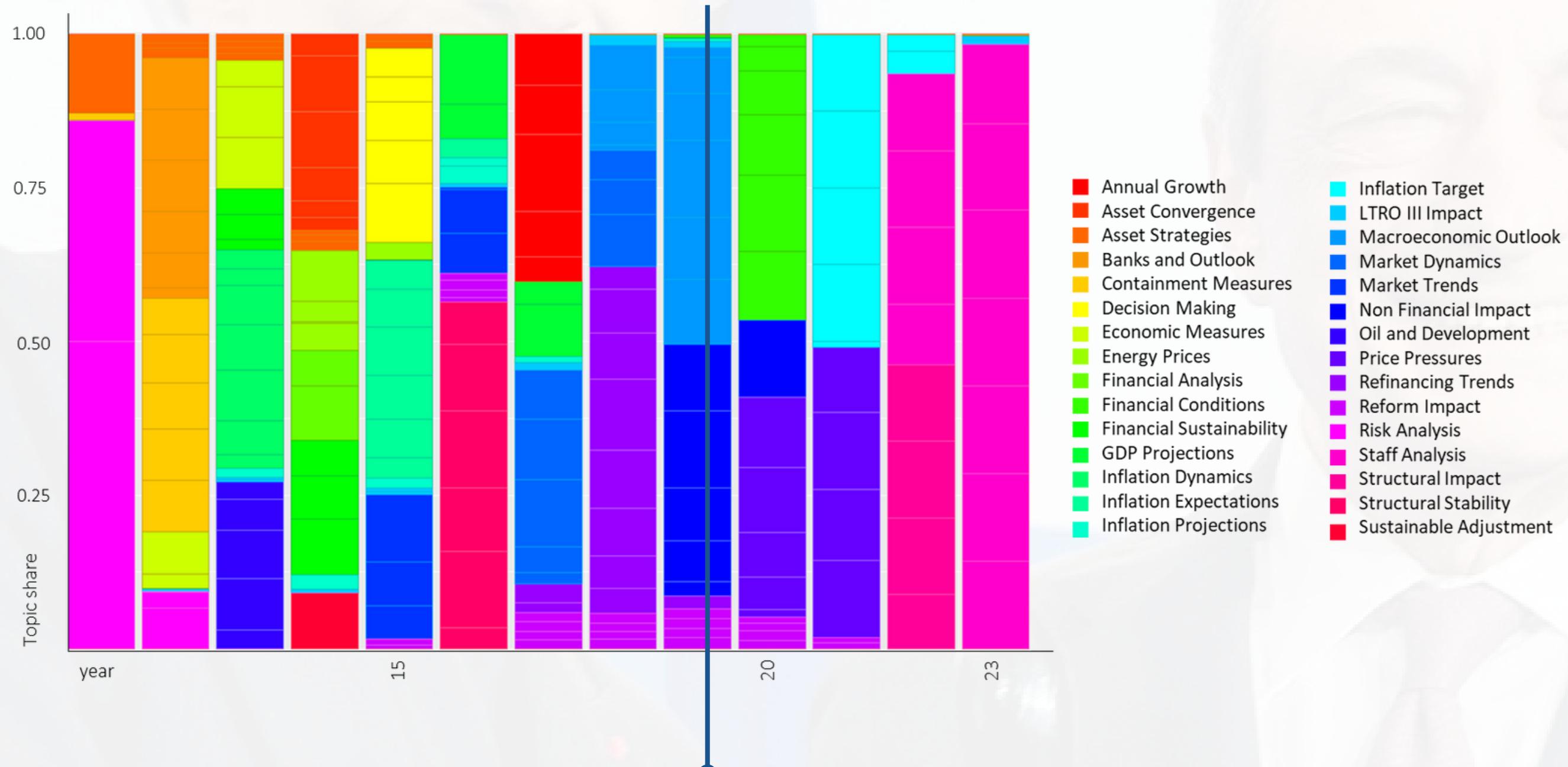
1. Among these words, it is notable the absence of any reference to Covid19. Can you get why?
 2. This may appear messy, therefore a clearer picture is provided next page

A Look at dictionaries

What can we notice?



