

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

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 (EDFTM) measures reflect the current state of the credit cycles
- » We are seeing a significant increase of expected loss for **private companies** in the Emerging Markets
- » Today's presentation is part of the webinar series providing a forward looking estimate of Point in Time PD across geographies and sectors

Agenda

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

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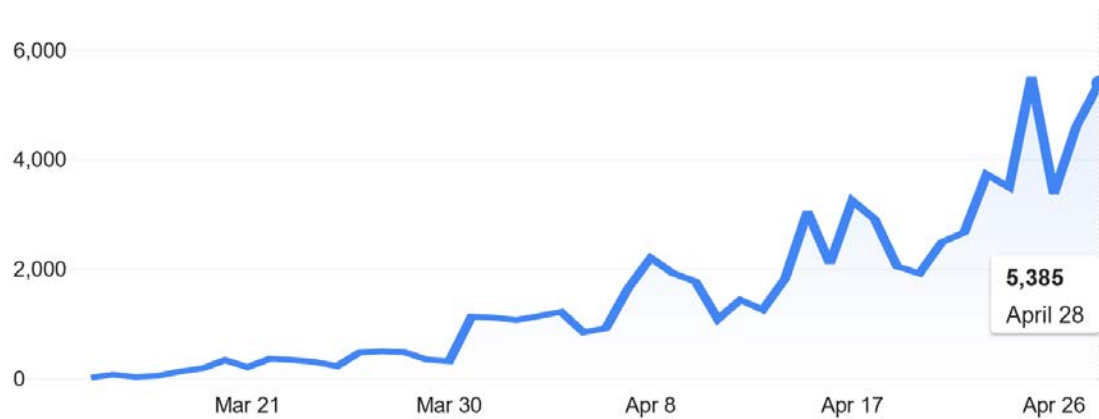
Public Firm EDFs for
Emerging Markets

COVID-19 Globally

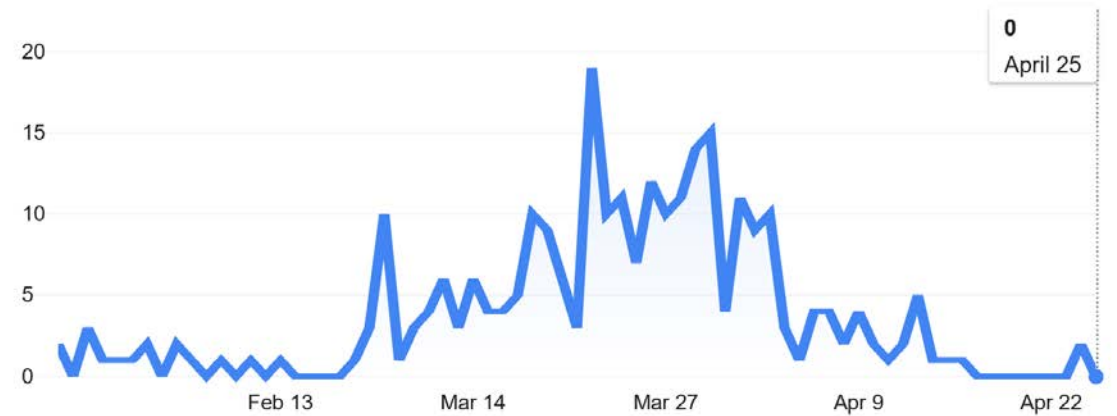
Brazil & Vietnam

New cases

 Brazil ▾



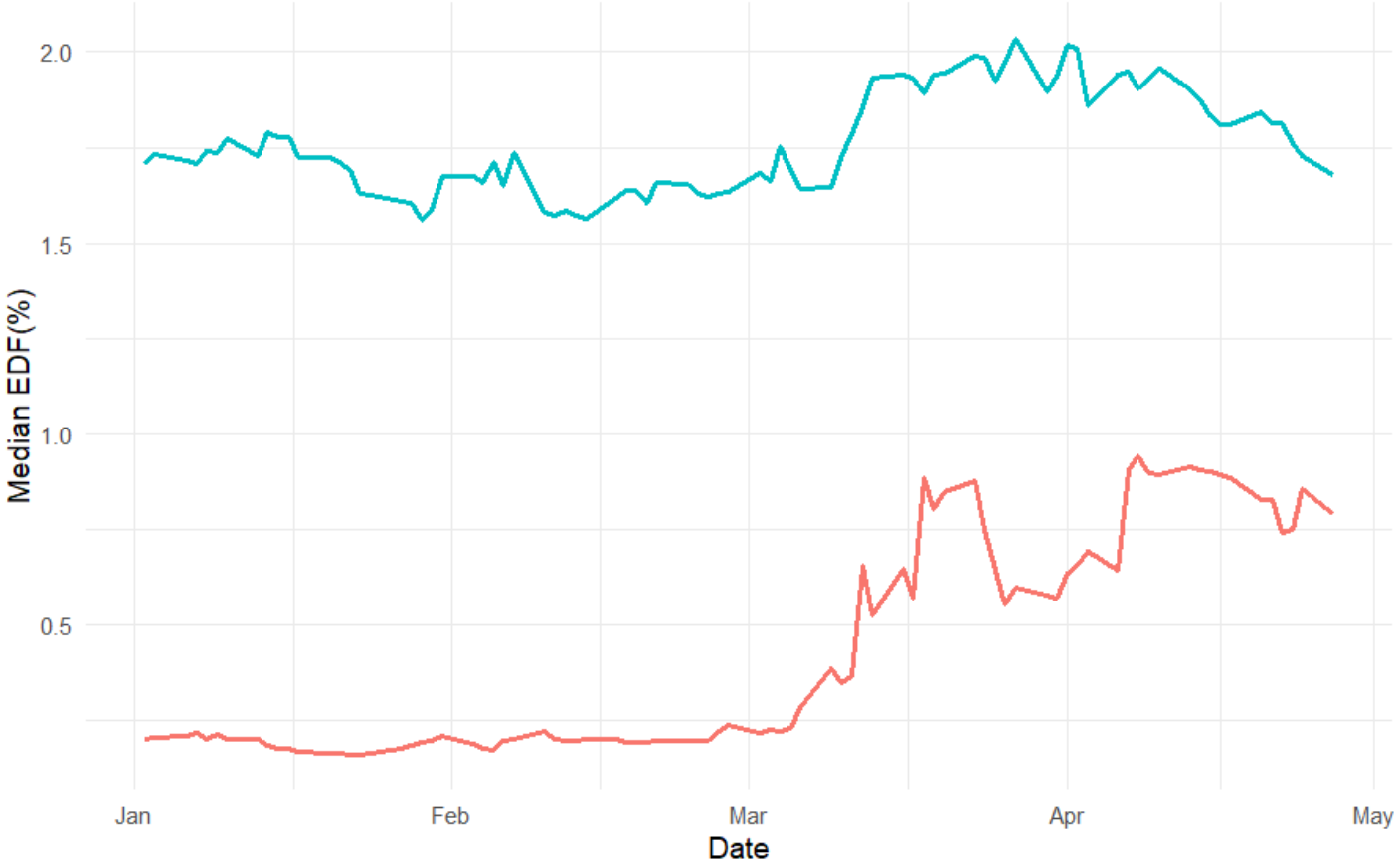
 Vietnam ▾



New cases are the confirmed cases reported since the previous day
Updated less than 30 mins ago · Source: [Wikipedia](#) · [About this data](#)

