

Tracking the Impact of Covid-19 on Credit Risk: European Private Firms

Speakers

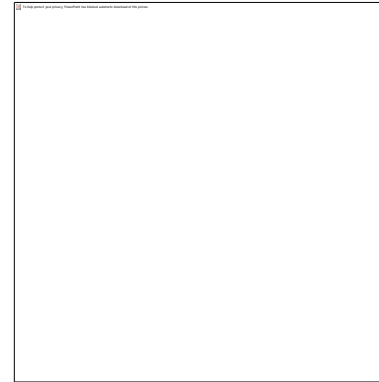


Moderator

Irina Baron

Director

Customer Success
Management

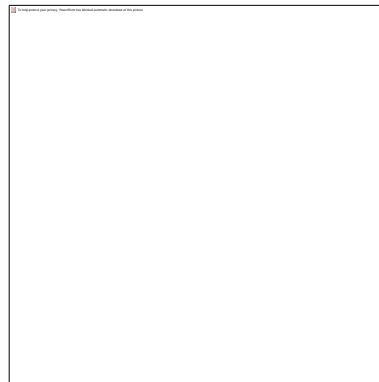


Presenter

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**Associate
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Presenter

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Overview

- » COVID-19 is a fast-developing epidemic that continues to be a major risk driver across the globe, APAC, Europe, and the Americas
- » Financial institutions are likely to re-assess expected losses while portfolio managers are likely to adjust exposures
- » The Moody's Analytics Expected Default Frequency (EDF™) measures reflect the current state of the credit cycles
- » We are seeing a significant increase of expected loss for **private companies** in Europe
- » Today's presentation is part of the webinar series providing a forward looking estimate of Point in Time (PIT) PD across geographies and sectors

Agenda

1. Public Firm EDFs for European Corporates
2. Private Firm Results
3. Forward Looking PIT Adjustment
4. Implications for Expected Loss
5. Summary

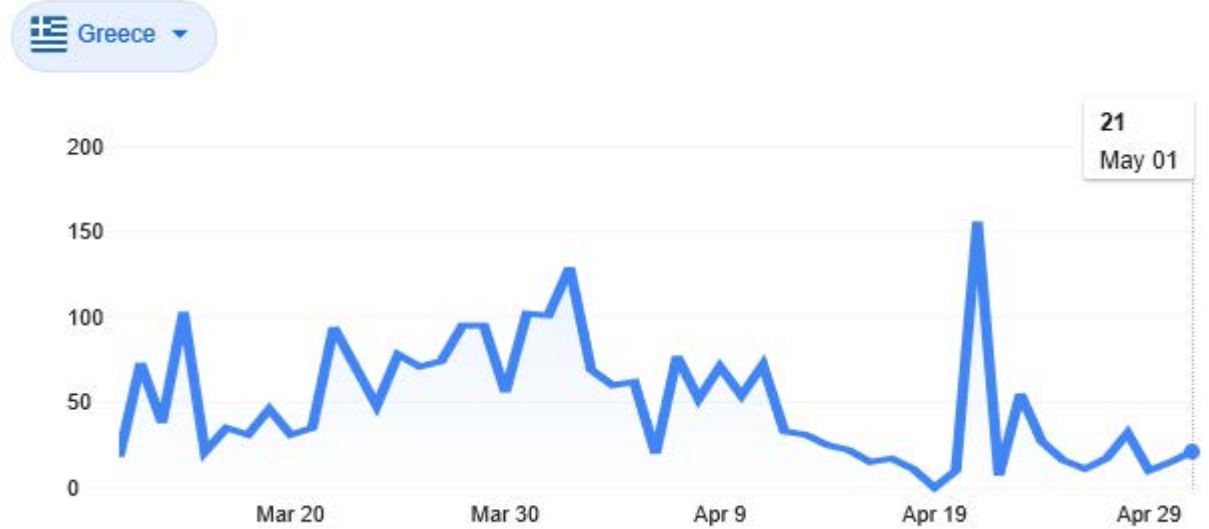
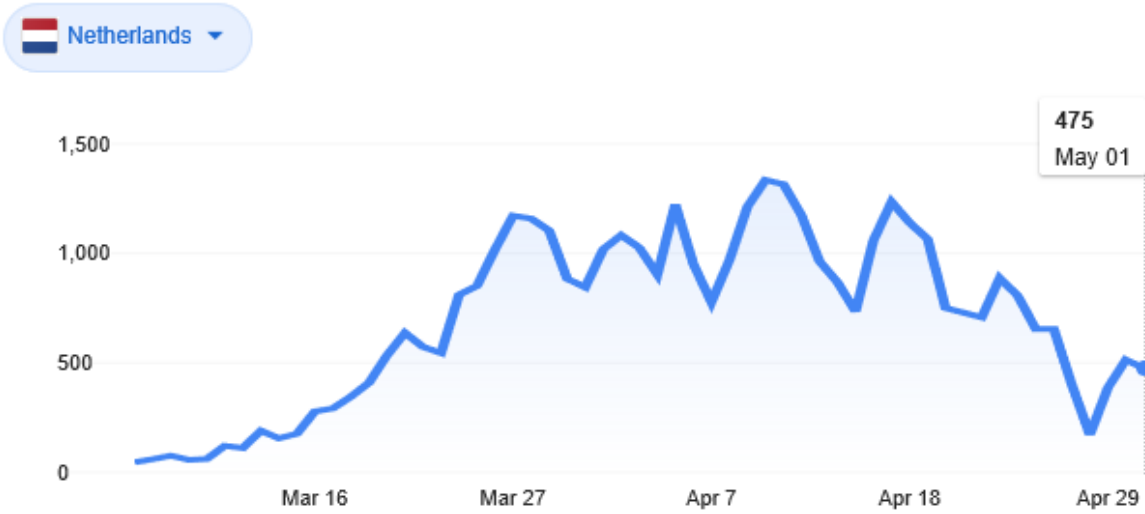
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Public Firm EDFs for
European Corporates

COVID-19 in Europe

Netherlands and Greece

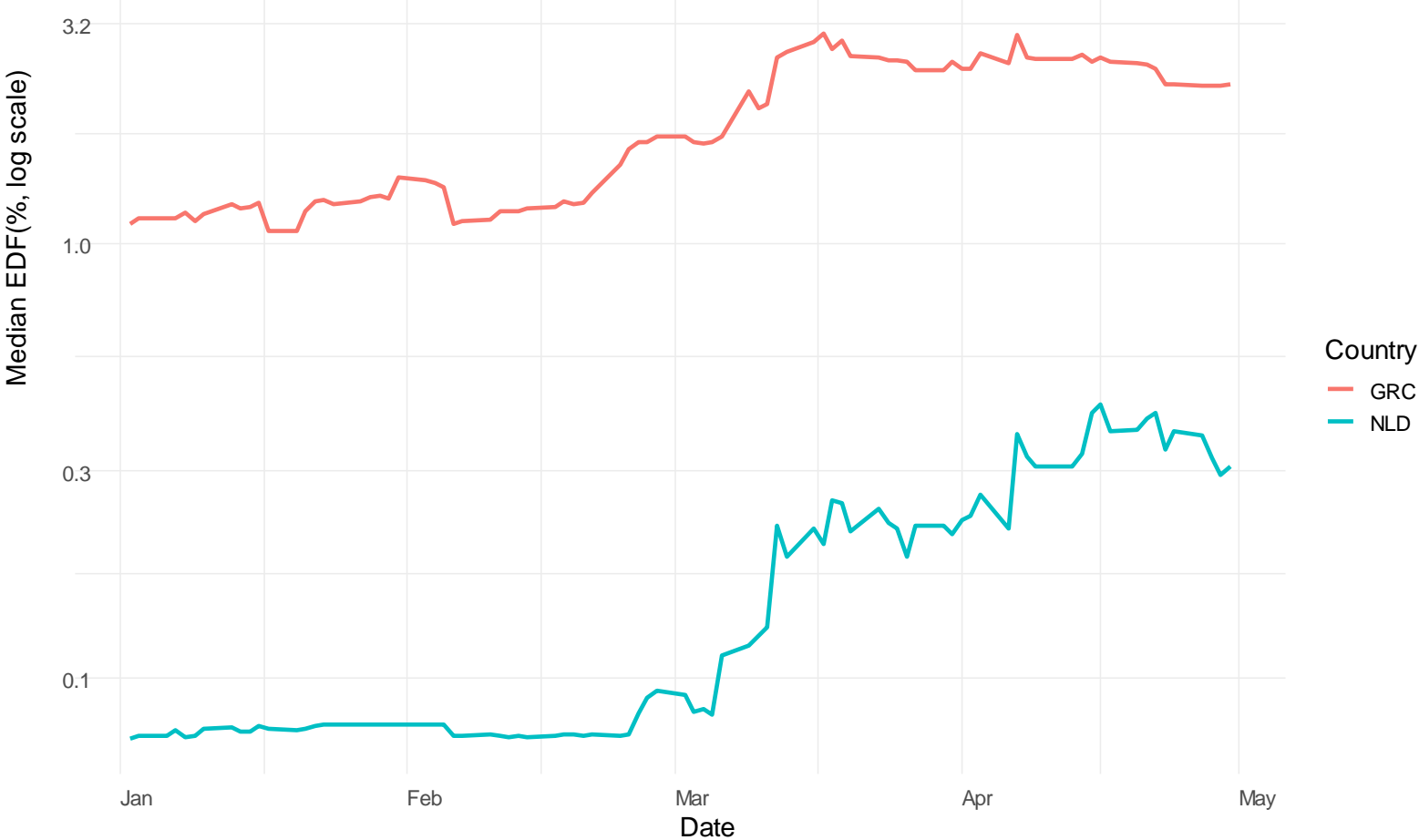
New cases



New cases are the confirmed cases reported since the previous day
Updated less than 20 mins ago · Source: [Wikipedia](#) · [About this data](#)

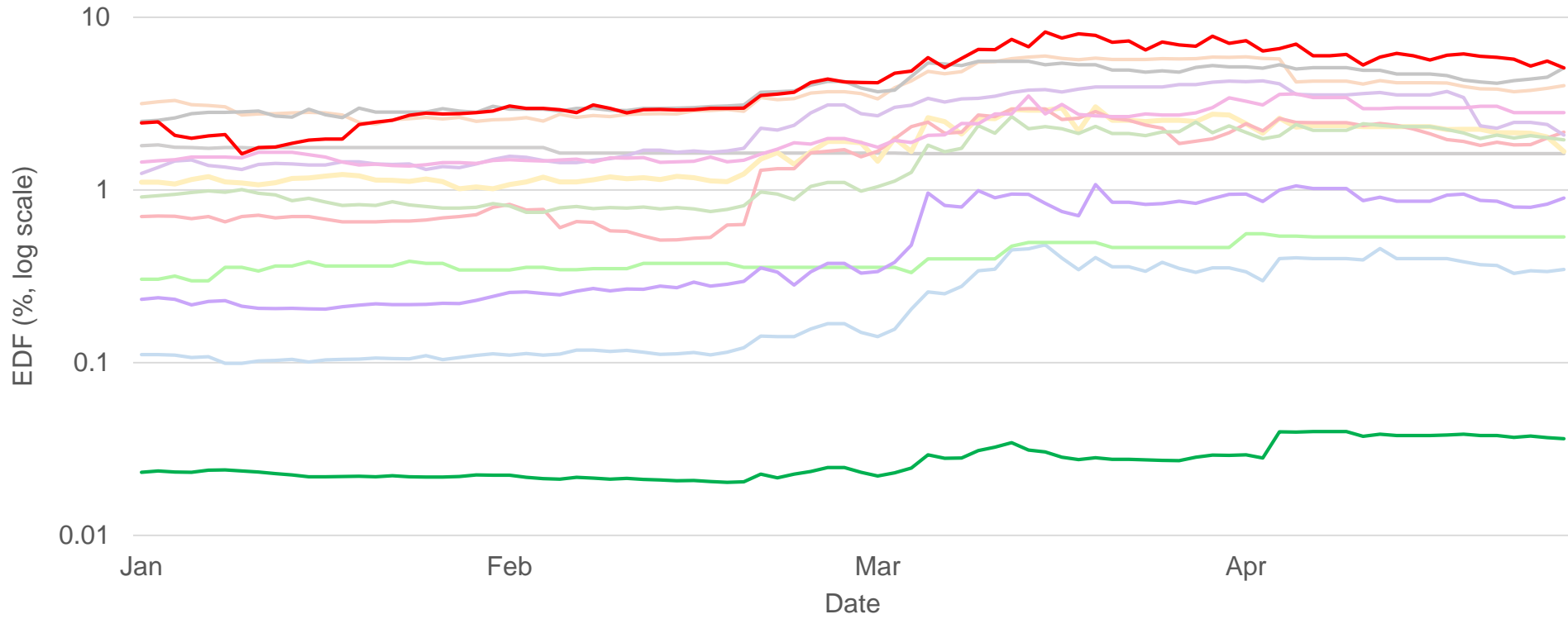
The impact is not the same across countries