3. Building the Model



1 NOVEMBER 2019

Ms. Christine Lagarde is appointed
as ECB Chairwoman

Main Takeaways

- Mr. Draghi's speeches, although concise, covered a **greater variety of topics**, focusing mostly on macroeconomic themes (e.g. financial conditions, adjustments and banking).
- Ms. Lagarde's speeches are instead concentrated on **fewer topics**, likely due to complex challenges faced during her mandate.
- Complex periods** exhibit much lower variety of topics in the speeches.
- Notice how **risk-related** topics have currently regained relevance after 2011.

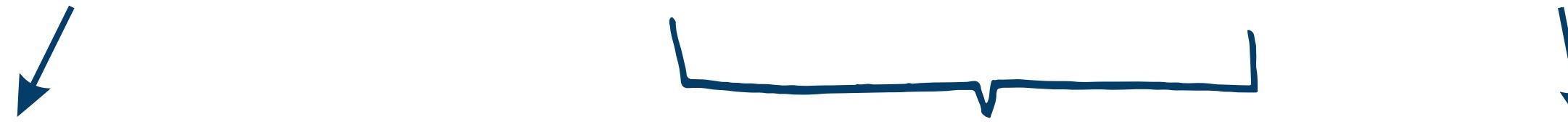
3. Building the Model

$$\Delta OIS\ 10Y = \beta_0 + \beta_n Topics_n + \beta_{GOV} Draghi + \epsilon$$

$$\Delta EURUSD = \beta_0 + \beta_n Topics_n + \beta_{GOV} Draghi + \epsilon$$

$$\Delta IT\ 10Y = \beta_0 + \beta_n Topics_n + \beta_{GOV} Draghi + \epsilon$$

$$\Delta DE\ 10Y = \beta_0 + \beta_n Topics_n + \beta_{GOV} Draghi + \epsilon$$



Dependent variables

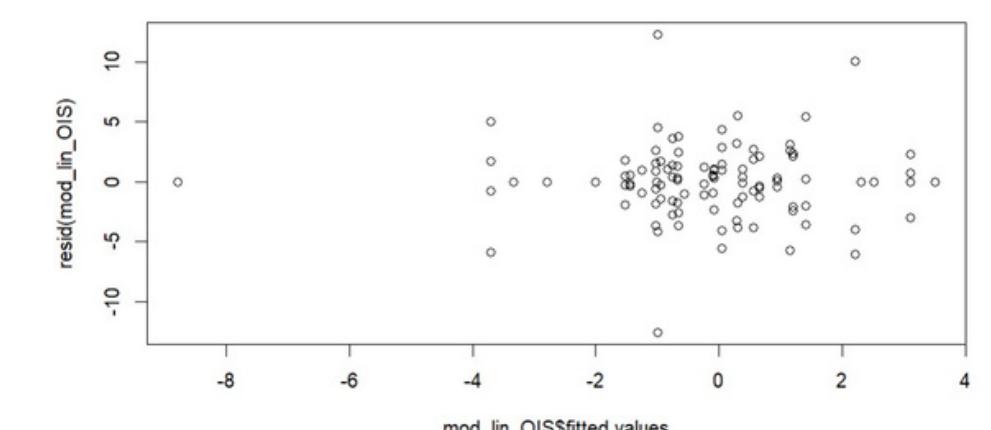
- These financial proxies are signals of the immediate market response in the very-short window before and after the monetary policy press release.
- The change is expressed in basis points (1 bp = 0.01%)

Independent variables

- "Topics" represent only the major topic for each speech.¹
- "Draghi" $\begin{cases} 1 & \text{if Mr. Draghi was the Chairmen} \\ 0 & \text{if Ms. lagarde was the Chairwomen} \end{cases}$

Residual error

Residuals being randomly scattered around zero without any discernible pattern.



¹ Deeply discussed in the report

3. Regressions' outputs - raw

OLS estimation, Dep. Var.: OIS_10Y
 Observations: 105
 Fixed-effects: year: 13
 Standard-errors: Clustered (year)