The impact is not the same across countries

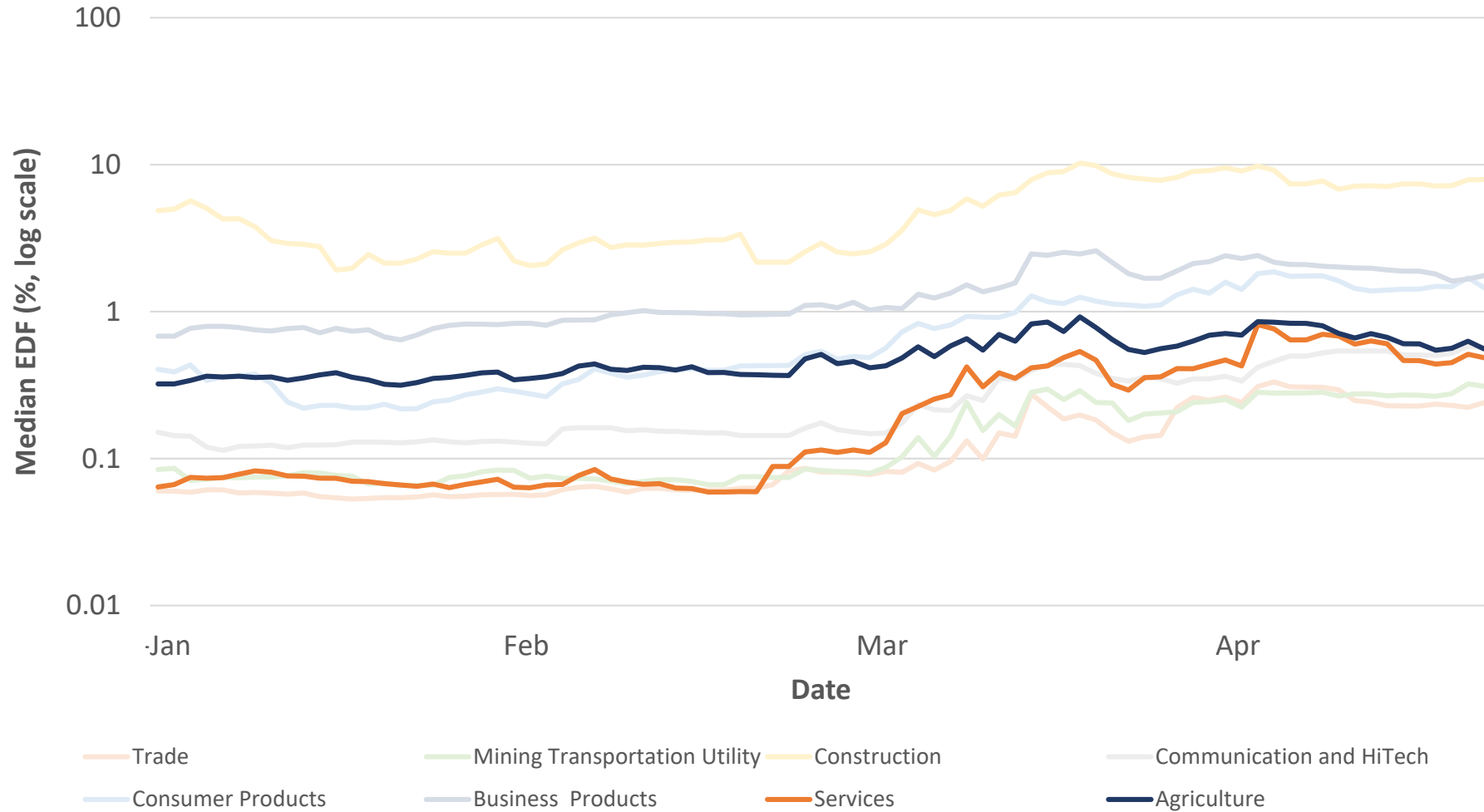
Brazil & Vietnam



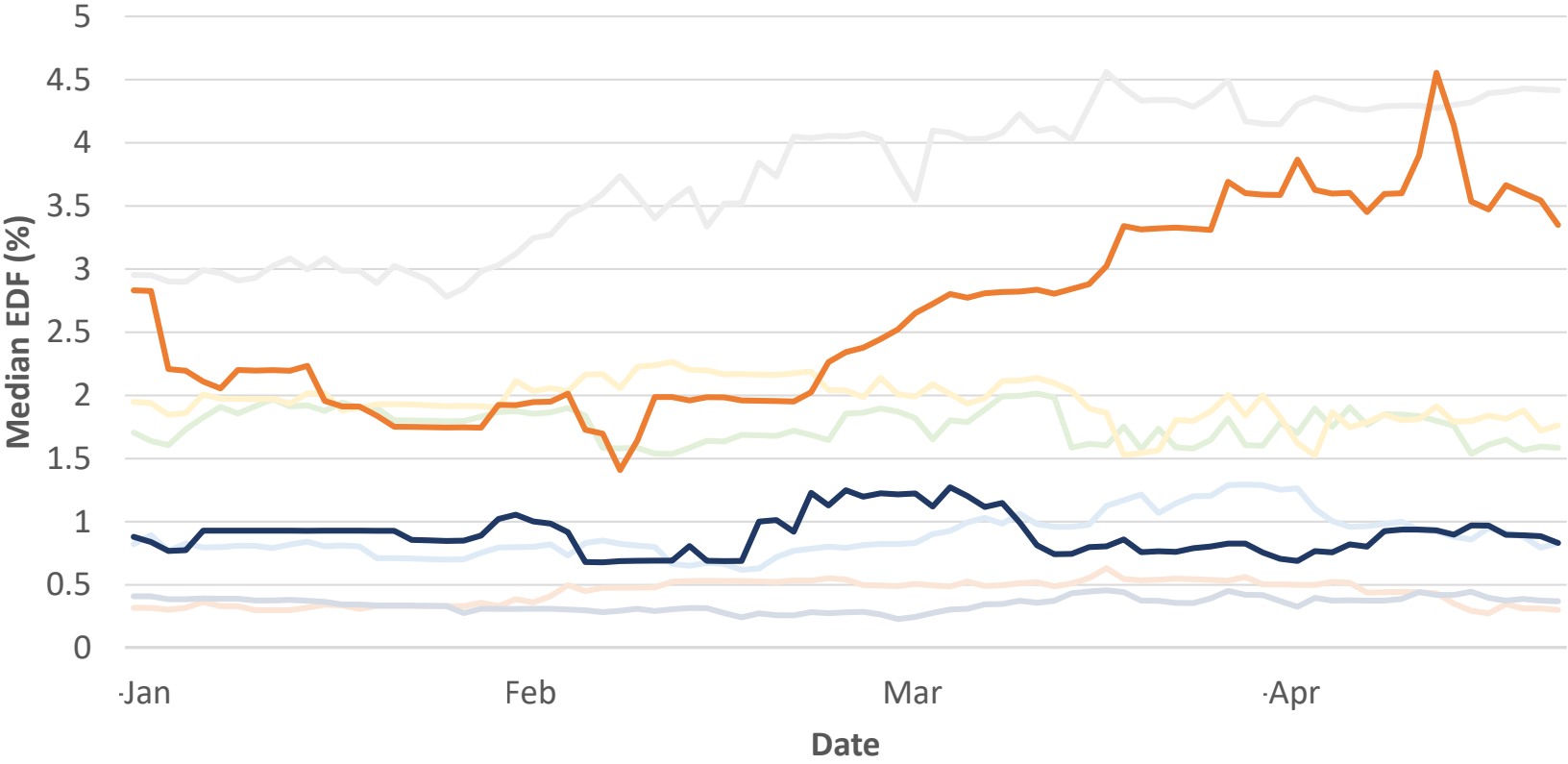
Country	Median EDF (Jan 2nd)	Median EDF (Apr 27th)	% Change	Absolute Change
Brazil	0.20%	0.79%	290%	0.59%
Vietnam	1.71%	1.68%	-2%	-0.03%