Netherlands and Greece



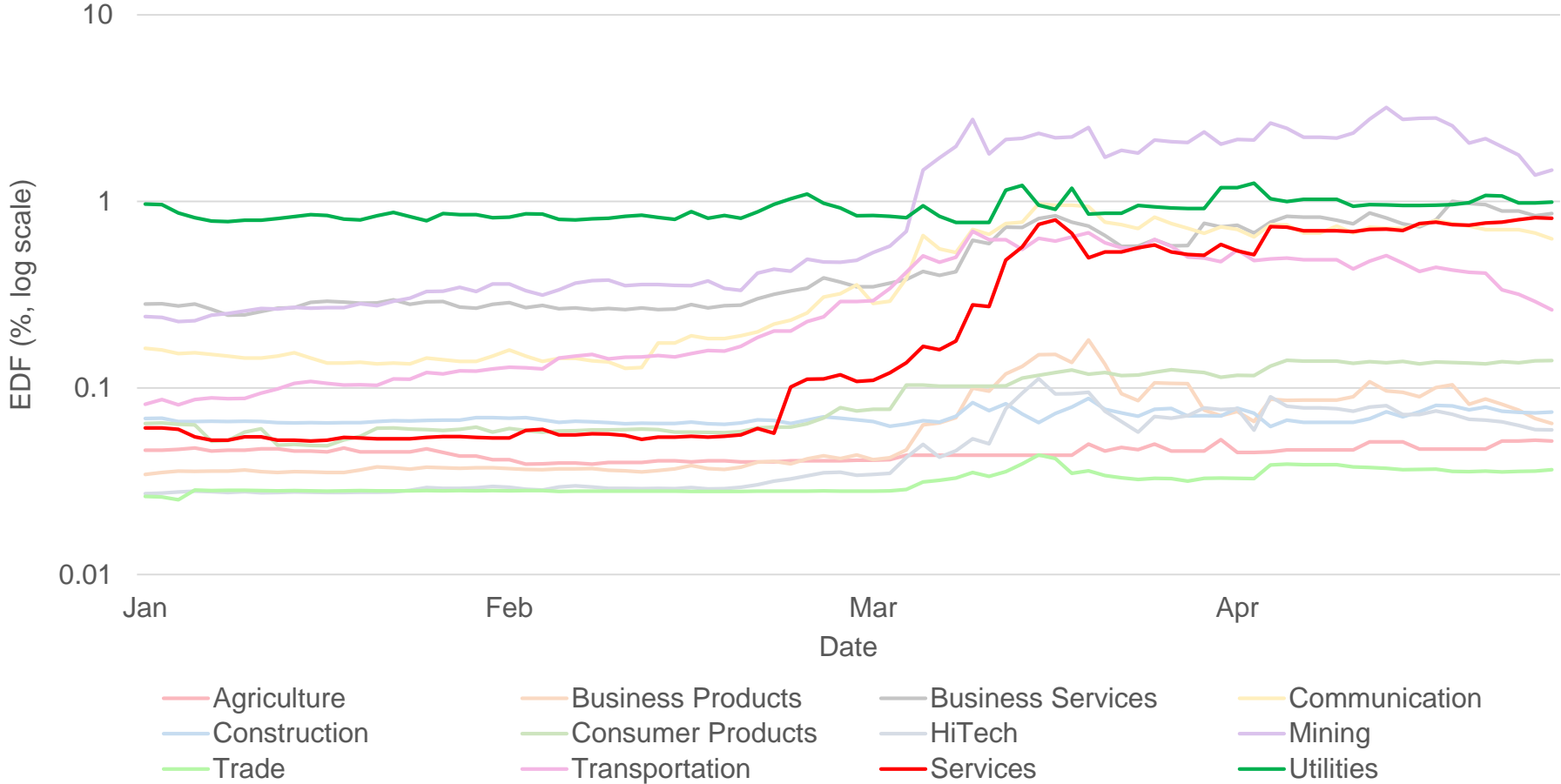
Country	Median EDF (Jan 2nd)	Median EDF (Apr 30th)	% Change
GRC	1.11%	2.32%	109%
NLD	0.07%	0.31%	322%

Timeline of Public EDFs for Greece



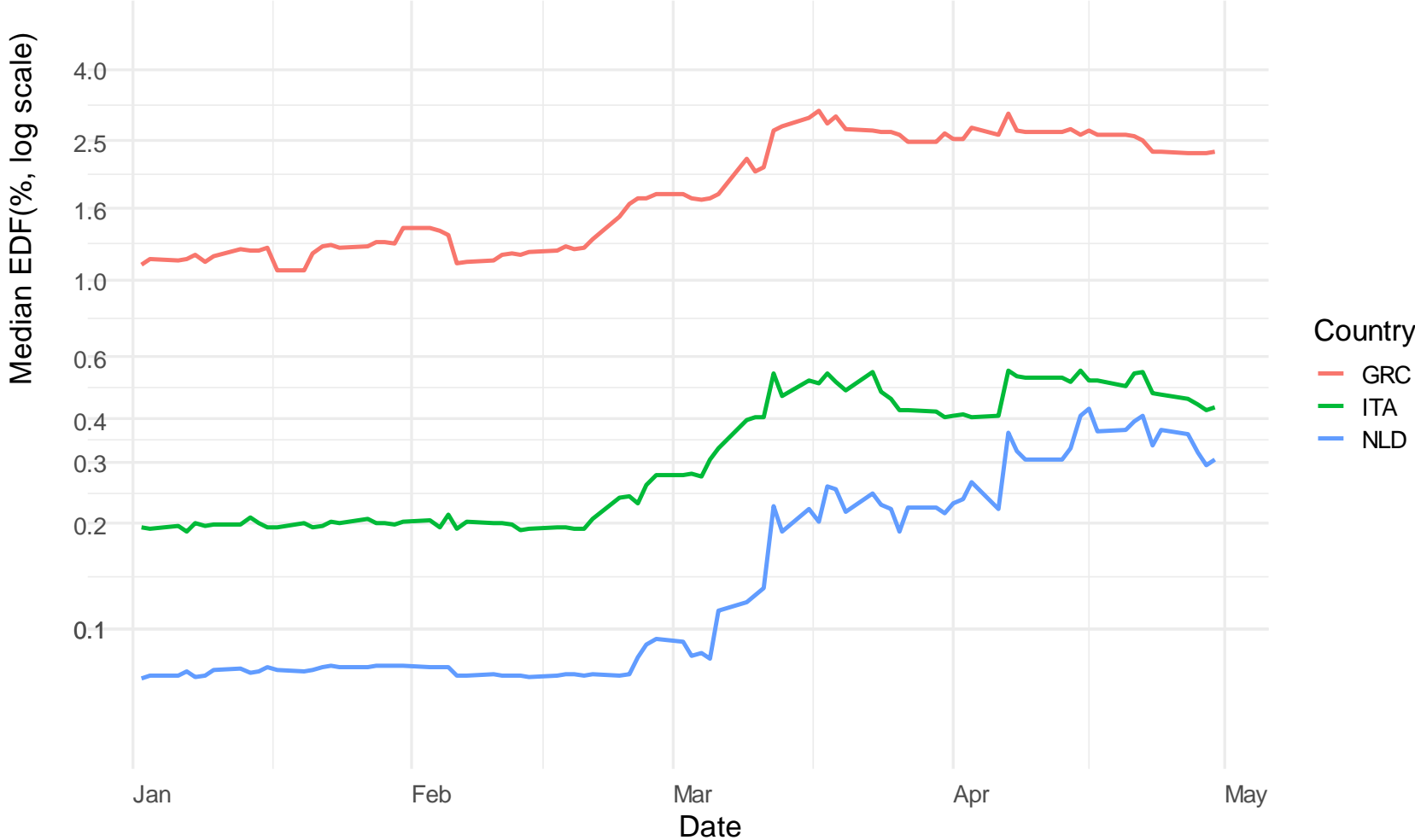
- Agriculture
- Business Products
- Business Services
- Communication
- Construction
- Consumer Products
- Health Care
- HiTech
- Services
- Trade
- Mining
- Transportation
- Utilities

Timeline of Public EDFs for Netherlands



Timeline of Public EDFs for European Countries

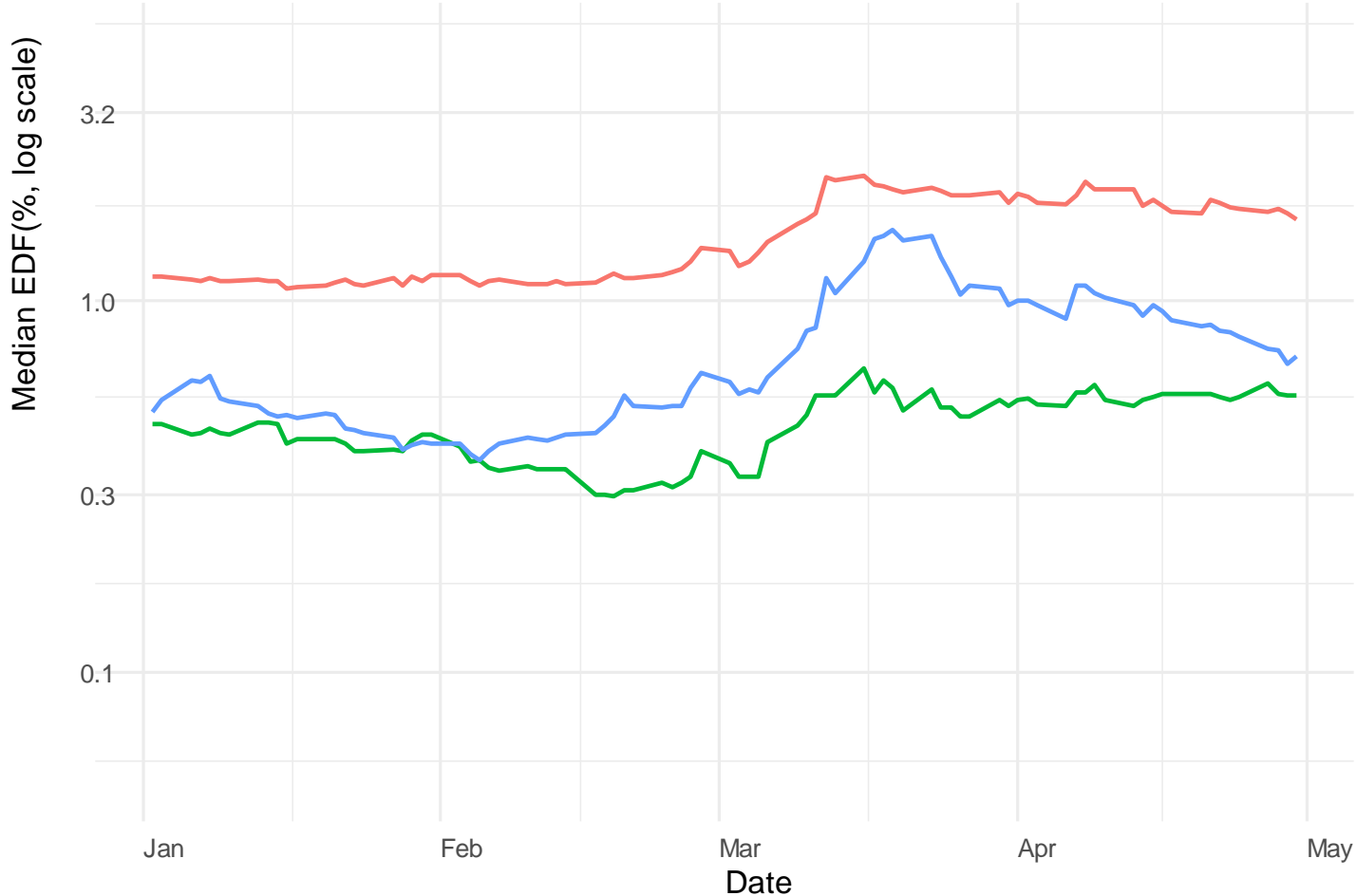
Western Europe



Country	Median EDF (Jan 2nd)	Median EDF (Apr 30th)	% Change	Absolute Change
GRC	1.11%	2.32%	109%	1.21%
ITA	0.20%	0.43%	121%	0.24%
NLD	0.07%	0.31%	322%	0.23%

Timeline of Public EDFs for European Countries

Eastern Europe



Country	Median EDF (Jan 2nd)	Median EDF (Apr 30th)	% Change	Absolute Change
POL	1.16%	1.65%	43%	0.50%
ROU	0.46%	0.55%	20%	0.09%
TUR	0.50%	0.70%	41%	0.21%