	Estimate	Std. Error	t value	Pr(> t)		
topic_label_facAsset_Convergence	12.030000	6.837600e-15	1.759398e+15	< 2.2e-16 ***		
topic_label_facAsset_Strategies	1.040000	3.629900e-15	2.865106e+14	< 2.2e-16 ***		
topic_label_facBanks_and_Outlook	0.890000	1.178190e-14	7.553985e+13	< 2.2e-16 ***		
topic_label_facContainment_Measures	-1.240370	2.581210e-01	-4.805384e+00	4.2958e-04 ***		
topic_label_facDecision_Making	0.655833	1.473900e-15	4.449737e+14	< 2.2e-16 ***		
topic_label_facEconomic_Measures	-0.588333	1.891000e-14	-3.111226e+13	< 2.2e-16 ***		
topic_label_facEnergy_Prices	-2.347037	2.581210e-01	-9.092779e+00	9.9063e-07 ***		
topic_label_facFinancial_Analysis	-2.505000	9.546700e-15	-2.623930e+14	< 2.2e-16 ***		
topic_label_facFinancial_Conditions	0.396667	2.229720e-14	1.778995e+13	< 2.2e-16 ***		
topic_label_facFinancial_Sustainability	0.900000	3.175800e-15	2.833945e+14	< 2.2e-16 ***		
topic_label_facGDP_Projections	2.603333	9.050000e-17	2.875369e+16	< 2.2e-16 ***		
topic_label_facInflation_Dynamics	-2.080370	2.581210e-01	-8.059672e+00	3.4842e-06 ***		
topic_label_facInflation_Expectations	-2.870000	1.075820e-14	-2.667740e+14	< 2.2e-16 ***		
topic_label_facInflation_Targets	2.664167	2.092210e-14	1.273373e+14	< 2.2e-16 ***		
topic_label_facLTRO_III_Impact	1.139630	2.581210e-01	4.415099e+00	8.4279e-04 ***		
topic_label_facMacroeconomic_Outlook	3.036667	1.211530e-14	2.506473e+14	< 2.2e-16 ***		
topic_label_facMarket_Dynamics	-4.150000	1.142380e-14	-3.632769e+14	< 2.2e-16 ***		
topic_label_facNon_Financial_Impact	-0.650000	8.742800e-15	-7.434705e+13	< 2.2e-16 ***		
topic_label_facPrice_Pressures	2.800000	5.747900e-15	4.871326e+14	< 2.2e-16 ***		
topic_label_facRefinancing_Trends	4.100000	1.104800e-15	3.711117e+15	< 2.2e-16 ***		
topic_label_facReform_Impact	-0.276296	9.034234e-01	-3.058330e-01	7.6497e-01		
topic_label_facStructural_Impact	4.450000	1.351700e-15	3.292198e+15	< 2.2e-16 ***		
topic_label_facStructural_Stability	11.230000	7.442700e-15	1.508868e+15	< 2.2e-16 ***		
draghi	-1.100000	5.638000e-16	-1.950994e+15	< 2.2e-16 ***		
... 2 variables were removed because of collinearity (topic_label_facStaff_Analysis and topic_label_facSustainable_Adjustments)						

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'	0.1 ' '	1
RMSE:	3.08924	Adj. R2:	-0.168683	Within R2:	0.18111	

OLS estimation, Dep. Var.: EURUSD
 Observations: 105
 Fixed-effects: year: 13
 Standard-errors: Clustered (year)