Country
— BRA
— VNM

Timeline of Public EDFs for Brazil

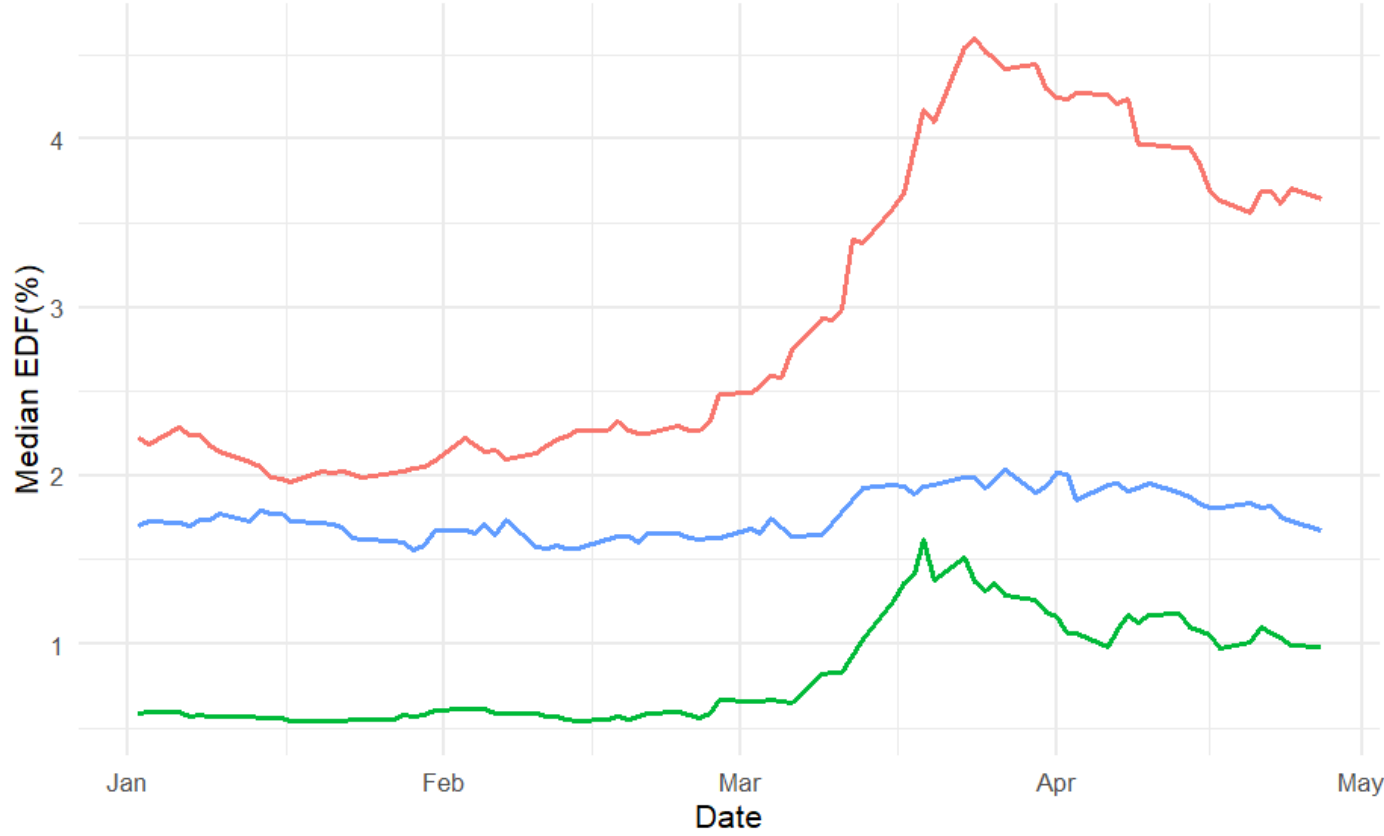


Timeline of Public EDFs for Vietnam



Timeline of Public EDFs for Emerging Markets

Asia

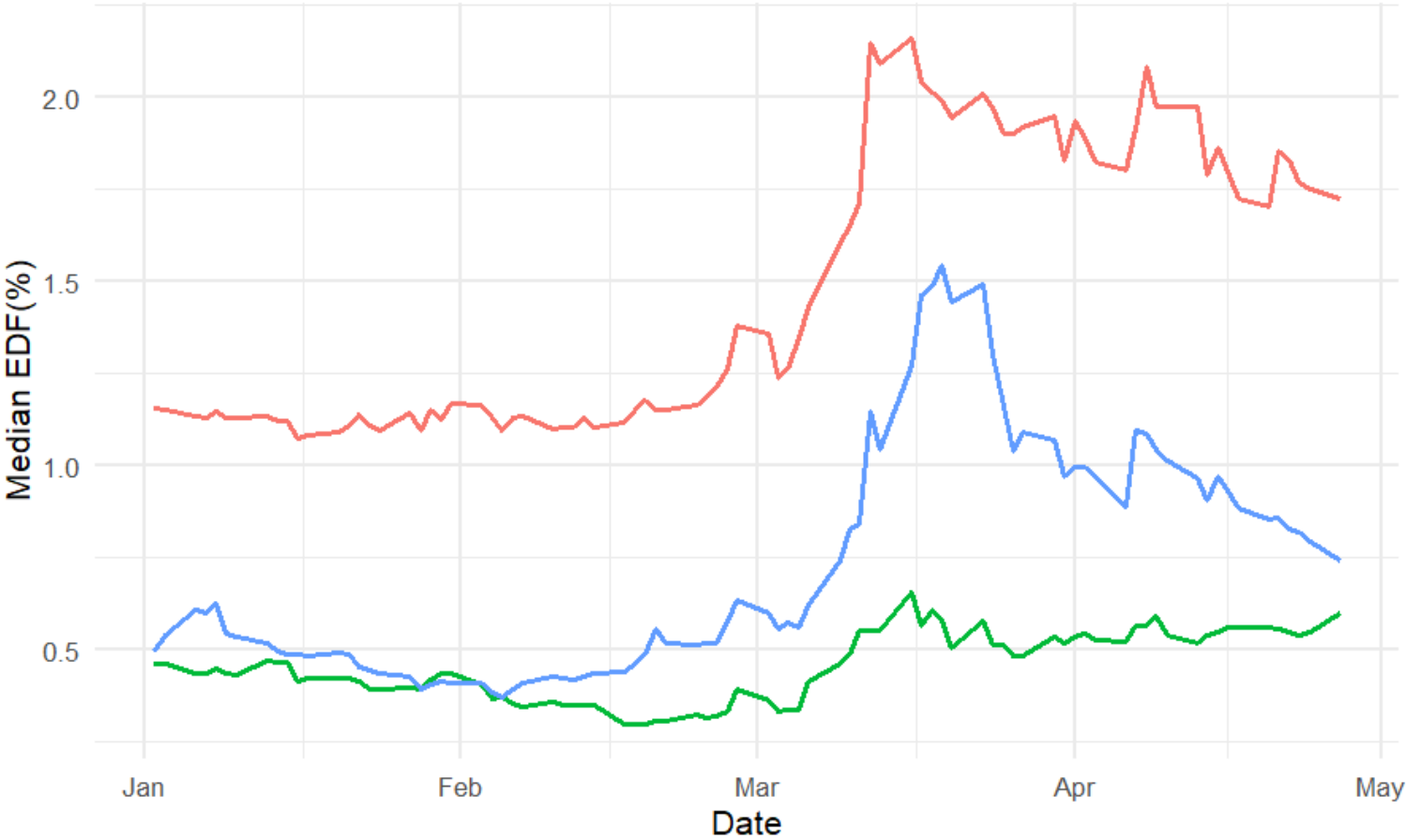


Country	Median EDF (Jan 2nd)	Median EDF (Apr 27th)	% Change	Absolute Change
India	2.22%	3.64%	64%	1.42%
Malaysia	0.59%	0.99%	67%	0.39%
Vietnam	1.71%	1.68%	-2%	-0.03%

Timeline of Public EDFs for Emerging Markets

Eastern Europe

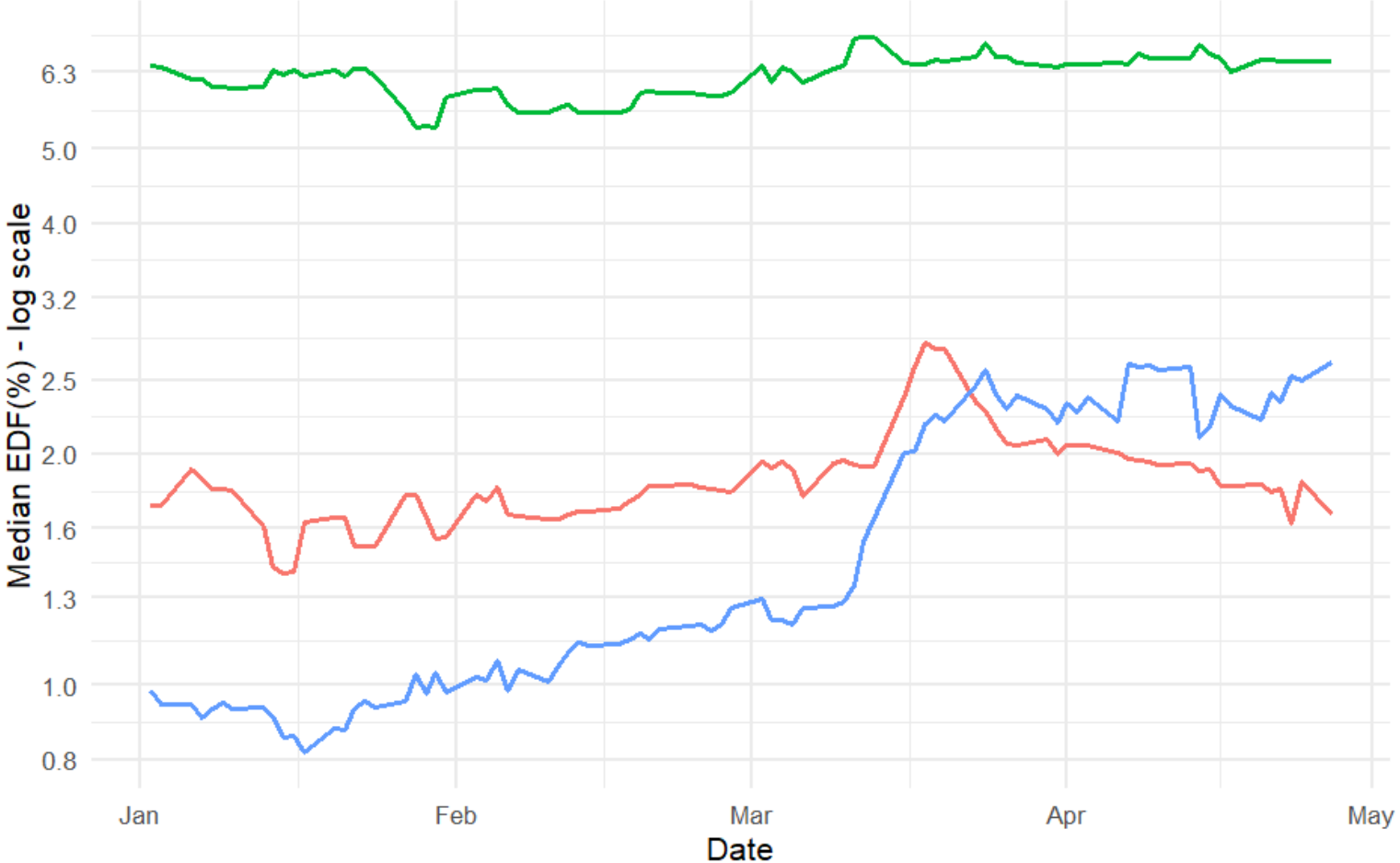
Country	Median EDF (Jan 2nd)	Median EDF (Apr 27th)	% Change	Absolute Change
Poland	1.16%	1.73%	49%	0.57%
Romania	0.46%	0.60%	29%	0.14%
Turkey	0.50%	0.74%	49%	0.24%