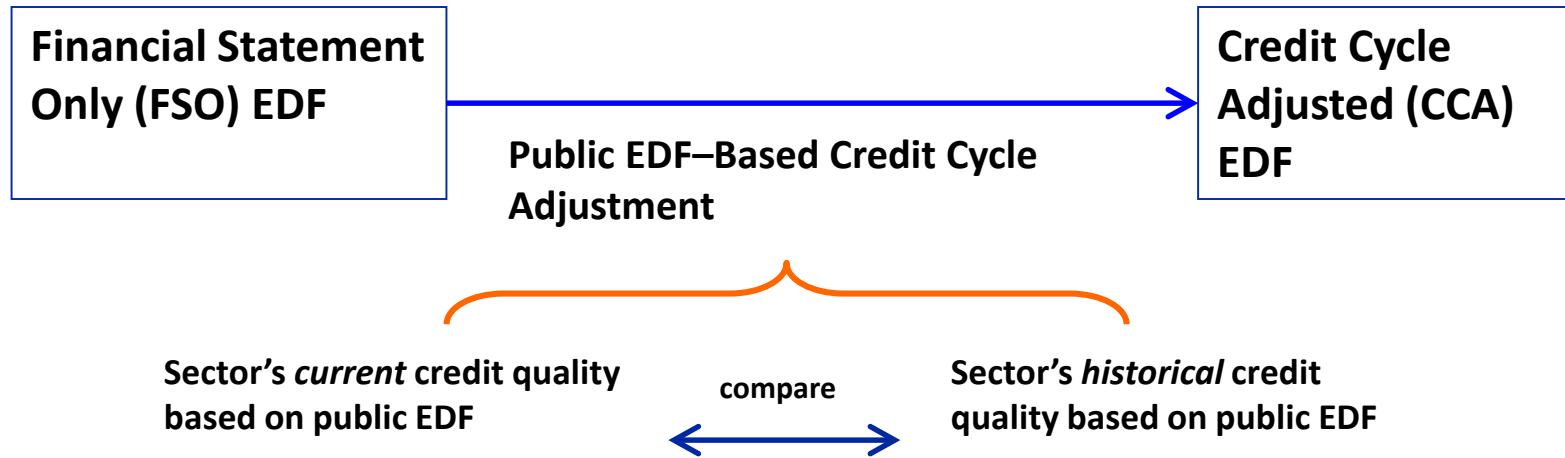
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Private Firm Results

European RiskCalc Models

- » RiskCalc suite is a collection of models designed for private firm default risk measurement
- » It includes fifteen European country models, focused on middle market companies
- » It also includes the Large Firm Europe model, which covers companies bigger than €50MM in Total Assets
- » Most of these models incorporate a Credit Cycle Adjustment (CCA) based on public firm data
- » Spain, Italy and Portugal models combine public firm data with unemployment rate at the national level

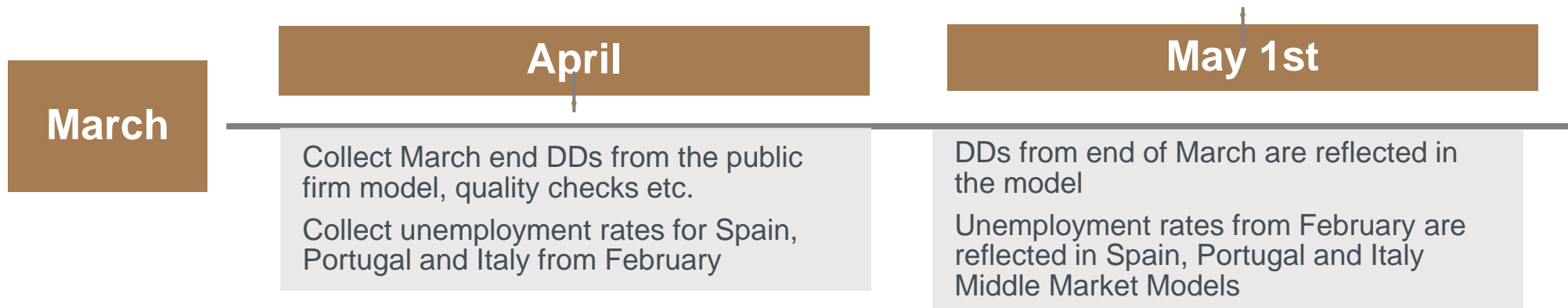
Credit Cycle Adjustment in RiskCalc Models



- » If current credit quality is **better** than historical average, FSO EDF is adjusted **down** to arrive at CCA EDF.
- » If current credit quality is **worse** than historical average, FSO EDF is adjusted **up** to arrive at CCA EDF.

Credit Cycle Adjustment in RiskCalc Models

- Adjustment is based on a transformation of the Public Firm's Distance-to-Default (DD) measure by industry. European models utilize DDs from publicly traded firms in different regions, countries and/or sectors
- The Distance-to-Default factor was designed to be region, country and industry-specific to capture these credit cycle heterogeneities
- If the DD factor for public firms in an industry indicates that risk is going **up**, EDFs are adjusted upwards, or vice versa



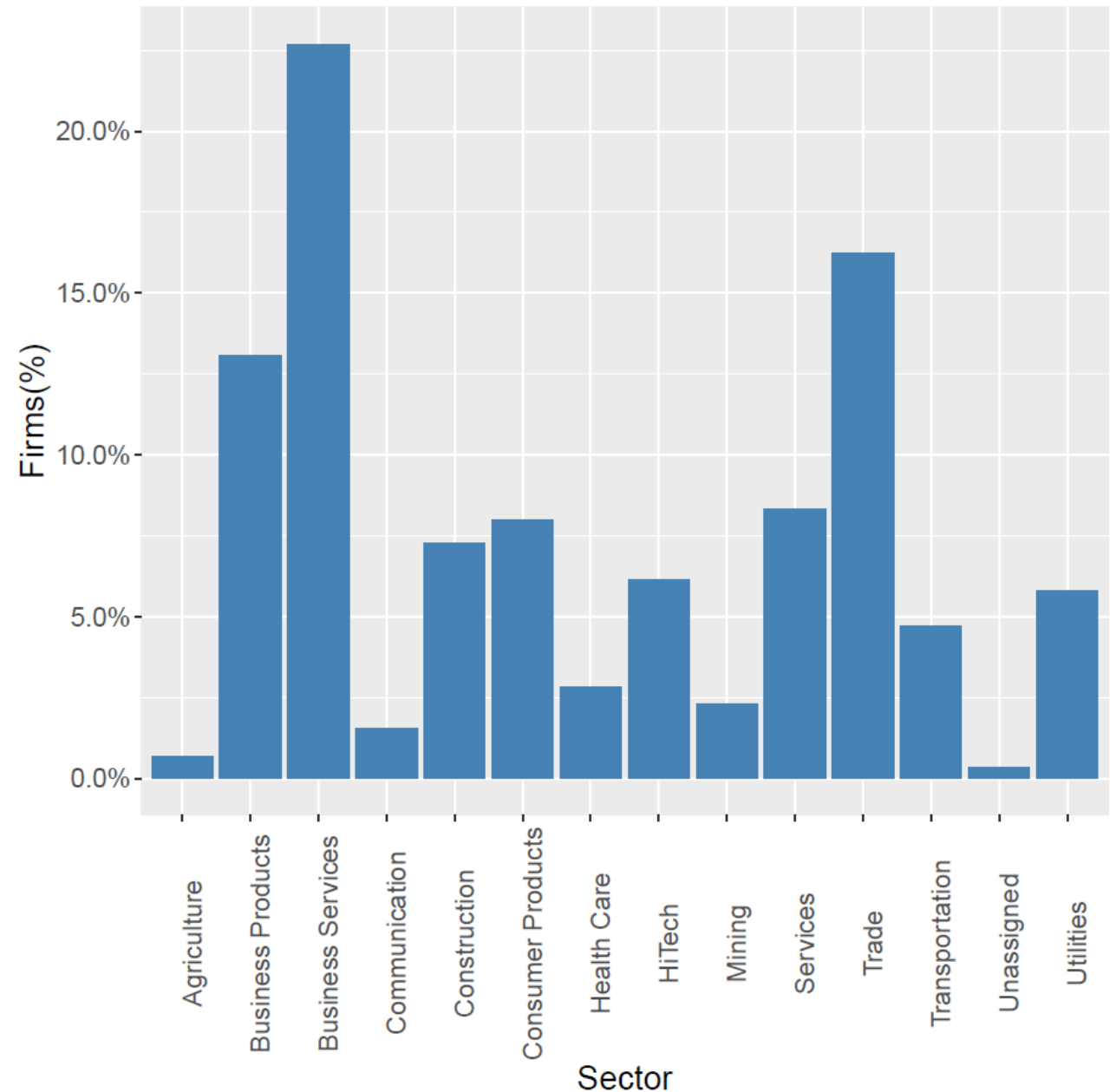
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Large Firm Europe
Impact Analysis

Data Description

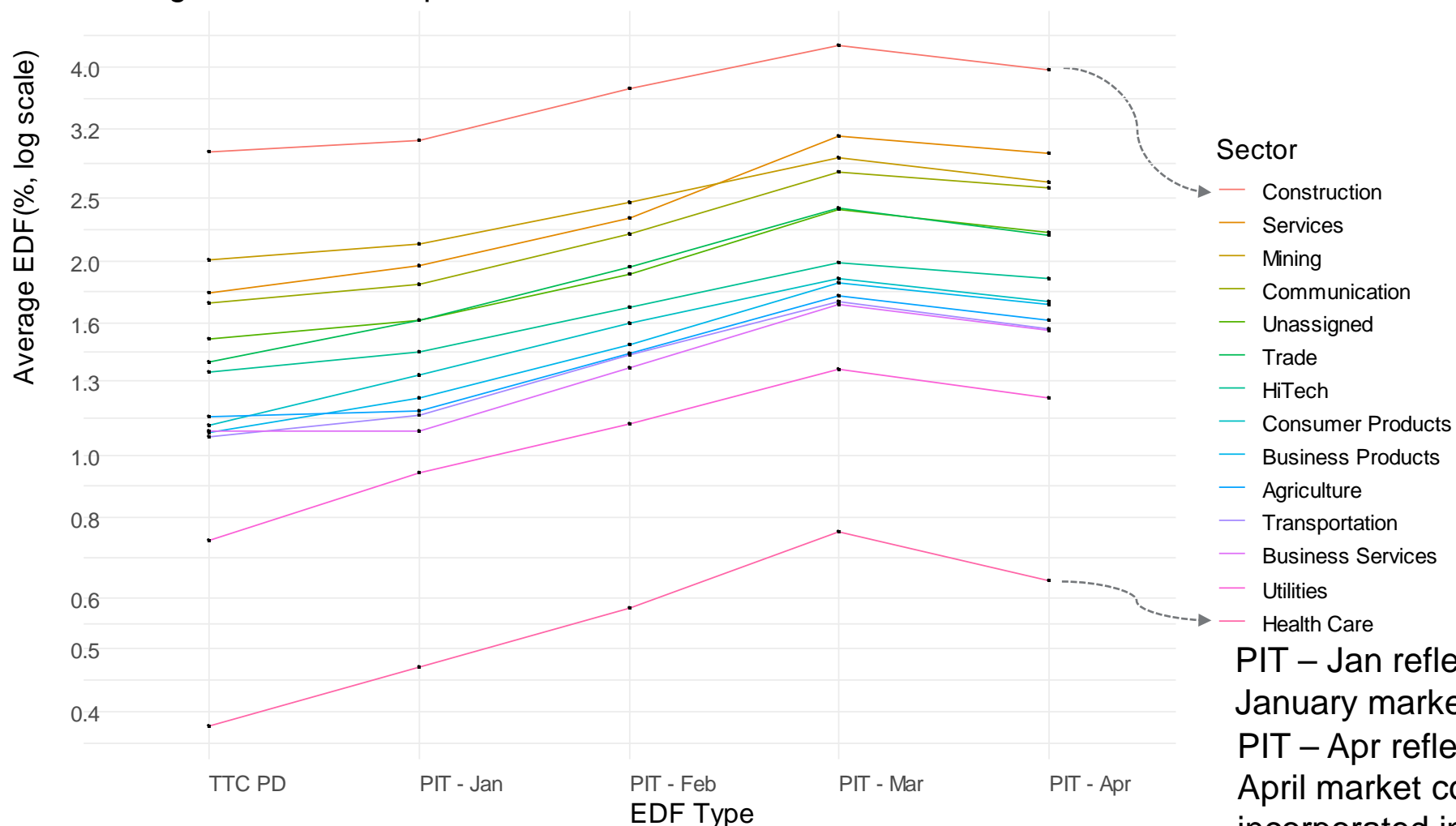
Large European Corporates

Sample includes 20k+ firms Large European Companies (Total Assets \geq €50MM) and their most recently available annual statement from Moody's Analytics Credit Research Database (CRD)