	Estimate	Std. Error	t value	Pr(> t)		
topic_label_facAsset_Convergence	1.730000	1.206000e-15	1.434189e+15	< 2.2e-16 ***		
topic_label_facAsset_Strategies	0.433333	5.010000e-16	8.640865e+14	< 2.2e-16 ***		
topic_label_facBanks_and_Outlook	-0.421667	1.848000e-15	-2.282236e+14	< 2.2e-16 ***		
topic_label_facContainment_Measures	-0.168519	6.031724e-02	-2.93870e+00	1.6228e-02 *		
topic_label_facDecision_Making	0.615000	2.920000e-16	2.107726e+15	< 2.2e-16 ***		
topic_label_facEconomic_Measures	0.683333	3.824000e-15	1.786855e+14	< 2.2e-16 ***		
topic_label_facEnergy_Prices	-0.481852	6.031724e-02	-7.988630e+00	3.8151e-06 ***		
topic_label_facFinancial_Analysis	-1.217500	2.365000e-15	-5.146921e+14	< 2.2e-16 ***		
topic_label_facFinancial_Conditions	-0.115000	3.244000e-15	-3.544871e+13	< 2.2e-16 ***		
topic_label_facFinancial_Sustainability	-1.320000	1.387000e-15	-9.514135e+14	< 2.2e-16 ***		
topic_label_facGDP_Projections	0.190000	1.770000e-16	1.073211e+15	< 2.2e-16 ***		
topic_label_facInflation_Dynamics	-0.285185	6.031724e-02	-4.728090e+00	4.9014e-04 ***		
topic_label_facInflation_Expectations	-0.895000	1.657000e-15	-5.399760e+14	< 2.2e-16 ***		
topic_label_facInflation_Targets	0.635833	1.953000e-15	3.255618e+14	< 2.2e-16 ***		
topic_label_facLTRO_III_Impact	0.211481	6.031724e-02	3.506150e+00	4.3325e-03 **		
topic_label_facMacroeconomic_Outlook	-0.221667	1.943000e-15	-1.140842e+14	< 2.2e-16 ***		
topic_label_facMarket_Dynamics	-1.289167	2.271000e-15	-5.676516e+14	< 2.2e-16 ***		
topic_label_facNon_Financial_Impact	-1.100000	1.364000e-15	-8.063829e+14	< 2.2e-16 ***		
topic_label_facPrice_Pressures	-0.607500	9.920000e-16	-6.126755e+14	< 2.2e-16 ***		
topic_label_facRefinancing_Trends	-0.177500	3.690000e-16	-4.811345e+14	< 2.2e-16 ***		
topic_label_facReform_Impact	0.415185	2.111104e-01	1.966670e+00	7.2779e-02 *		
topic_label_facStructural_Impact	-0.480000	5.480000e-16	-8.758260e+14	< 2.2e-16 ***		
topic_label_facStructural_Stability	1.883333	8.440000e-16	2.230466e+15	< 2.2e-16 ***		
draghi	-0.035000	3.060000e-16	-1.143329e+14	< 2.2e-16 ***		
... 2 variables were removed because of collinearity (topic_label_facStaff_Analysis and topic_label_facSustainable_Adjustments)						

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'	0.1 ' '	1
RMSE:	0.498881	Adj. R2:	-0.206546	Within R2:	0.19354	

OLS estimation, Dep. Var.: IT10Y
 Observations: 105
 Fixed-effects: year: 13
 Standard-errors: Clustered (year)

	Estimate	Std. Error	t value	Pr(> t)		
topic_label_facAsset_Convergence	20.763333	1.732000e-14	1.198667e+15	< 2.2e-16 ***		
topic_label_facAsset_Strategies	2.583333	7.810000e-15	3.305760e+14	< 2.2e-16 ***		
topic_label_facBanks_and_Outlook	13.260000	5.899000e-14	2.247926e+14	< 2.2e-16 ***		
topic_label_facContainment_Measures	-5.798148	2.563253e+00	-2.262028e+00	0.043053 *		
topic_label_facDecision_Making	0.650000	3.820000e-15	1.701188e+14	< 2.2e-16 ***		
topic_label_facEconomic_Measures	11.675000	6.687000e-14	1.745933e+14	< 2.2e-16 ***		
topic_label_facEnergy_Prices	-7.148148	2.563253e+00	-2.788702e+00	0.016384 *		
topic_label_facFinancial_Analysis	6.660000	6.361000e-14	1.047085e+14	< 2.2e-16 ***		
topic_label_facFinancial_Conditions	11.260000	5.996000e-14	1.877989e+14	< 2.2e-16 ***		
topic_label_facFinancial_Sustainability	23.410000	6.561000e-14	3.568209e+14	< 2.2e-16 ***		
topic_label_facGDP_Projections	-3.700000	7.380000e-15	-5.014767e+14	< 2.2e-16 ***		
topic_label_facInflation_Dynamics	-0.931481	2.563253e+00	-3.633980e-01	0.722629		
topic_label_facInflation_Expectations	8.160000	5.899000e-14	1.383362e+14	< 2.2e-16 ***		
topic_label_facInflation_Targets	18.902500	6.828000e-14	2.768202e+14	< 2.2e-16 ***		
topic_label_facLTRO_III_Impact	-2.435648	2.563253e+00	-9.502180e-01	0.360748		
topic_label_facMacroeconomic_Outlook	17.660000	5.897000e-14	2.994514e+14	< 2.2e-16 ***		
topic_label_facMarket_Dynamics	2.910000	7.549000e-14	3.854740e+13	< 2.2e-16 ***		
topic_label_facNon_Financial_Impact	-2.340000	1.391000e-14	-1.682563e+14	< 2.2e-16 ***		
topic_label_facPrice_Pressures	-7.190000	4.540000e-14	-1.583860e+14	< 2.2e-16 ***		
topic_label_facRefinancing_Trends	7.937500	7.860000e-15	1.009247e+15	< 2.2e-16 ***		
topic_label_facReform_Impact	-1.318519	8.971384e+00	-1.469690e-01	0.885597		
topic_label_facStructural_Impact	4.210000	1.387000e-14	3.034811e+14	< 2.2e-16 ***		
topic_label_facStructural_Stability	18.058333	1.577000e-14	1.144805e+15	< 2.2e-16 ***		
draghi	-11.700000	3.960000e-15	-2.956375e+15	< 2.2e-16 ***		
... 2 variables were removed because of collinearity (topic_label_facStaff_Analysis and topic_label_facSustainable_Adjustments)						