Country
 — POL
 — ROU
 — TUR

Timeline of Public EDFs for Emerging Markets

Africa



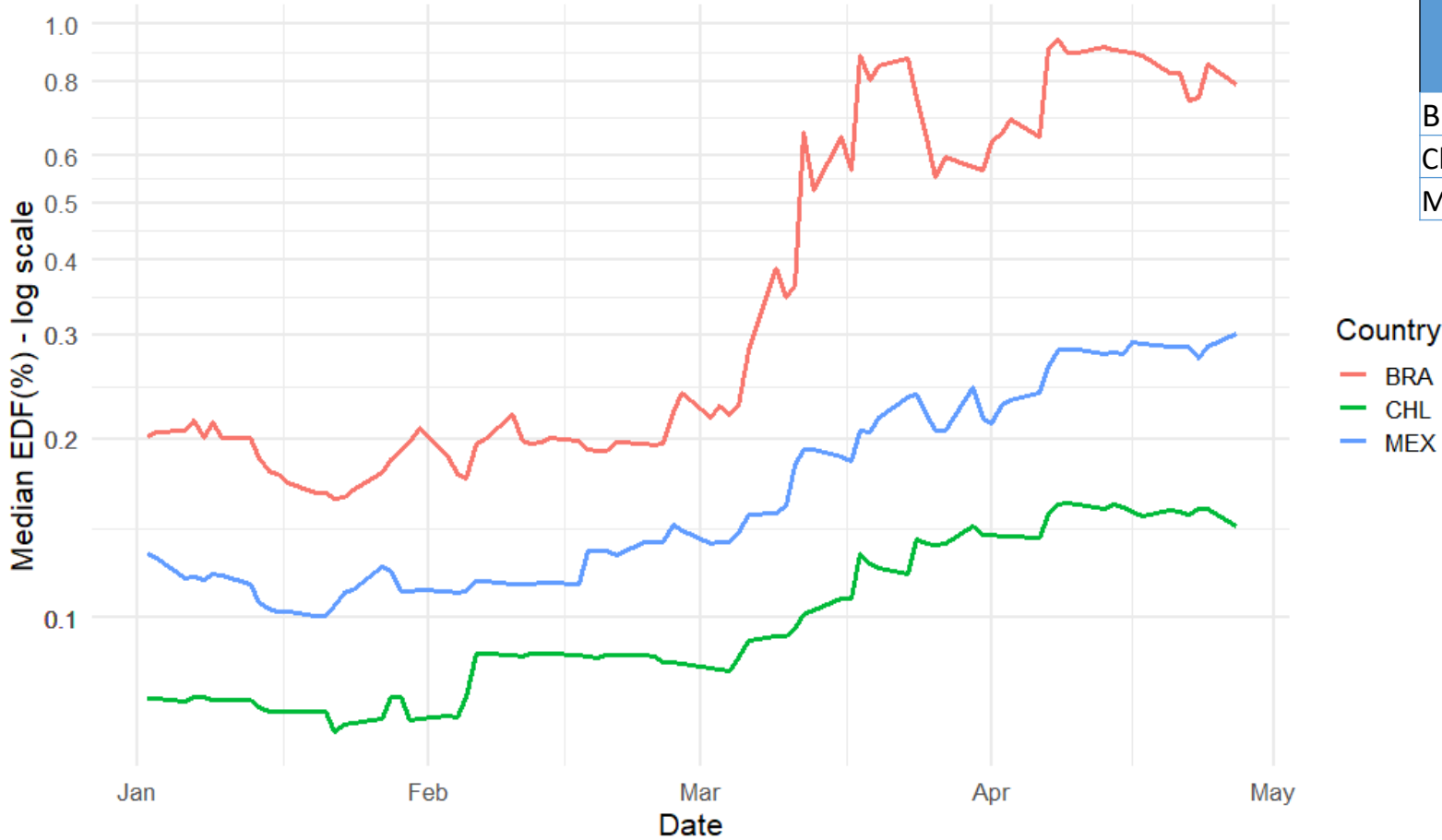
Country	Median EDF (Jan 2nd)	Median EDF (Apr 27th)	% Change	Absolute Change
Egypt	1.72%	1.67%	-3%	-0.05%
Nigeria	6.41%	6.51%	2%	0.10%
South Africa	0.98%	2.64%	169%	1.66%

Country
 — EGY
 — NGA
 — ZAF

Timeline of Public EDFs for Emerging Markets

Central & South America

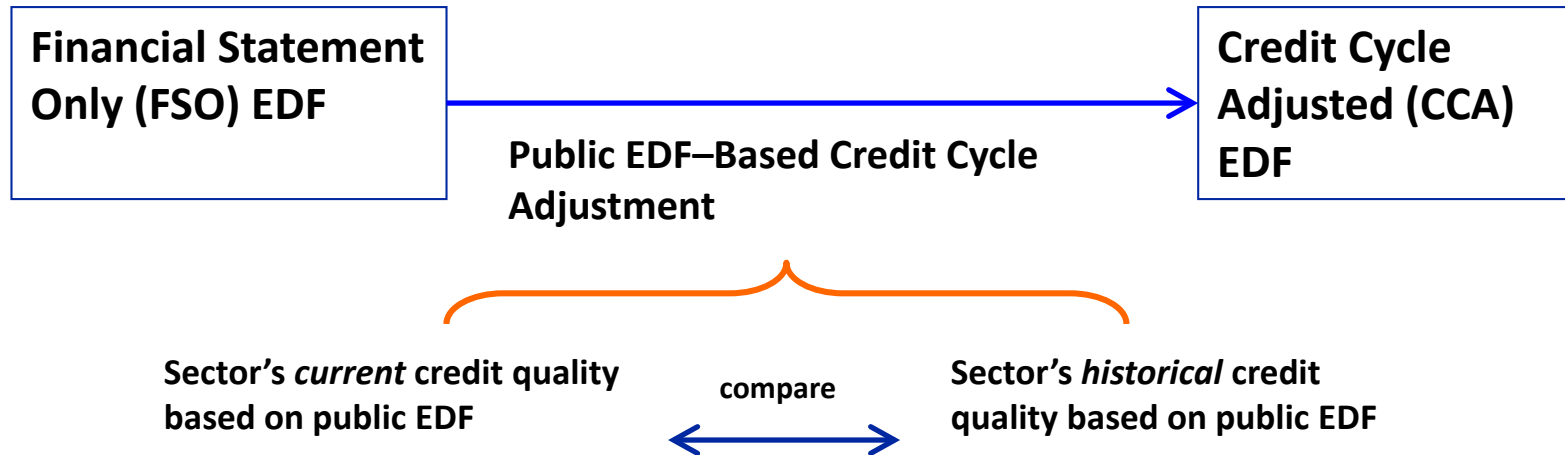
Country	Median EDF (Jan 2nd)	Median EDF (Apr 27th)	% Change	Absolute Change
Brazil	0.20%	0.79%	290%	0.59%
Chile	0.07%	0.14%	95%	0.07%
Mexico	0.13%	0.30%	135%	0.17%



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Private Firm Results

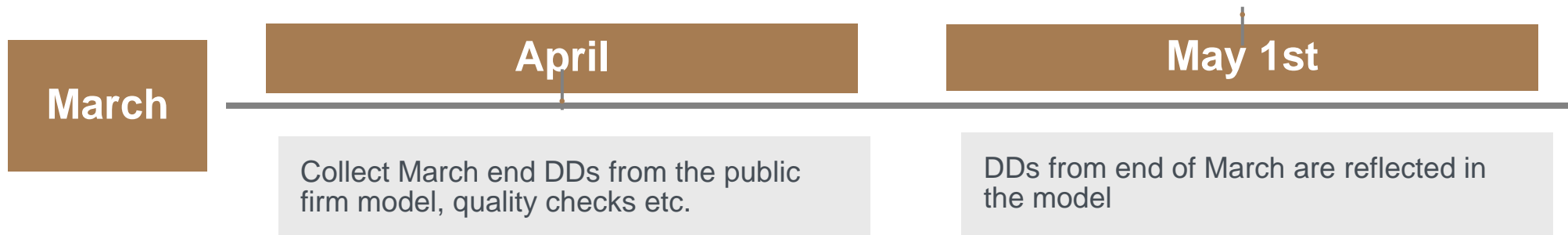
Credit Cycle Adjustment in RiskCalc Models