EDF Levels for Large Firm Europe

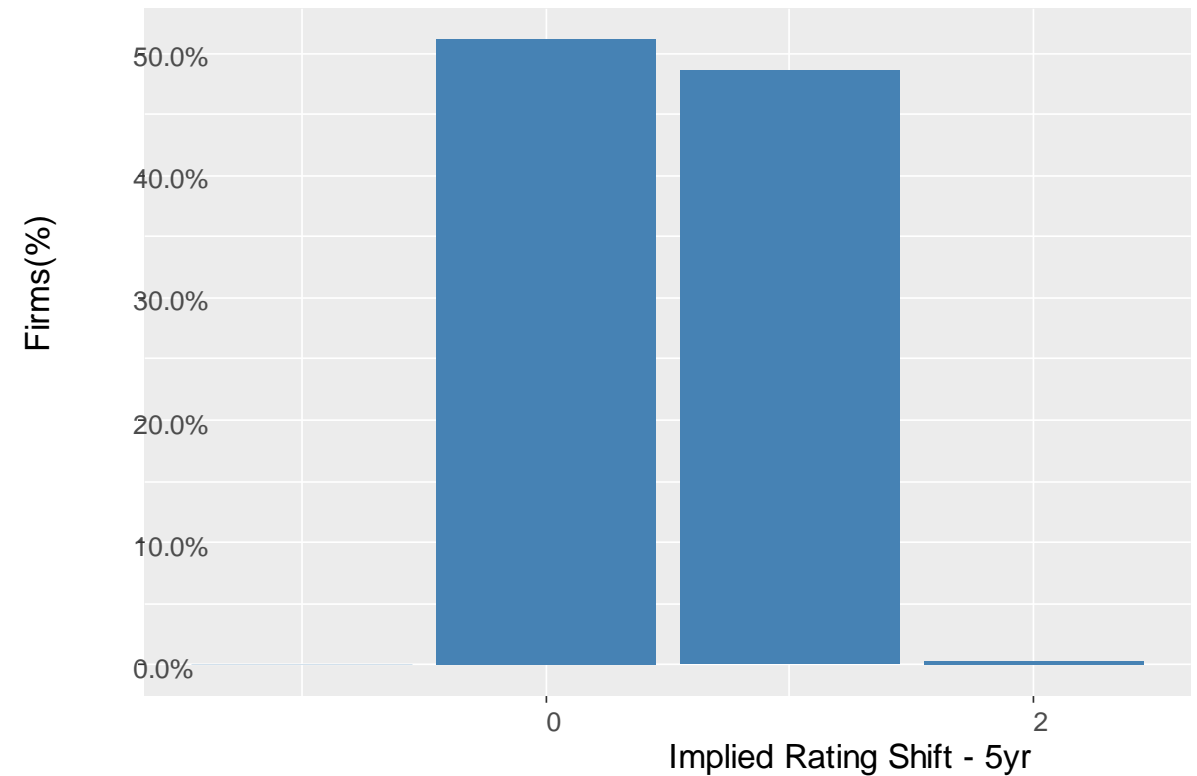
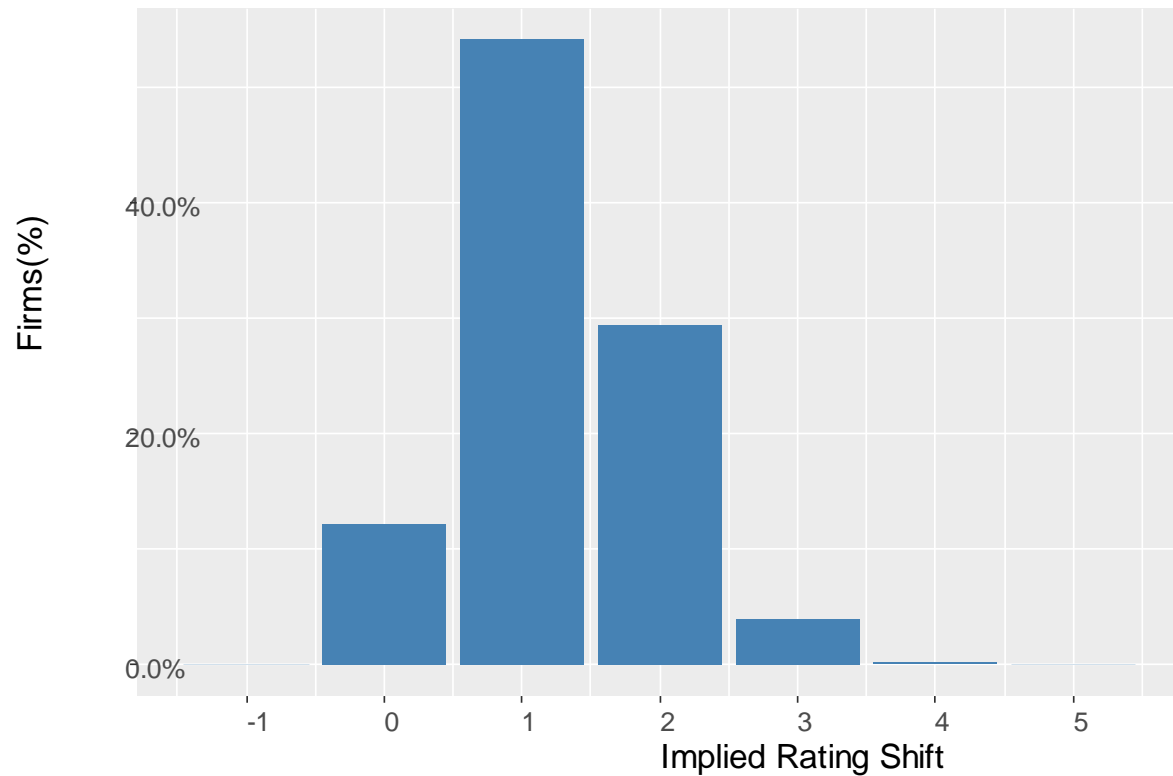
All Regions - CRD Sample



PIT – Jan reflects CCA based on end of January market conditions
 PIT – Apr reflects CCA based on end of April market conditions, which are not yet incorporated in the models

Implied Rating Changes – CRD Sample

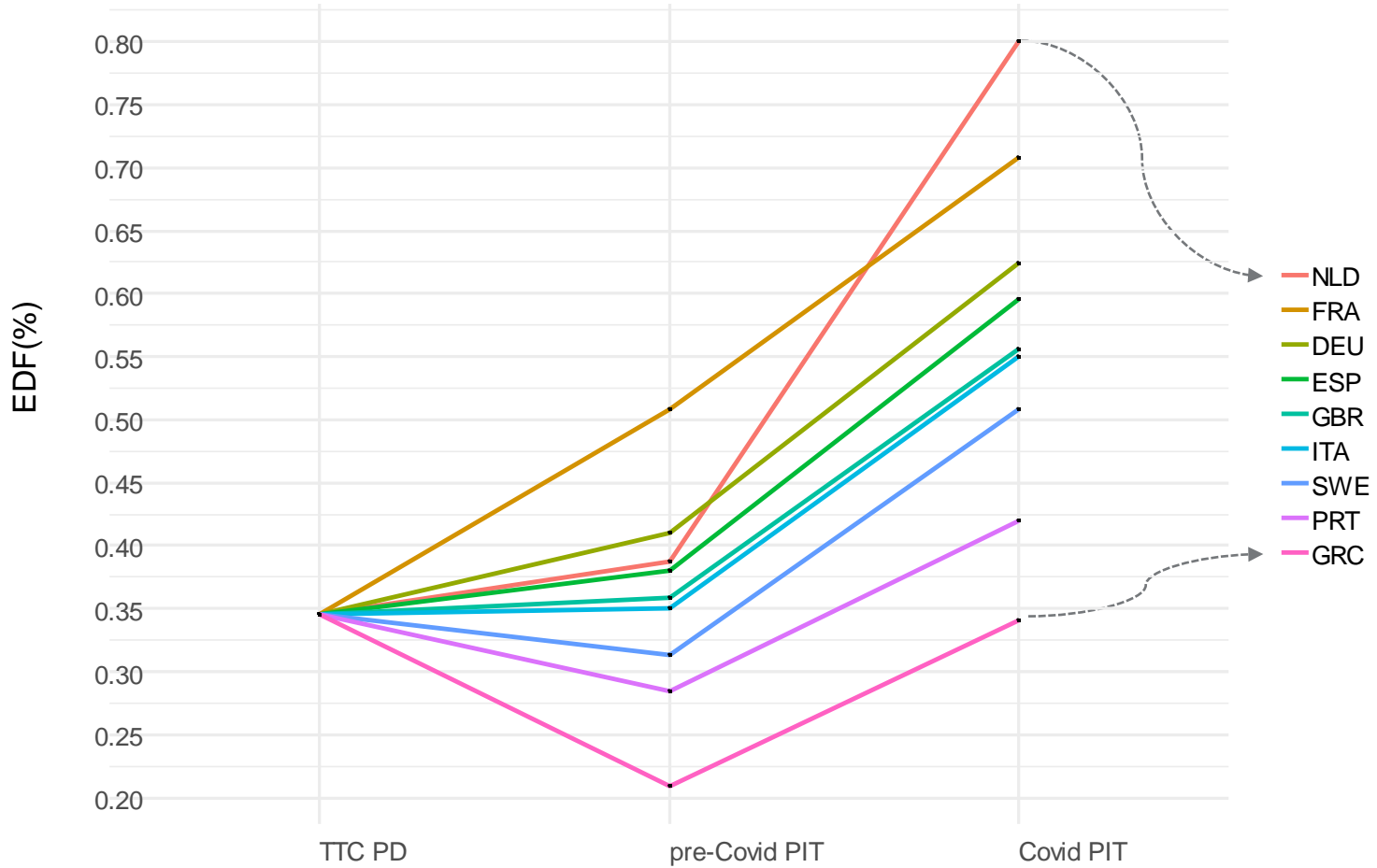
TTC to PIT



- +1 = Rating downgrade relative to TTC
- Certain sectors in Greece still have PIT PDs lower than TTC

Impact By Country

Selected Countries

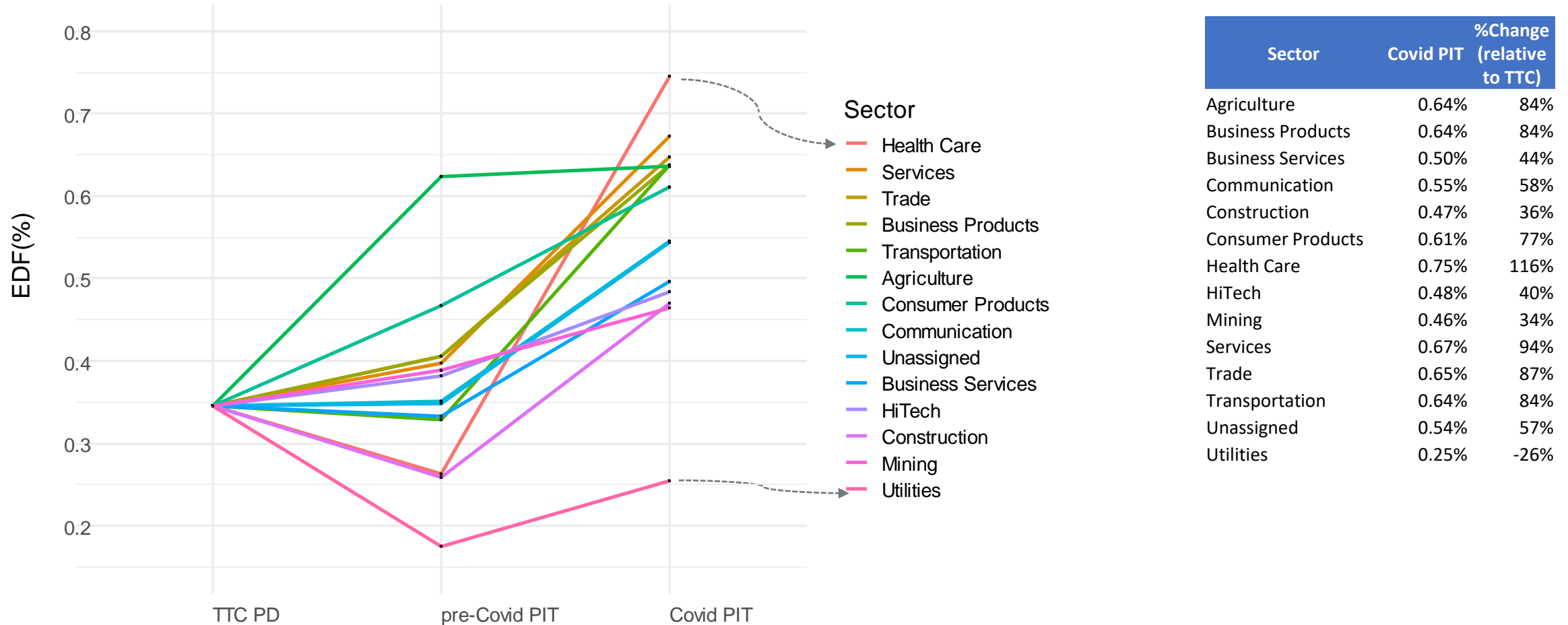


Country	Covid PIT	%Change (relative to TTC)
DEU	0.62%	80%
ESP	0.60%	72%
FRA	0.71%	105%
GBR	0.56%	61%
GRC	0.34%	-2%
ITA	0.55%	59%
NLD	0.80%	131%
PRT	0.42%	21%
SWE	0.51%	47%