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'	0.1 ' '	1
RMSE:	7.95393	Adj. R2:	-0.039806	Within R2:	0.249016	

OLS estimation, Dep. Var.: DE10Y
 Observations: 105
 Fixed-effects: year: 13
 Standard-errors: Clustered (year)

4. Interpretations - two examples

First 15 bigrams in Topic 10:
Asset Convergence

Topic 10

"asset_purchase"	"favourable_finance"	"previous_month"	"finance_condition"
"underlie_inflation"	"bank_lend"	"towards_level"	"area_economy"
"3_quarter"	"rate_towards"	"economic_analysis"	"secure_sustain"
"annual_growth"	"look_ahead"	"economic_expansion"	



- High β on OIS 10Y (12.030)
- Low β on EUR/USD (1.730)
- High β on IT 10Y (20.763)
- High β on DE 10Y (16.663)



- **OIS 10Y:** Asset convergence talks sway interest rate swaps with far less volatility than 10-year sovereign bonds due to different **investor bases, liquidity, duration** and their function as a **hedging** tool against OIS short-term fluctuations.
- The low beta on **EUR/USD** suggests that the Topic has a relatively minor effect on FX trades.

First 15 bigrams in Topic 16:
Inflation Expectations

Topic 16

"energy_price"	"energy_food"	"inflation_expectation"	"high_energy"
"supply_bottleneck"	"price_pressure"	"high_inflation"	"term_inflation"
"economic_activity"	"price_inflation"	"bank_lend"	"basis_point"
"near_term"	"inflation_outlook"	"food_price"	



- Low β on OIS 10Y (-2.870)
- Modest β on EUR/USD (-0.895)
- High β on IT 10Y (8.160)
- Low β on DE 10Y (-4.300)



- **IT 10Y BTP:** Inflation-related discussions have a notable positive impact on Italian 10 Y bond yields (this stems from uncertainty on the Italian financial resilience).
- Far minor impact (negative) on **Germany 10Y bund**, highlighting markets' consideration of Germany as the Europe's engine and Bund as continent's risk-free asset.
- **OIS 10Y:** Scholarly inverse relationship between inflation and interest rates

4. Interpretations - dummy



Linear Regression Results - OIS 10 Y

OLS estimation, Dep. Var.: OIS_10Y
Observations: 105
Fixed-effects: year: 13
Standard-errors: Clustered (year)

	Estimate	Std. Error	t value	Pr(> t)
draghi	-1.100000	5.638000e-16	-1.950994e+15	< 2.2e-16 ***

Liner Regression Results – EURUSD

OLS estimation, Dep. Var.: EURUSD
Observations: 105
Fixed-effects: year: 13
Standard-errors: Clustered (year)

	Estimate	Std. Error	t value	Pr(> t)
draghi	-0.035000	3.060000e-16	-1.143329e+14	< 2.2e-16 ***

Linear Regression Results – IT 10 Y

OLS estimation, Dep. Var.: IT10Y
Observations: 105
Fixed-effects: year: 13
Standard-errors: Clustered (year)