- » 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

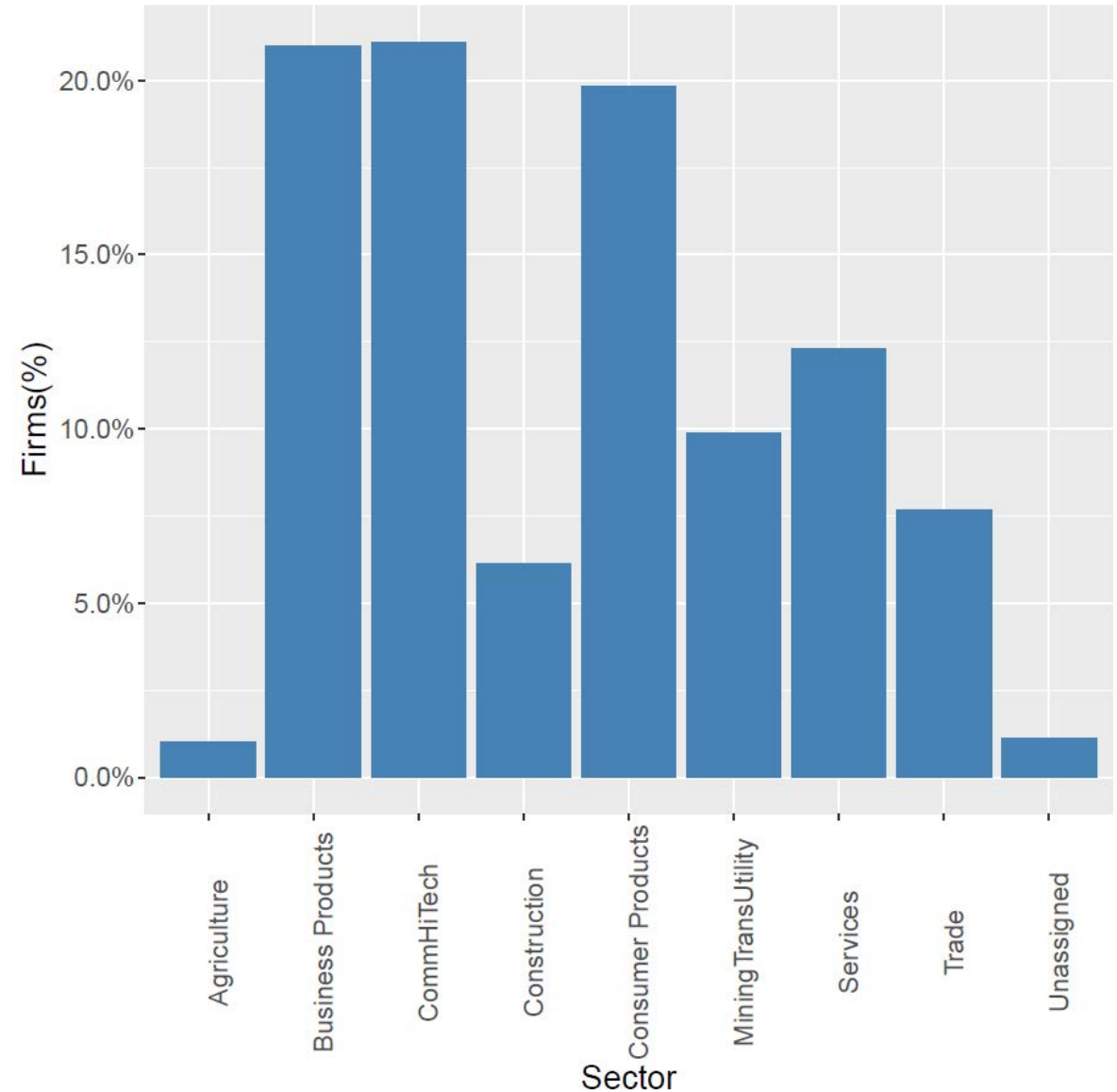
- Adjustment is based on a transformation of the Public Firm's Distance-to-Default (DD) measure by industry. Emerging market model utilizes DDs from publicly traded firms in different regions, countries and/or sectors
- The Distance-to-Default factor was designed to be region, country and industry-specific 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



Data Description

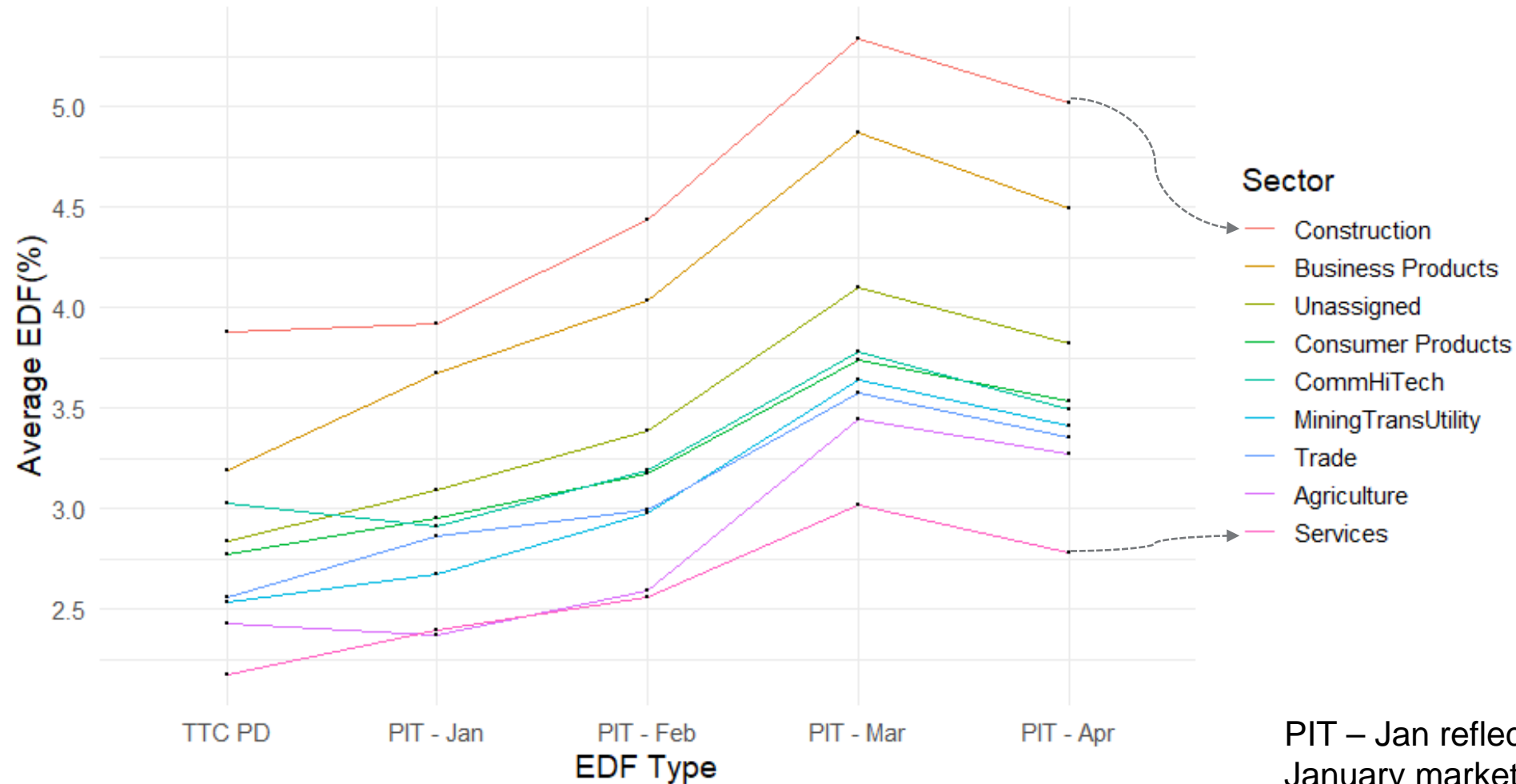
Emerging Market Corporates

Sample includes 3k+ firms and it's most recently available annual statement from Moody's Analytics Credit Research Database (CRD)