pre-Covid PIT reflects CCA based on end of February market conditions

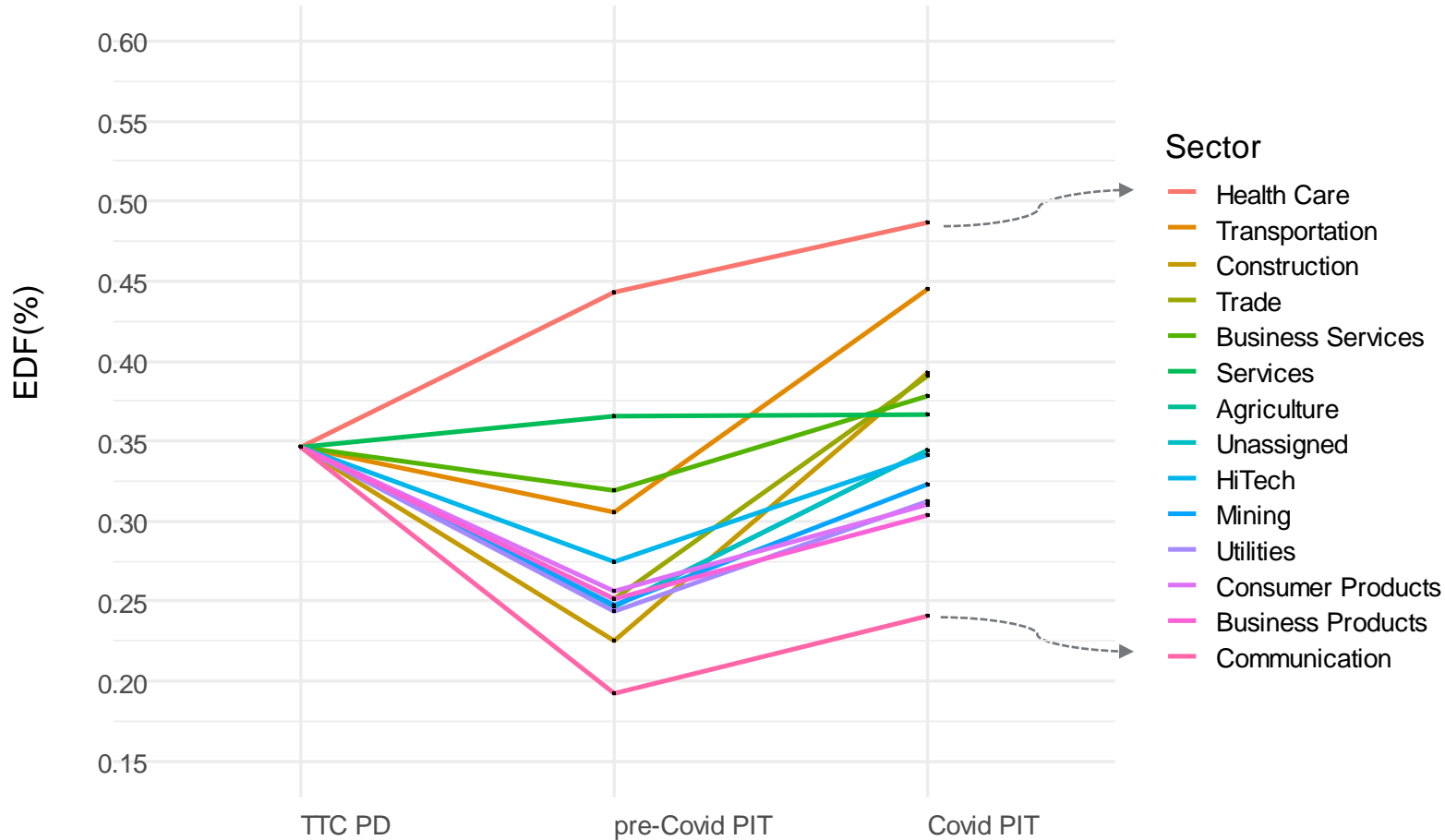
Impact on Sectors By Regions

Western Europe



Impact on Sectors By Regions

Middle and Eastern Europe



Sector	Covid PIT	%Change (relative to TTC)
Agriculture	0.34%	-1%
Business Products	0.30%	-12%
Business Services	0.38%	9%
Communication	0.24%	-30%
Construction	0.39%	13%
Consumer Products	0.31%	-10%
Health Care	0.49%	41%
HiTech	0.34%	-1%
Mining	0.32%	-7%
Services	0.37%	6%
Trade	0.39%	13%
Transportation	0.44%	29%
Unassigned	0.34%	-1%
Utilities	0.31%	-10%

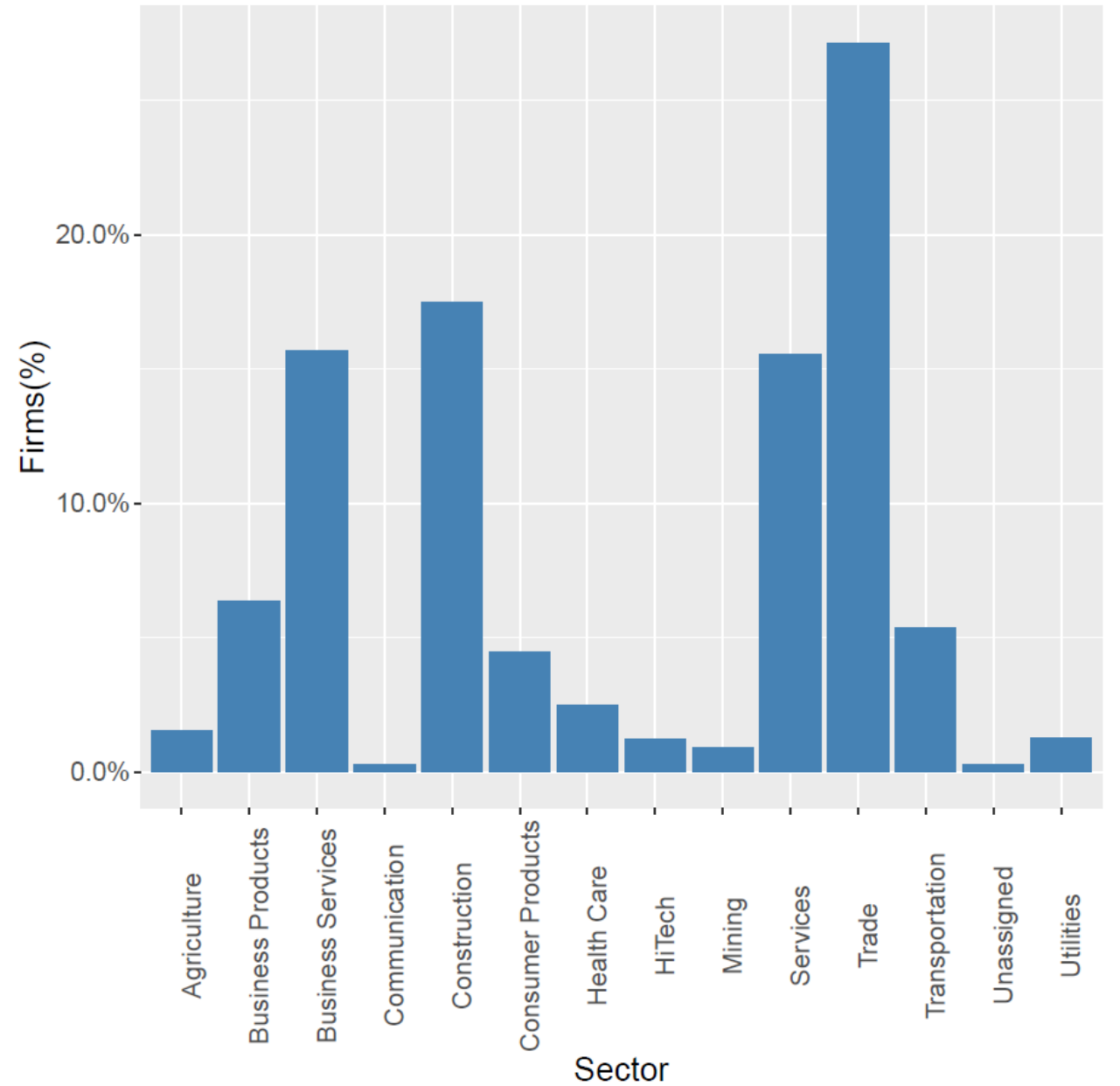
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Country Models
Impact Analysis

Data Description

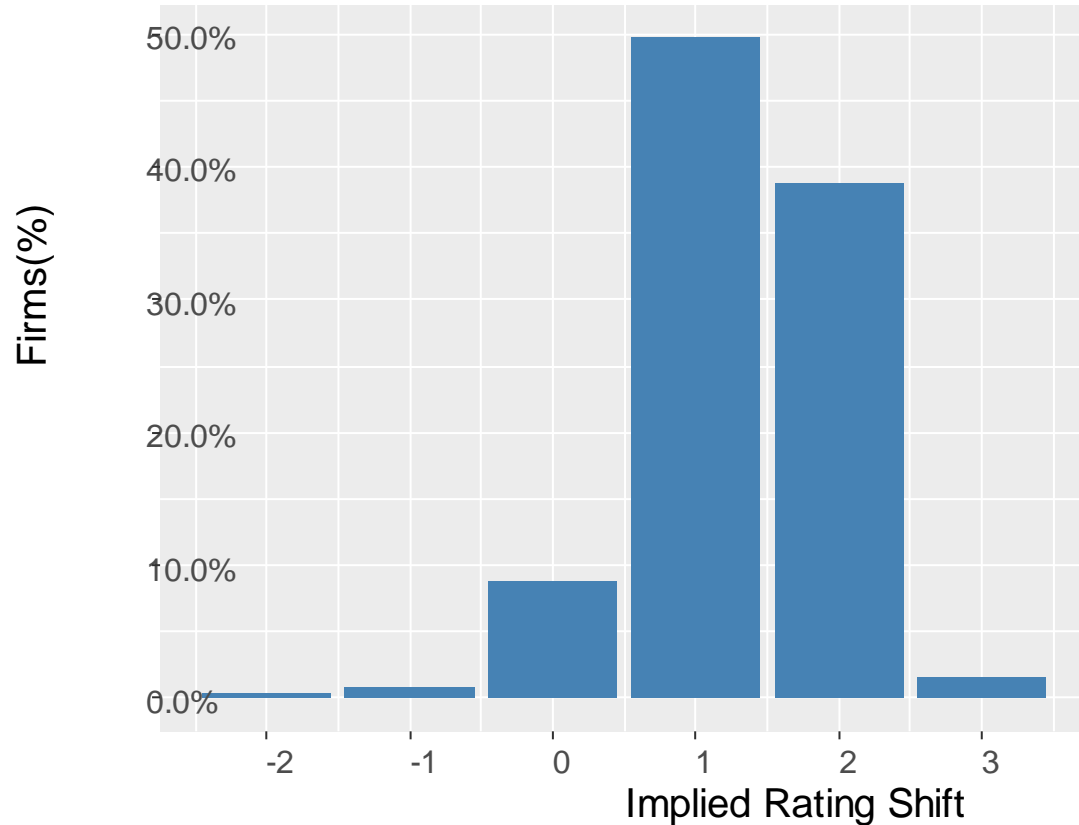
France Middle Market Model

Sample includes 100k+ French firms and their most recently available annual statement from Moody's Analytics Credit Research Database (CRD)