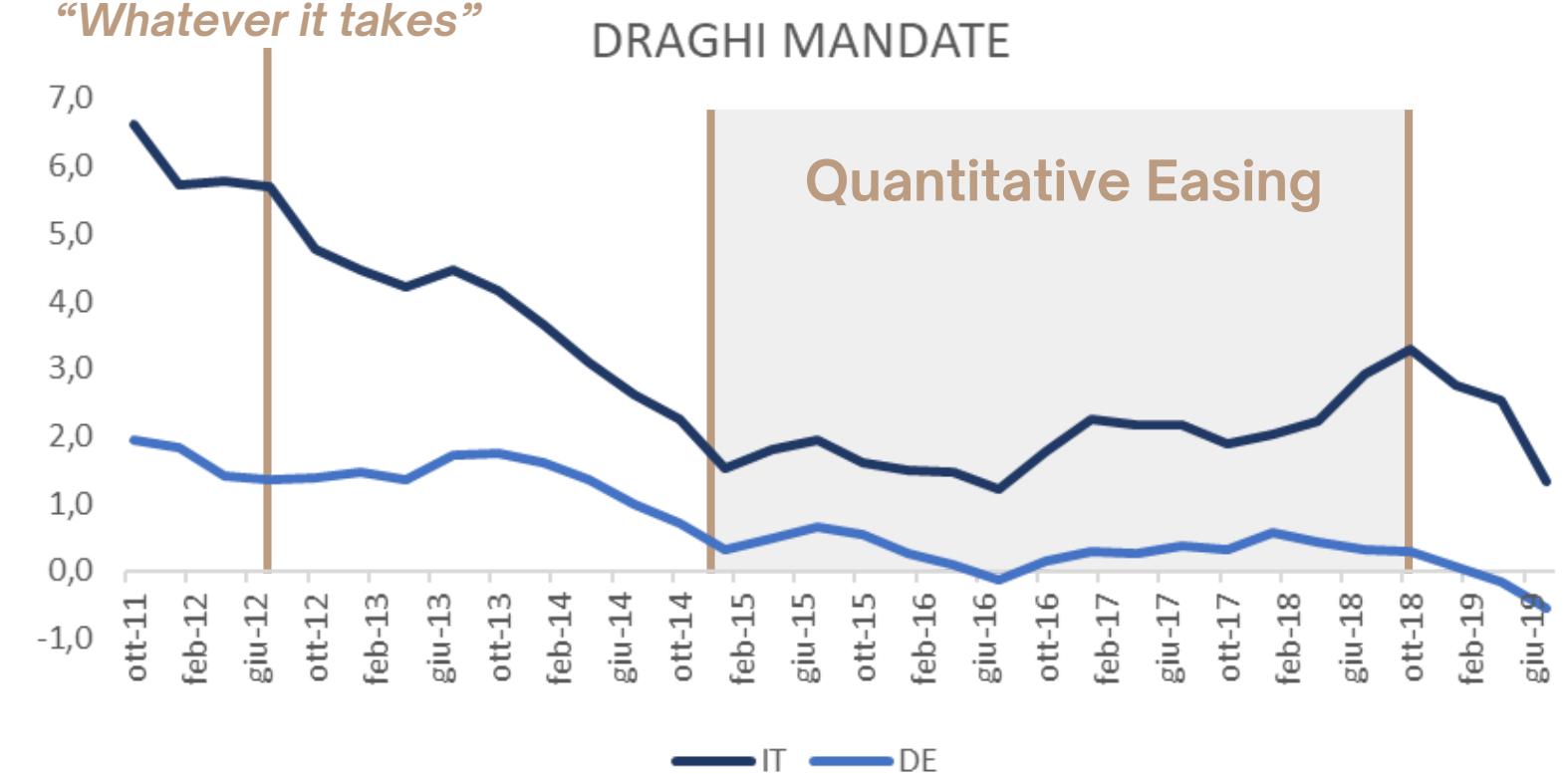
	Estimate	Std. Error	t value	Pr(> t)
draghi	-11.700000	3.960000e-15	-2.956375e+15	< 2.2e-16 ***