EDF Levels for Emerging Markets

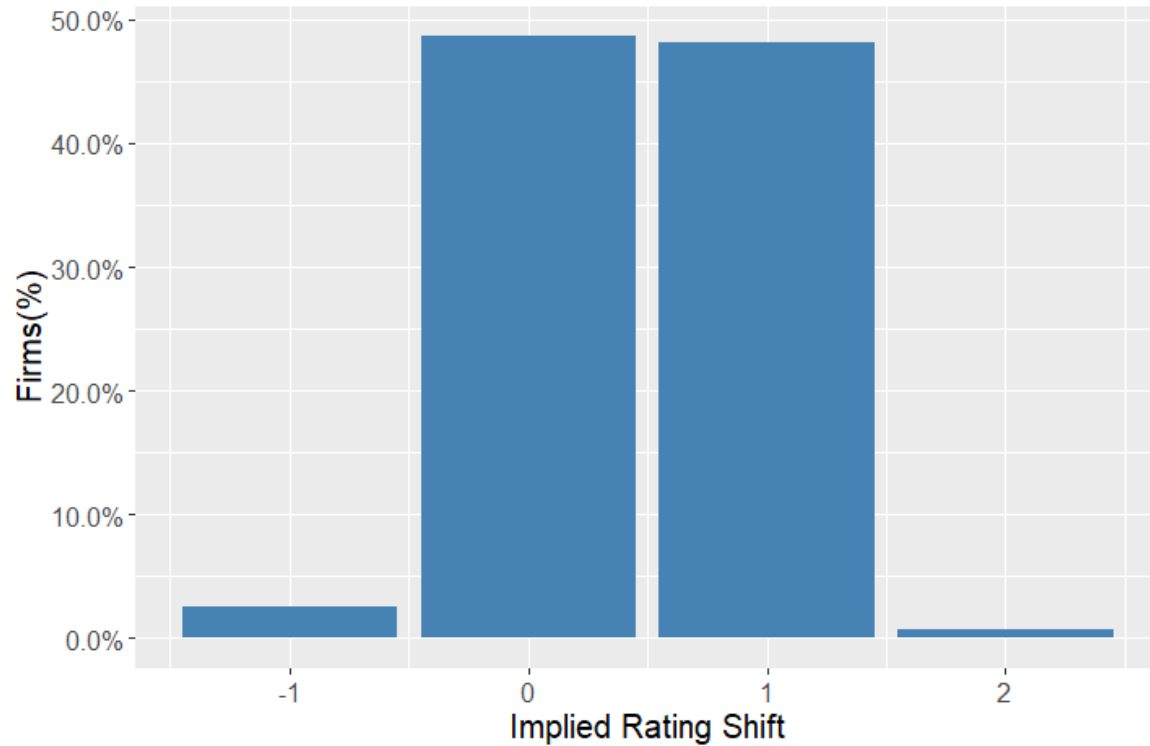
All Regions - CRD Sample



PIT – Jan reflects CCA based on end of January market conditions

Implied Rating Changes – CRD Sample

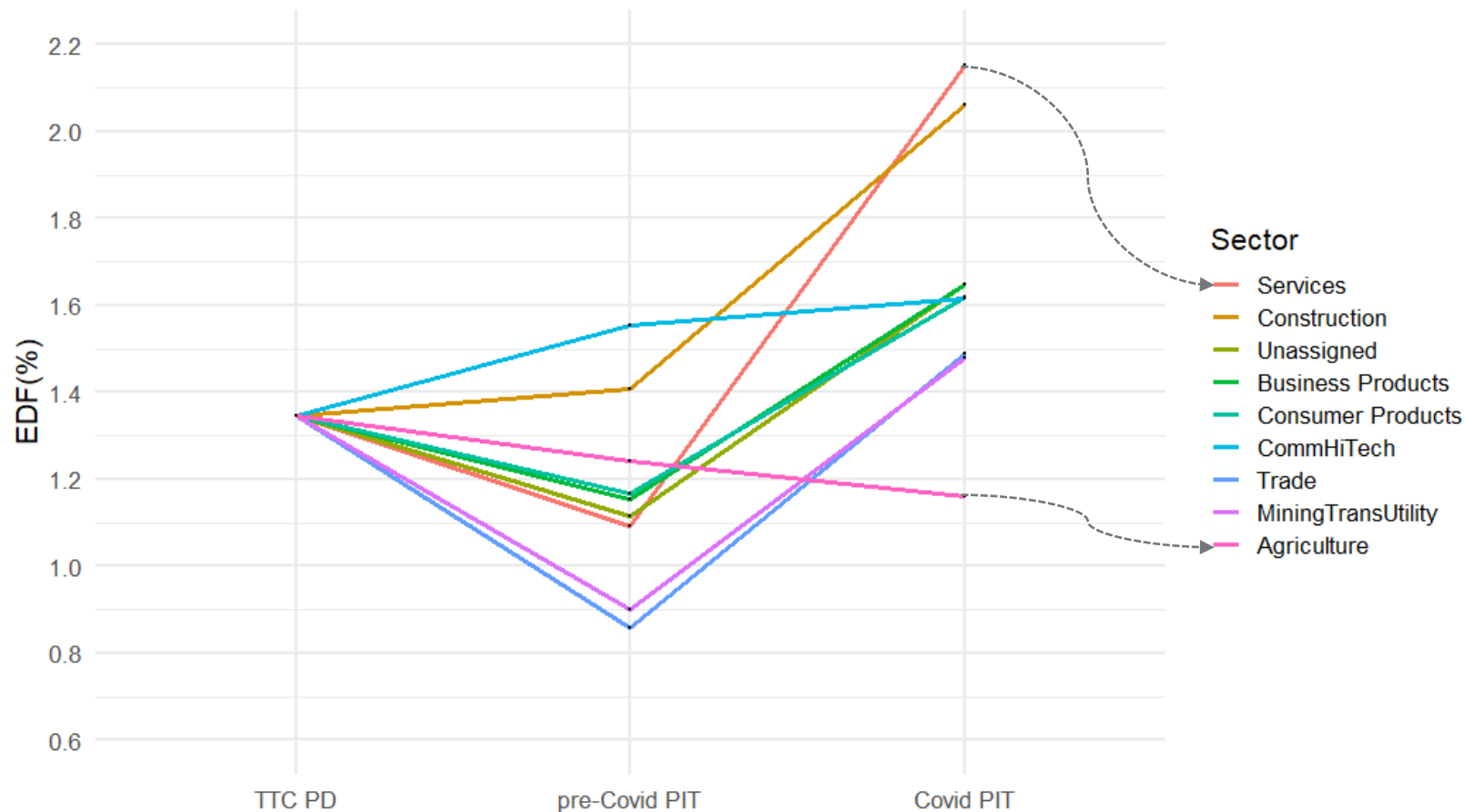
TTC to PIT



- +1 = Rating downgrade relative to TTC
- Certain sectors in Taiwan, Greece, and other Eastern European countries still have PIT PDs lower than TTC