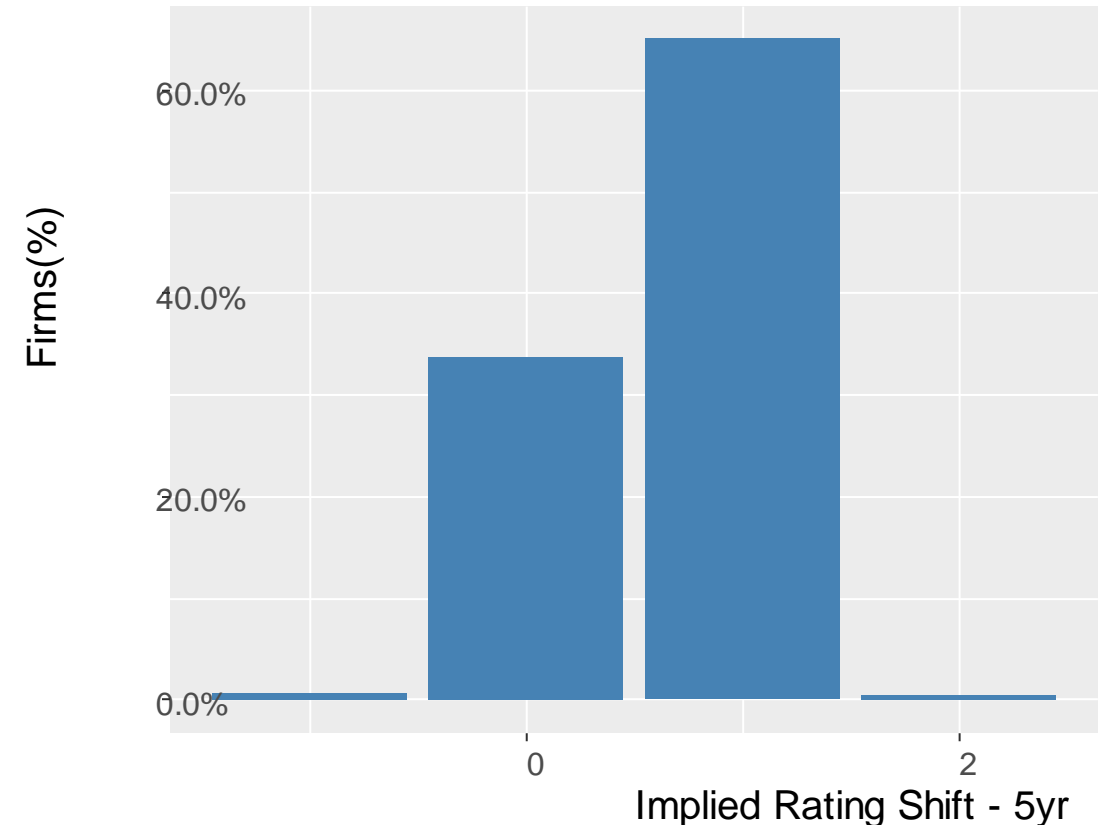


Implied Rating Changes – CRD Sample

TTC to PIT

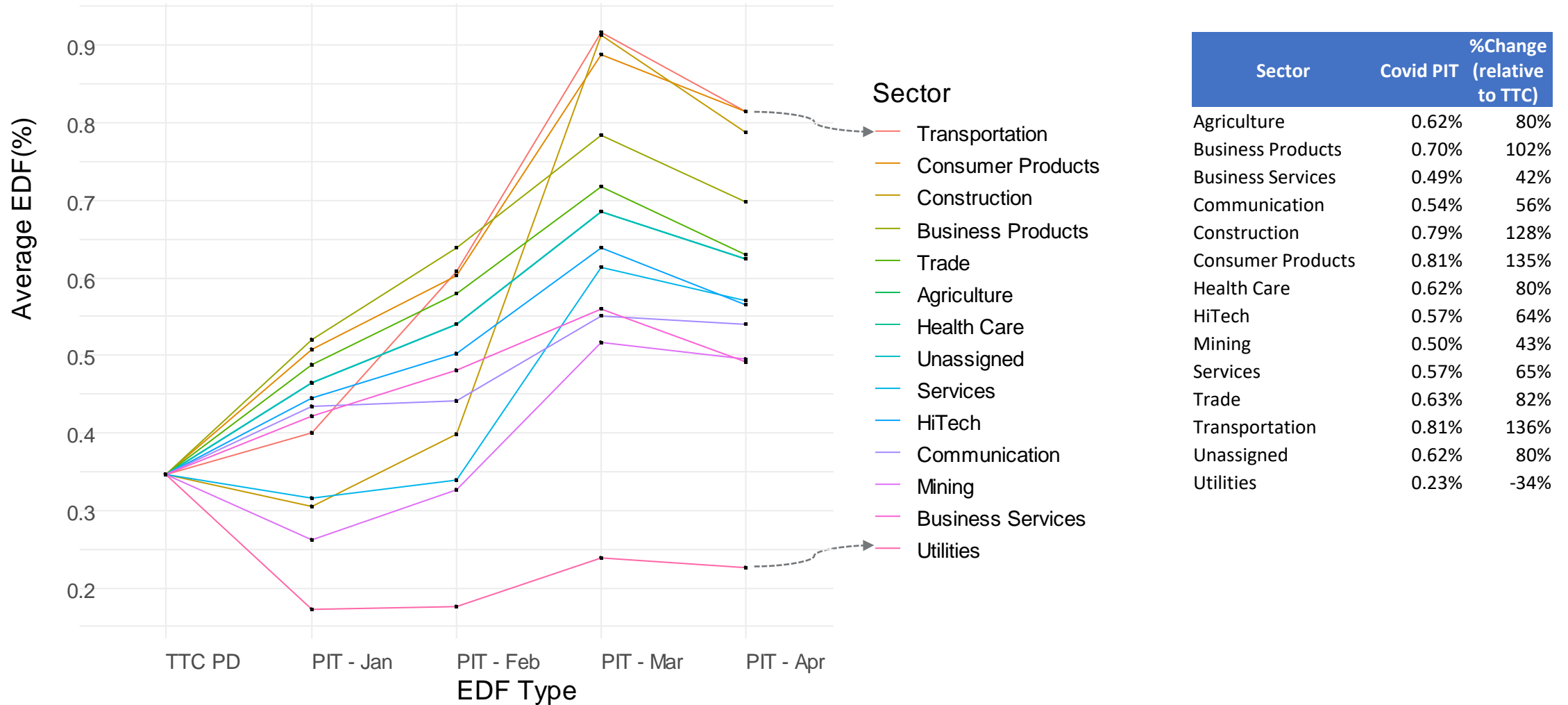


- +1 = Rating downgrade relative to TTC
- Utility companies have PIT PDs lower than TTC