Linear Regression Results – DE 10 Y

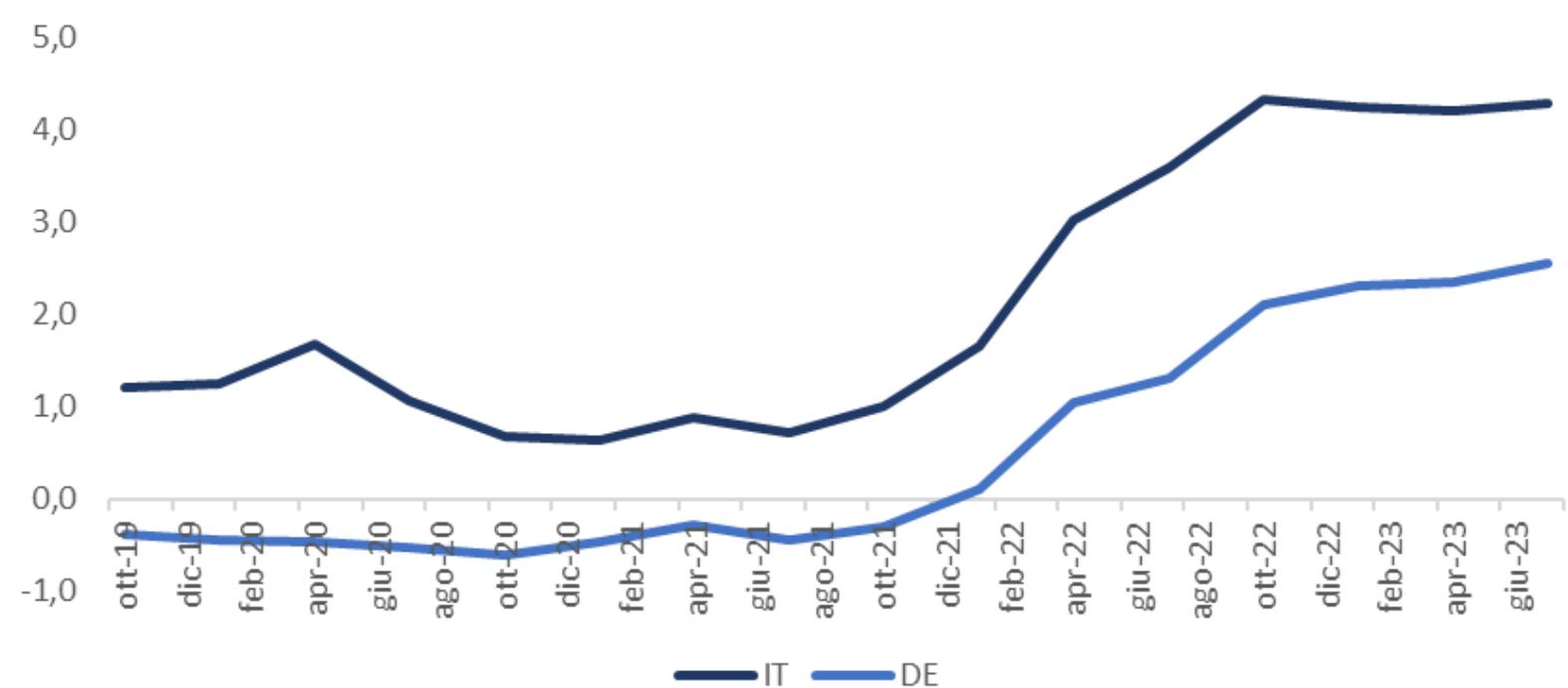
OLS estimation, Dep. Var.: DE10Y
Observations: 105
Fixed-effects: year: 13
Standard-errors: Clustered (year)

	Estimate	Std. Error	t value	Pr(> t)
draghi	-2.350000	1.355000e-15	-1.733949e+15	< 2.2e-16 ***