Impact on Sectors By Regions

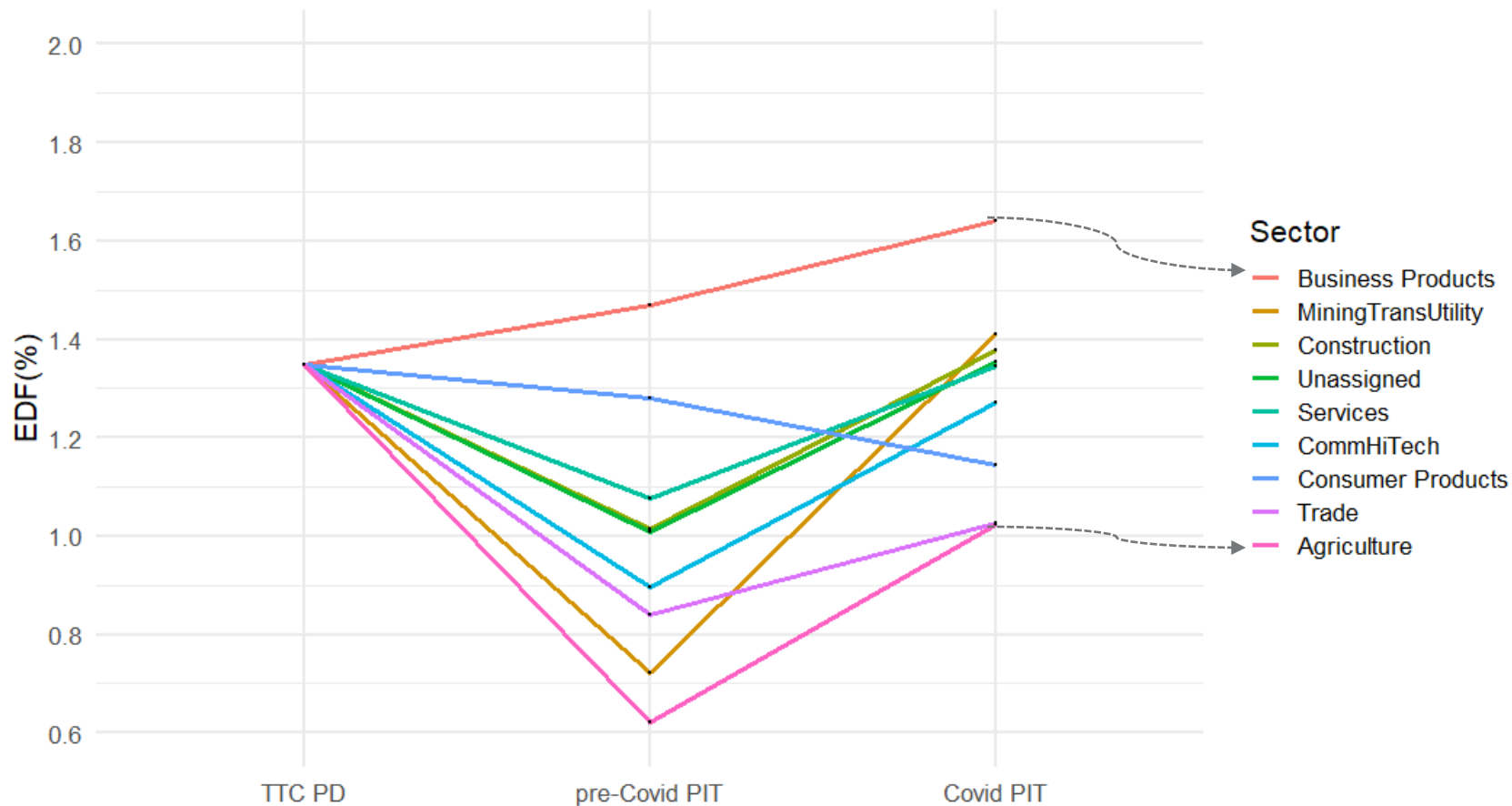
Central And South America



Sector	pre-Covid PIT	Covid PIT	%Change
Agriculture	1.2%	1.2%	-6%
Business Products	1.2%	1.6%	43%
CommHiTech	1.6%	1.6%	4%
Construction	1.4%	2.1%	46%
Consumer Products	1.2%	1.6%	39%
MiningTransUtility	0.9%	1.5%	64%
Services	1.1%	2.2%	97%
Trade	0.9%	1.5%	73%
Unassigned	1.1%	1.6%	48%

Impact on Sectors By Regions

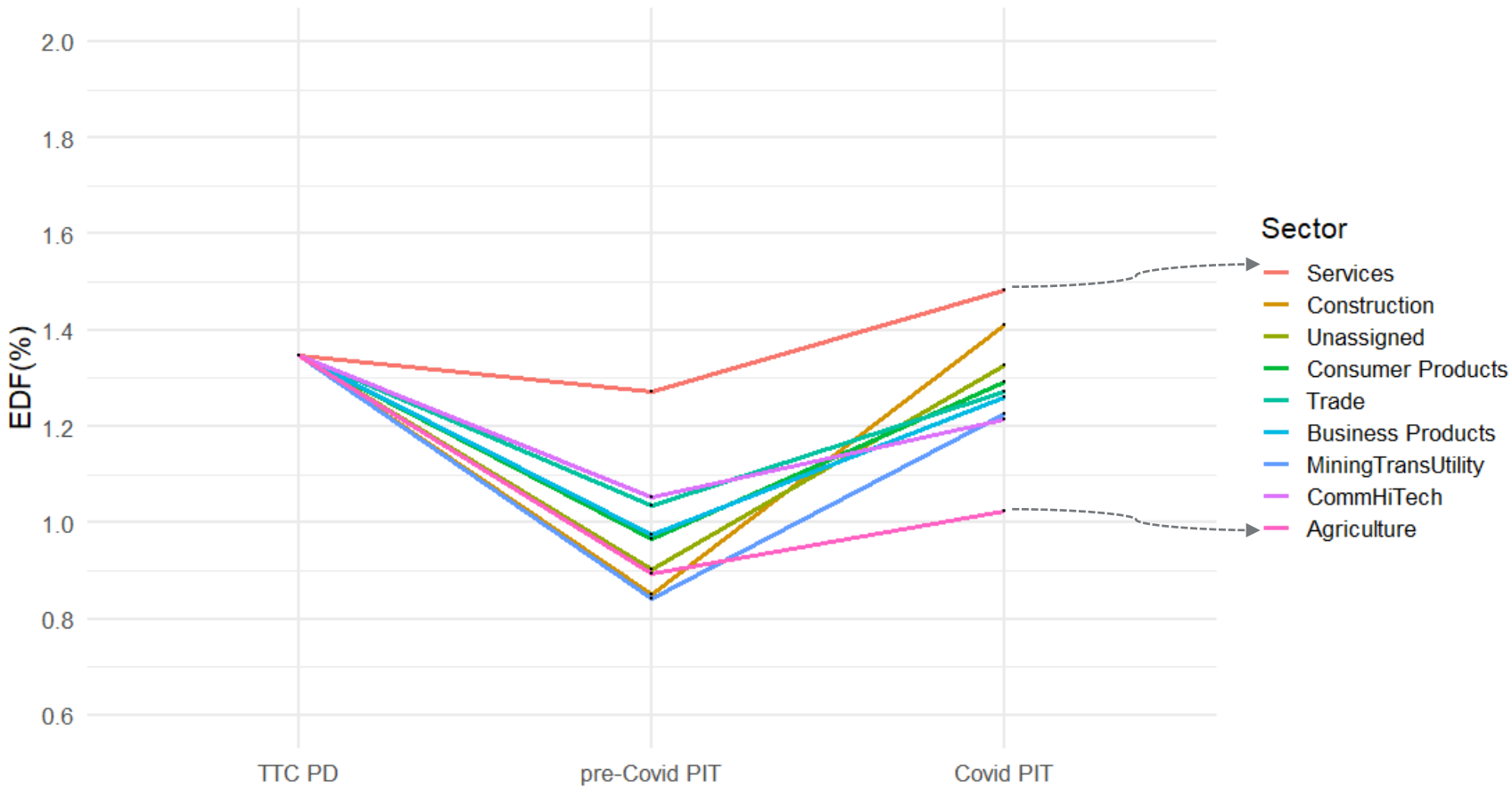
Middle East



Sector	pre-Covid PIT	Covid PIT	%Change
Agriculture	0.6%	1.0%	64%
Business Products	1.5%	1.6%	12%
CommHiTech	0.9%	1.3%	42%
Construction	1.0%	1.4%	36%
Consumer Products	1.3%	1.1%	-11%
MiningTransUtility	0.7%	1.4%	95%
Services	1.1%	1.3%	25%
Trade	0.8%	1.0%	22%
Unassigned	1.0%	1.4%	34%

Impact on Sectors By Regions

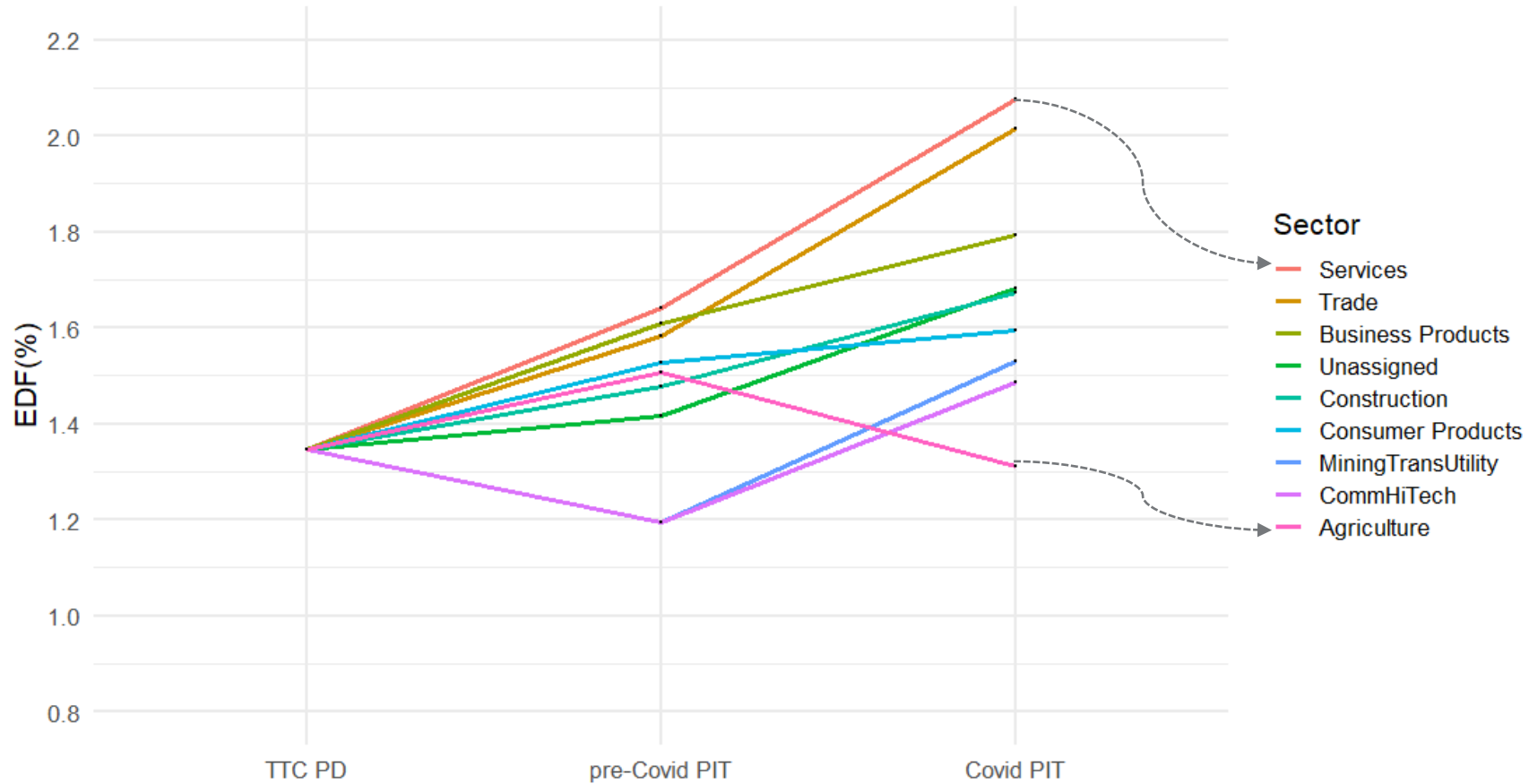
Eastern Europe



Sector	pre-Covid PIT	Covid PIT	%Change
Agriculture	0.9%	1.0%	15%
Business Products	1.0%	1.3%	29%
CommHiTech	1.1%	1.2%	15%
Construction	0.9%	1.4%	66%
Consumer Products	1.0%	1.3%	34%
MiningTransUtility	0.8%	1.2%	45%
Services	1.3%	1.5%	17%
Trade	1.0%	1.3%	23%
Unassigned	0.9%	1.3%	47%