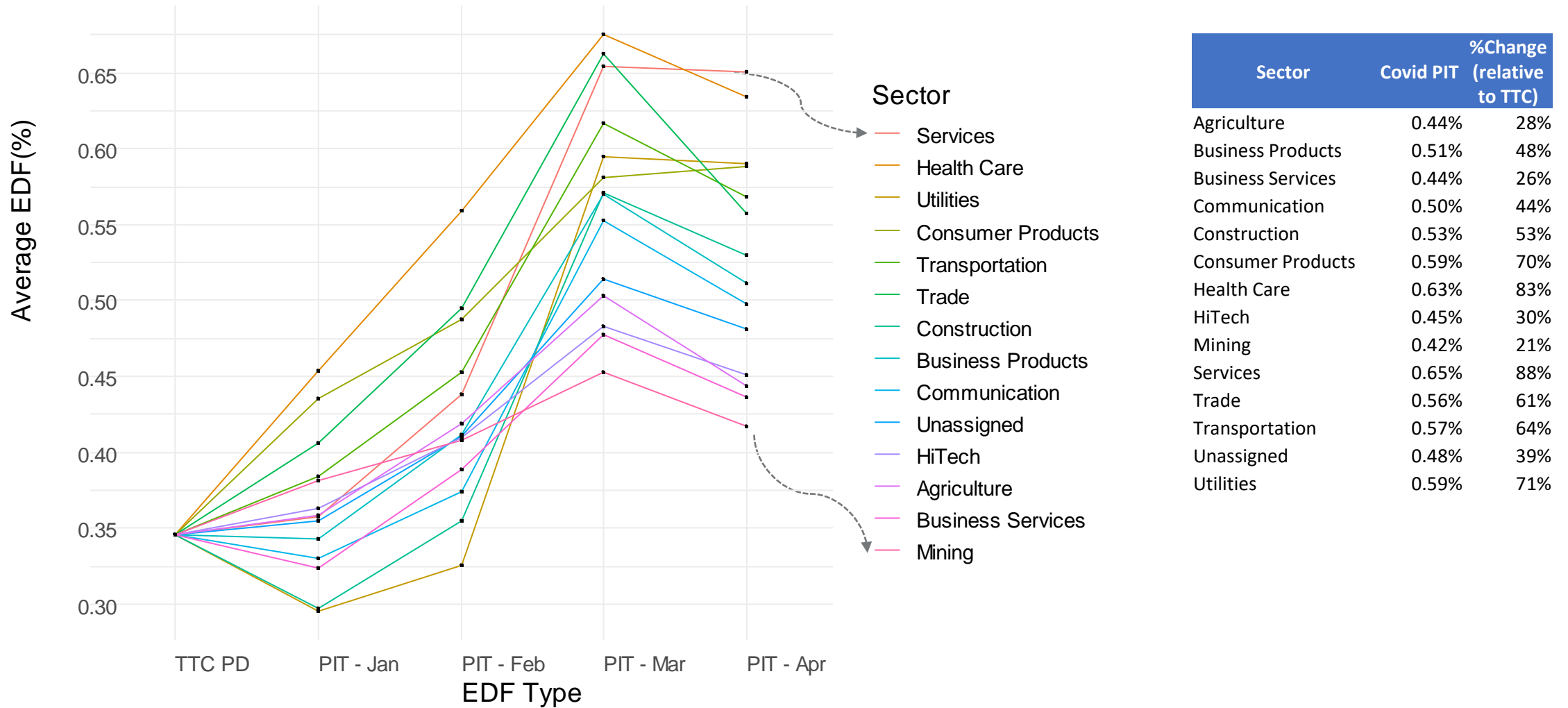
Impact by Sectors

France



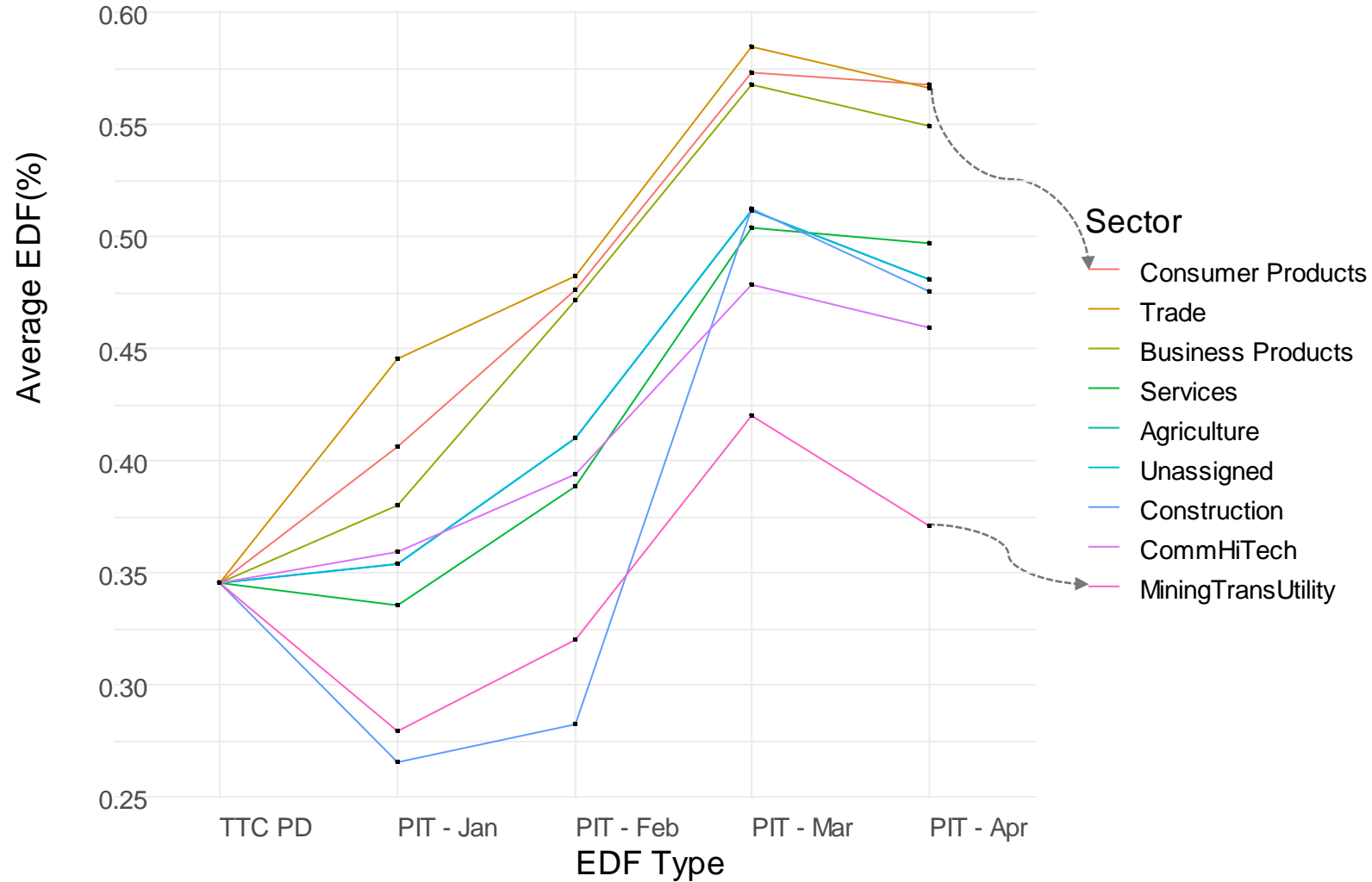
Impact by Sectors

United Kingdom



Impact by Sectors

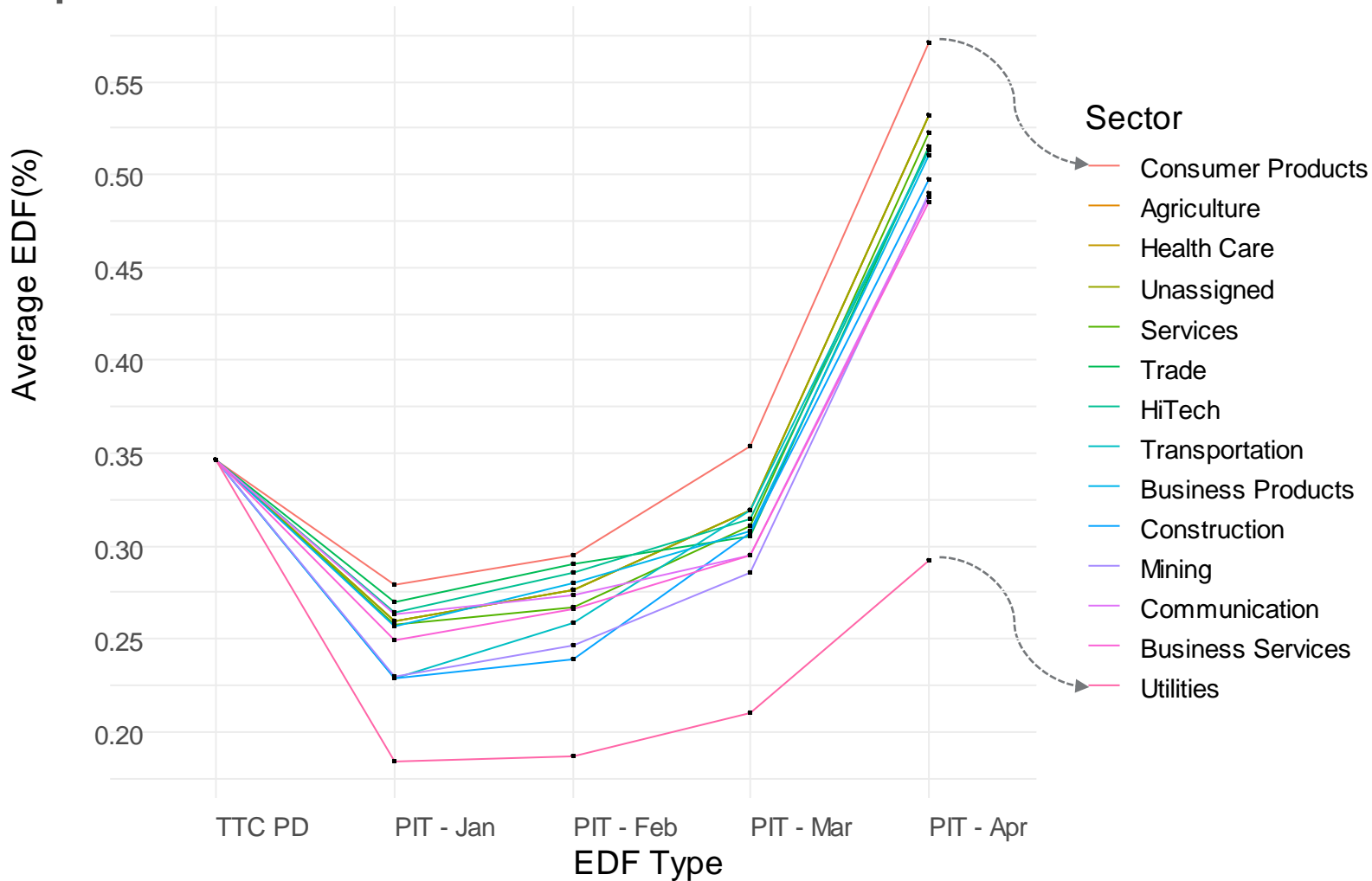
Germany



Sector	Covid PIT	%Change (relative to TTC)
Agriculture	0.48%	39%
Business Products	0.55%	59%
CommHiTech	0.46%	33%
Construction	0.48%	37%
Consumer Products	0.57%	64%
MiningTransUtility	0.37%	7%
Services	0.50%	44%
Trade	0.57%	64%
Unassigned	0.48%	39%

Impact by Sectors

Spain

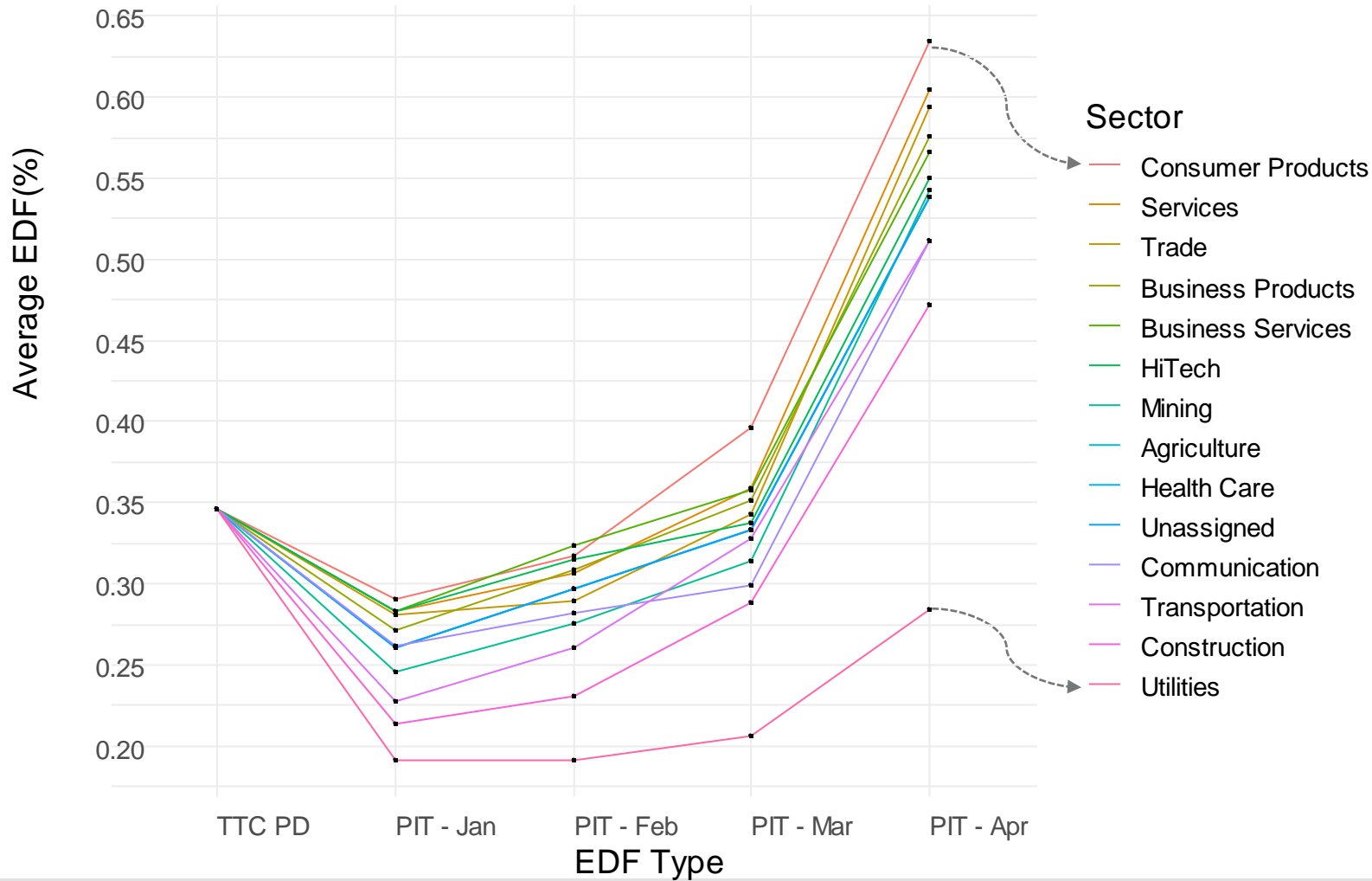


Sector	Covid PIT	%Change (relative to TTC)
Agriculture	0.53%	54%
Business Products	0.51%	48%
Business Services	0.49%	40%
Communication	0.49%	41%
Construction	0.50%	44%
Consumer Products	0.57%	65%
Health Care	0.53%	54%
HiTech	0.51%	48%
Mining	0.49%	42%
Services	0.52%	51%
Trade	0.52%	49%
Transportation	0.51%	48%
Unassigned	0.53%	54%
Utilities	0.29%	-16%

PIT – Apr incorporates a stressed unemployment rate of 25%

Impact by Sectors

Italy



Sector	Covid PIT	%Change (relative to TTC)
Agriculture	0.54%	56%
Business Products	0.58%	67%
Business Services	0.57%	64%
Communication	0.51%	48%
Construction	0.47%	36%
Consumer Products	0.63%	84%
Health Care	0.54%	56%
HiTech	0.55%	59%
Mining	0.54%	57%
Services	0.60%	75%
Trade	0.59%	72%
Transportation	0.51%	48%
Unassigned	0.54%	56%
Utilities	0.28%	-18%

PIT – Apr incorporates a stressed unemployment rate of 13%

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Forward Looking PIT Adjustment

Heat Map: France Middle Market Model

TTC to Covid19 PIT

sector	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa/C
Agriculture	65%	57%	45%	53%	73%	80%	90%	91%	89%	82%	65%	50%	46%	19%
Business Products	83%	68%	56%	70%	92%	102%	114%	116%	111%	99%	78%	59%	61%	24%
Business Services	38%	37%	24%	26%	35%	42%	44%	48%	46%	44%	37%	28%	19%	10%
Communication	47%	44%	32%	34%	48%	56%	61%	64%	62%	58%	48%	37%	26%	13%
Construction	107%	79%	67%	90%	112%	128%	140%	142%	134%	117%	91%	68%	74%	29%
Consumer Products	114%	82%	71%	95%	118%	135%	148%	150%	141%	122%	95%	70%	78%	31%
Health Care	65%	57%	45%	53%	73%	80%	90%	91%	89%	82%	65%	50%	46%	19%
HiTech	52%	48%	36%	39%	56%	64%	70%	72%	70%	66%	54%	41%	33%	14%
Mining	38%	37%	24%	26%	35%	43%	45%	49%	47%	45%	38%	29%	19%	11%
Services	53%	49%	37%	40%	57%	65%	71%	74%	72%	67%	55%	42%	34%	14%
Trade	67%	59%	46%	55%	75%	82%	92%	93%	91%	83%	67%	51%	48%	19%
Transportation	114%	83%	71%	95%	119%	136%	148%	150%	141%	122%	95%	70%	78%	31%
Unassigned	65%	57%	45%	53%	73%	80%	90%	91%	89%	82%	65%	50%	46%	19%
Utilities	-18%	-35%	-35%	-26%	-29%	-34%	-41%	-42%	-45%	-43%	-43%	-37%	-30%	-23%

Applying adjustment factors:

- For a Transportation firm with a risk profile similar to Baa2 risk rating with an FSO EDF of 0.35%, use the multiplication factor of (1+1.36) to get a forward looking PIT measure of 0.83%

Heat Map: France Middle Market Model

PIT PD to Covid19 PIT

sector	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa/C
Agriculture	-9%	-5%	-6%	-9%	-9%	-9%	-10%	-10%	-9%	-8%	-6%	-5%	-8%	-4%
Business Products	-11%	-6%	-7%	-10%	-9%	-11%	-10%	-11%	-9%	-8%	-7%	-5%	-8%	-4%
Business Services	-9%	-7%	-8%	-9%	-13%	-12%	-14%	-13%	-14%	-12%	-10%	-9%	-10%	-3%
Communication	-2%	-1%	-1%	-1%	-2%	-2%	-2%	-2%	-2%	-2%	-2%	-1%	-2%	0%
Construction	-8%	-8%	-10%	-12%	-12%	-14%	-13%	-13%	-11%	-9%	-8%	-6%	-9%	-6%
Consumer Products	-4%	-5%	-6%	-8%	-7%	-8%	-8%	-8%	-7%	-6%	-5%	-3%	-5%	-3%
Health Care	-9%	-5%	-6%	-9%	-9%	-9%	-10%	-10%	-9%	-8%	-6%	-5%	-8%	-4%
HiTech	-10%	-7%	-8%	-11%	-12%	-11%	-13%	-12%	-12%	-11%	-9%	-7%	-11%	-5%
Mining	-3%	-2%	-3%	-3%	-5%	-4%	-5%	-5%	-5%	-4%	-4%	-3%	-2%	-1%
Services	-6%	-5%	-5%	-7%	-8%	-7%	-8%	-8%	-8%	-7%	-5%	-5%	-7%	-3%
Trade	-12%	-7%	-8%	-11%	-11%	-12%	-13%	-13%	-12%	-10%	-8%	-6%	-10%	-5%
Transportation	-5%	-7%	-9%	-10%	-10%	-11%	-10%	-10%	-9%	-8%	-7%	-5%	-7%	-5%
Unassigned	-9%	-5%	-6%	-9%	-9%	-9%	-10%	-10%	-9%	-8%	-6%	-5%	-8%	-4%
Utilities	-1%	-9%	-7%	-4%	-5%	-5%	-8%	-8%	-9%	-9%	-9%	-8%	-6%	-5%