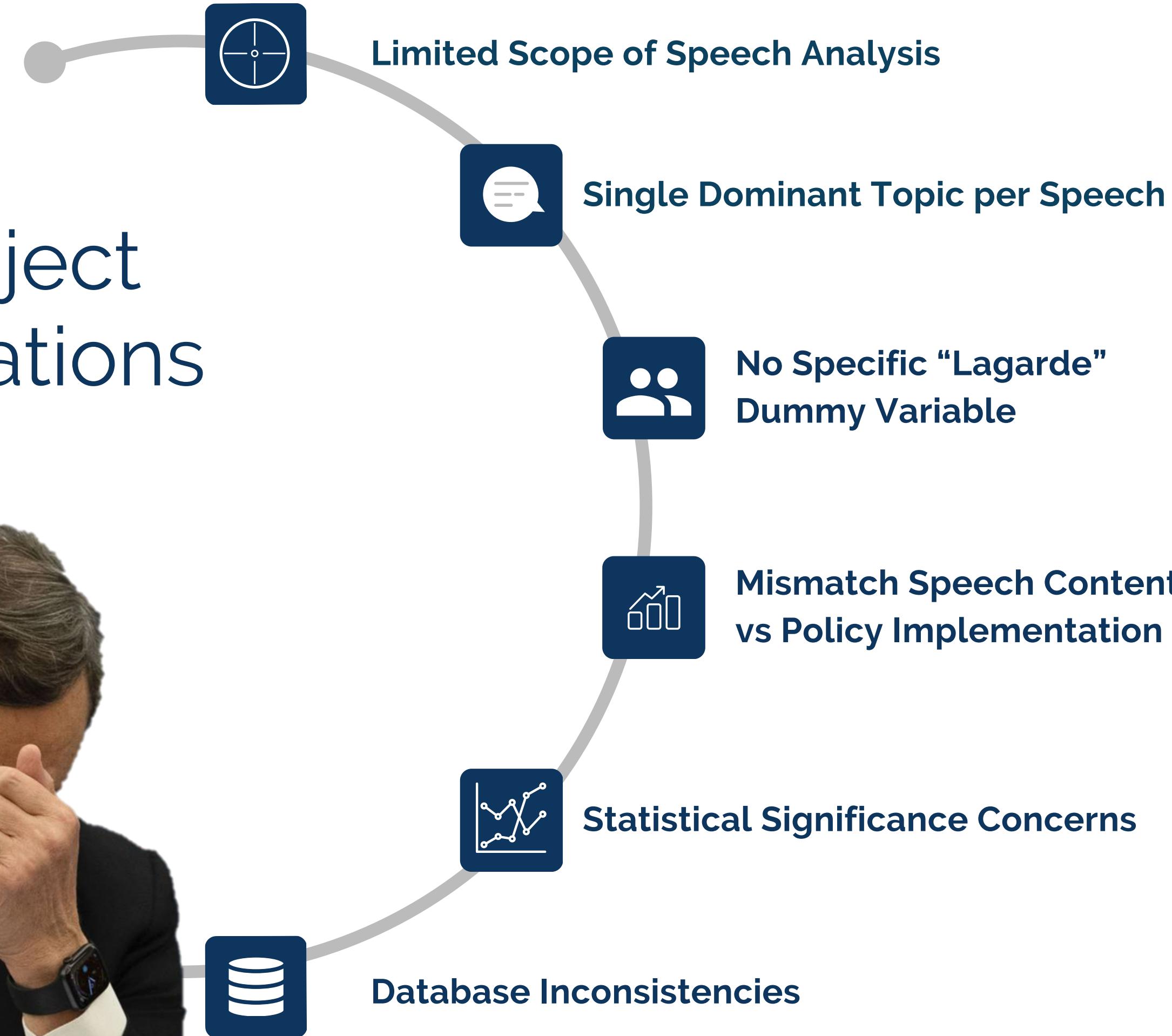
“Whatever it takes”



LAGARDE MANDATE



5. Project Limitations



Potential bias due to a focus on Mario Draghi's presidency, with less on Christine Lagarde's ongoing term.

Only including one main topic from each speech in the regression model may limit comprehensive understanding.

Absence of a distinct variable for Lagarde's tenure might affect the precision in interpreting her communication's market impact.

Potential discrepancy between ECB speech and actual monetary policies, which might lead to overestimating the speeches' market effects.

Issues with collinearity, heteroskedasticity and R^2 could impact the interpretability and overall significance of the regression model.

Any inaccuracies in the initial datasets could affect the study's outcomes, though using the ECB's database, as in previous studies, minimizes this risk.

6. Conclusions

High R²

THE NARROW TIME WINDOWS SELECTED



Short time windows pre-post speech (2,5 hours) were **critical** for capturing immediate market impacts.

Indeed, longer windows, such as 1 or 3 days, would have **diluted** the significance of observed variations.

Satisfactory RMSE

THE CHOSEN PROXIES OF MARKET RESPONSE



10-year OIS Rate: benchmarks for LT financing rates

EUR/USD Exchange Rate: index of currency strength and macro-policy impact

Italian & German Bond Yields: measure of risk perception and domestic solidity

+ Aligned with financial literature

Normally Distributed Residuals

THE INCLUSION OF A GOVERNOR'S DUMMY



Differentiation of market response to ECB presidency, capturing specific effects:

- Mr. Draghi's tenure as a **stabilising market force**, especially for **Italian** sovereign titles.
- Ms. Lagarde's tenure contrasted without a dedicated **dummy** variable.¹

¹ Issue acknowledged as a project limitation

Thank You!

Group 9



Pier Paolo Mignone



Nicolò Garaffa



Niccolò Belvedere



Virginia Cappannoli



Cristina Solidoro



Salvatore Santalucia