Applying adjustment factors:

- For a Transportation firm with a risk profile similar to Baa2 risk rating with a CCA EDF (Using 'Current Date' input of May in RiskCalc France Model) of 0.35%, use the multiplication factor of (1-0.11) to get a forward looking PIT measure of 0.31%

Heat Map: France Middle Market Model

TTC to Covid19 PIT – 5 year

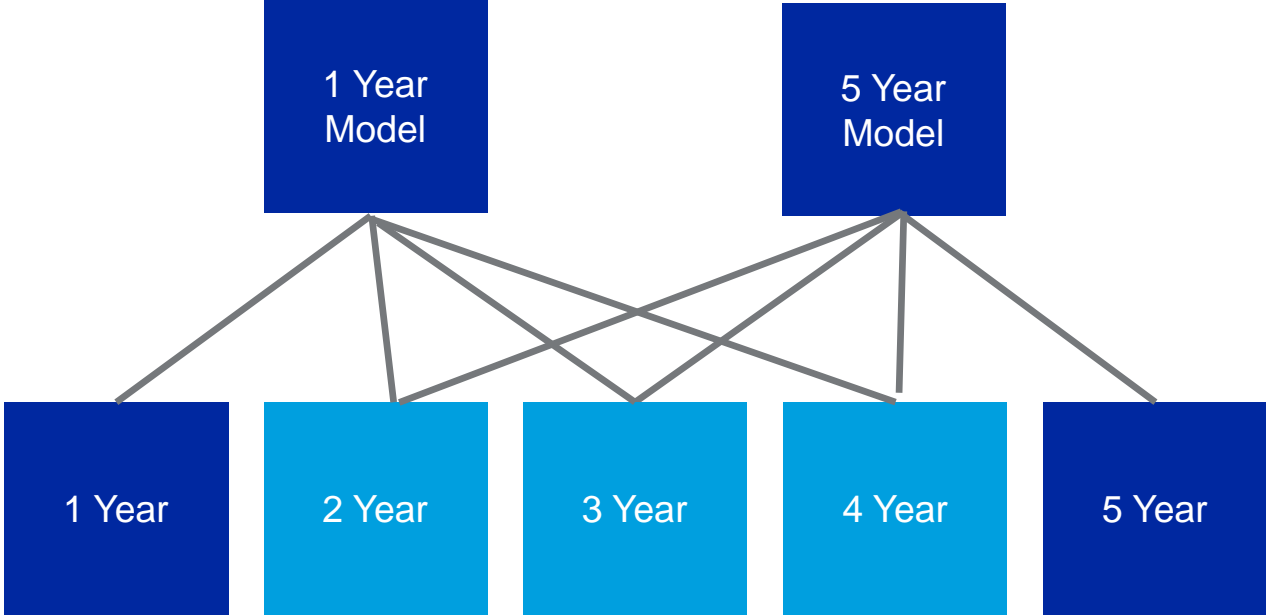
sector	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa/C
Agriculture	17%	15%	19%	28%	35%	31%	28%	23%	22%	22%	20%	16%	11%	20%
Business Products	19%	17%	23%	35%	42%	37%	33%	28%	27%	26%	23%	19%	13%	23%
Business Services	10%	9%	9%	14%	21%	18%	16%	13%	12%	12%	11%	9%	7%	12%
Communication	13%	11%	13%	19%	26%	23%	21%	17%	16%	16%	15%	12%	9%	15%
Construction	21%	20%	28%	43%	49%	43%	38%	33%	31%	31%	27%	22%	19%	26%
Consumer Products	22%	21%	29%	45%	51%	45%	39%	34%	33%	32%	28%	23%	21%	26%
Health Care	17%	15%	19%	28%	35%	31%	28%	23%	22%	22%	20%	16%	11%	20%
HiTech	15%	12%	15%	22%	29%	26%	23%	19%	18%	18%	16%	13%	10%	17%
Mining	10%	9%	10%	15%	21%	18%	16%	14%	12%	13%	12%	10%	7%	12%
Services	15%	13%	15%	23%	30%	26%	24%	20%	18%	18%	17%	13%	10%	17%
Trade	18%	15%	19%	29%	36%	32%	28%	24%	23%	22%	20%	16%	11%	20%
Transportation	22%	21%	29%	45%	51%	45%	39%	34%	33%	32%	28%	23%	21%	26%
Unassigned	17%	15%	19%	28%	35%	31%	28%	23%	22%	22%	20%	16%	11%	20%
Utilities	-8%	-9%	-11%	-16%	-22%	-22%	-20%	-18%	-17%	-16%	-16%	-14%	-11%	-19%

Applying adjustment factors:

- For a Transportation firm with a risk profile similar to Baa2 risk rating with an FSO EDF-5yr of 2.44%, use the multiplication factor of $(1+0.45)$ to get a forward looking PIT 5yr measure of 3.54%

Obtaining a Term structure of Adjusted PDs

Extrapolate 2, 3, and 4 Year PDs using a Weibull Distribution



4

Implications for Expected Loss

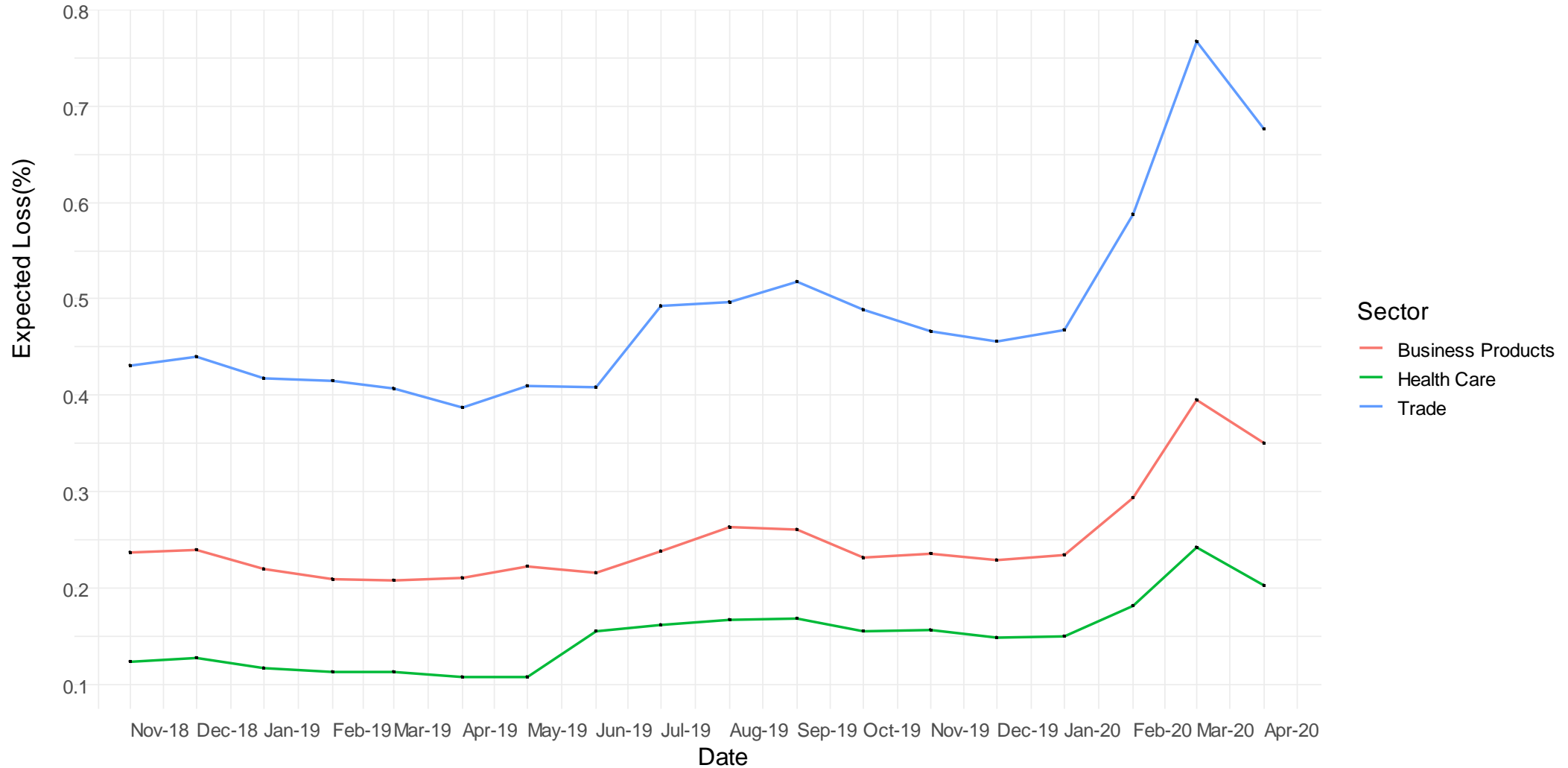
Results

Expected Loss

- Expected loss (EL) percent calculated from the CRD sample
- Assumptions
 - Size weighted exposures
 - Loss Given Default (LGD) of 50%
- $EL(\%) = \text{Size weighted PIT PD} * 50\%$

Results

Expected Loss – Sectors



In Summary:

- » COVID-19 has become, and will likely continue to be, a major driver of credit risk, at least in the coming months
- » Increase in Credit Cycle Adjusted EDFs for private firms across all industries with Health Care deteriorating the most
- » Size weighted Expected Loss expected to increase by close to 40% at an aggregate level for Large European Corporates (with respect to the beginning of the year)
- » The signal provided by EDF measures and insights from their interpretation may:
 - Help re-assess loss provisions as well as make proper adjustment to portfolios
 - Offer policy implications on maintaining the credit health of “mission critical” companies as well as analyzing the cost and benefit of stimulus packages for various industries

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Appendix

Static Mapping

Rating	Average PD	Average PD
	1yr	5yr
Aaa	0.01%	0.01%
Aa1	0.02%	0.33%
Aa2	0.04%	0.45%
Aa3	0.07%	0.60%
A1	0.11%	0.78%
A2	0.16%	0.93%
A3	0.20%	1.16%
Baa1	0.25%	1.64%
Baa2	0.35%	2.44%
Baa3	0.53%	3.60%
Ba1	0.85%	5.07%
Ba2	1.35%	6.72%
Ba3	2.02%	8.74%
B1	3.03%	11.36%
B2	4.55%	14.77%
B3	6.82%	19.20%
Caa/C	17.10%	43.89%

Credit Cycle Adjustment – Europe Large Firm 4.0

- » The final Distance-to-Default factor (DD factor) for a specific country/sector is constructed as a weighted-average of three intermediate DD factors:
 - A country DD factor based on all publicly listed firms in the country
 - A country/sector DD factor based on all the publicly listed firms in the country for that sector
 - A region/sector DD factor based on all the publicly listed firms in that sector located in the same geographic region

$$DD = w_{region,sector} DD_{region,sector} + w_{country} DD_{country} + w_{country,sector} DD_{country,sector}$$

- » The weights are a function of the number of observations available each month for this country and sector.
 - The more publicly listed firms in a specific country and sector are available, the bigger $w_{country,sector}$ will be
 - If we do not have any country level information on public listed firms, then the DD factor will equal to the region/sector DD factor

Term Structure in RiskCalc

» Weibull distribution has the following CDF:

$$\begin{cases} p_1 = 1 - e^{-\lambda^p} \\ p_5 = 1 - e^{-(5\lambda)^p} \end{cases} \Rightarrow$$

» Given p_1 and p_5 can solve the following equations to find the parameters λ and p :

$$\begin{cases} p = \frac{1}{\ln 5} \ln \left(\frac{\ln \left(\frac{1}{1-p_5} \right)}{\ln \left(\frac{1}{1-p_1} \right)} \right) \\ \lambda = \left(\ln \left(\frac{1}{1-p_1} \right) \right)^{\frac{1}{p}}. \end{cases}$$

Term Structure in RiskCalc

Construct the term structure using the Weibull CDF

» For 2-year horizon:

$$p_2 = 1 - e^{-(2\lambda)^P}$$

» And for any k :

$$p_k = 1 - e^{-(k\lambda)^P}$$

PIT Converter

TTC to PIT PD

Converts any TTC PD to a PIT PD term structure, leveraging our Private Firm Model suite: RiskCalc

Inputs	Outputs
TTC PD Analysis Date Industry Classification Private Firm Model Name State (optional)	PIT PD Term Structure

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