Impact on Sectors By Regions

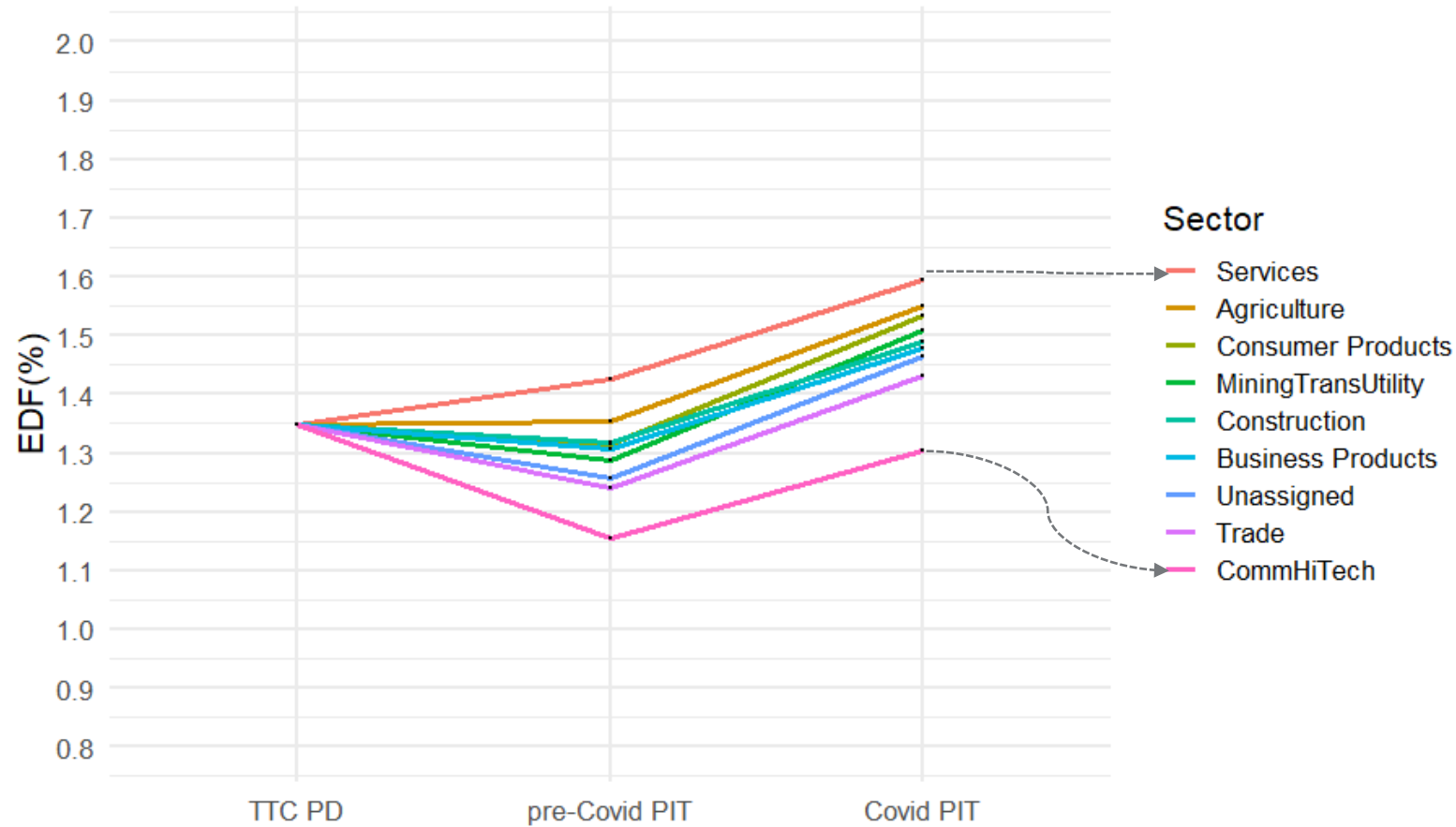
Africa



Sector	pre-Covid PIT	Covid PIT	%Change
Agriculture	1.5%	1.3%	-13%
Business Products	1.6%	1.8%	11%
CommHiTech	1.2%	1.5%	24%
Construction	1.5%	1.7%	13%
Consumer Products	1.5%	1.6%	5%
MiningTransUtility	1.2%	1.5%	28%
Services	1.6%	2.1%	27%
Trade	1.6%	2.0%	27%
Unassigned	1.4%	1.7%	19%

Impact on Sectors By Regions

Asia



Sector	pre-Covid PIT	Covid PIT	%Change
Agriculture	1.4%	1.6%	14%
Business Products	1.3%	1.5%	13%
CommHiTech	1.2%	1.3%	13%
Construction	1.3%	1.5%	13%
Consumer Products	1.3%	1.5%	17%
MiningTransUtility	1.3%	1.5%	17%
Services	1.4%	1.6%	12%
Trade	1.2%	1.4%	15%
Unassigned	1.3%	1.5%	17%

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Forward Looking PIT Adjustment

Heat Map: Central & South America

TTC to Covid19 PIT

Sector	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa/C
Agriculture	-1%	-2%	-4%	-6%	-13%	-17%	-18%	-14%	-16%	-11%	-8%	-11%	-19%
Business Products	2%	4%	8%	20%	34%	32%	34%	22%	20%	21%	28%	23%	38%
CommHiTech	2%	3%	6%	15%	27%	25%	25%	20%	12%	15%	25%	18%	29%
Construction	6%	9%	18%	51%	82%	75%	70%	53%	39%	38%	54%	50%	86%
Consumer Products	2%	3%	6%	15%	27%	25%	25%	20%	13%	15%	25%	18%	29%
MiningTransUtility	1%	1%	3%	6%	11%	13%	10%	10%	4%	9%	14%	9%	13%
Services	7%	11%	23%	73%	101%	99%	84%	60%	54%	43%	68%	63%	108%
Trade	1%	2%	3%	7%	13%	15%	11%	11%	5%	9%	16%	10%	15%
Unassigned	3%	4%	8%	20%	35%	32%	34%	22%	20%	21%	29%	23%	39%

Applying adjustment factors:

- For a Construction firm with a risk profile similar to Ba2 risk rating with an FSO EDF of 1.35%, use the multiplication factor of (1+53%) to get a forward looking PIT measure of 2.07%

Heat Map: Central & South America

PIT PD to Covid19 PIT

Sector	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa/C
Agriculture	-1%	-2%	-4%	-6%	-13%	-17%	-18%	-14%	-16%	-11%	-9%	-11%	-19%
Business Products	2%	3%	7%	18%	31%	26%	30%	18%	18%	17%	24%	19%	32%
CommHiTech	-2%	-3%	-5%	-12%	-17%	-17%	-14%	-11%	-13%	-10%	-10%	-12%	-18%
Construction	4%	5%	11%	31%	42%	39%	35%	26%	23%	19%	24%	27%	43%
Consumer Products	2%	3%	6%	14%	25%	22%	23%	18%	12%	13%	23%	16%	26%
MiningTransUtility	3%	5%	10%	18%	38%	57%	48%	43%	29%	28%	32%	31%	57%
Services	7%	11%	23%	73%	103%	102%	85%	62%	55%	44%	70%	64%	111%
Trade	4%	6%	13%	22%	50%	75%	64%	60%	40%	40%	39%	38%	73%
Unassigned	3%	5%	11%	25%	47%	49%	52%	36%	33%	32%	38%	33%	60%

Applying adjustment factors:

- For a Construction firm with a risk profile similar to Ba2 risk rating with an CCA EDF (Analysis Date of April) of 1.35%, use the multiplication factor of (1+26%) to get a forward looking PIT measure of 1.7%

Heat Map: Central & South America

TTC to Covid19 PIT – 5 year

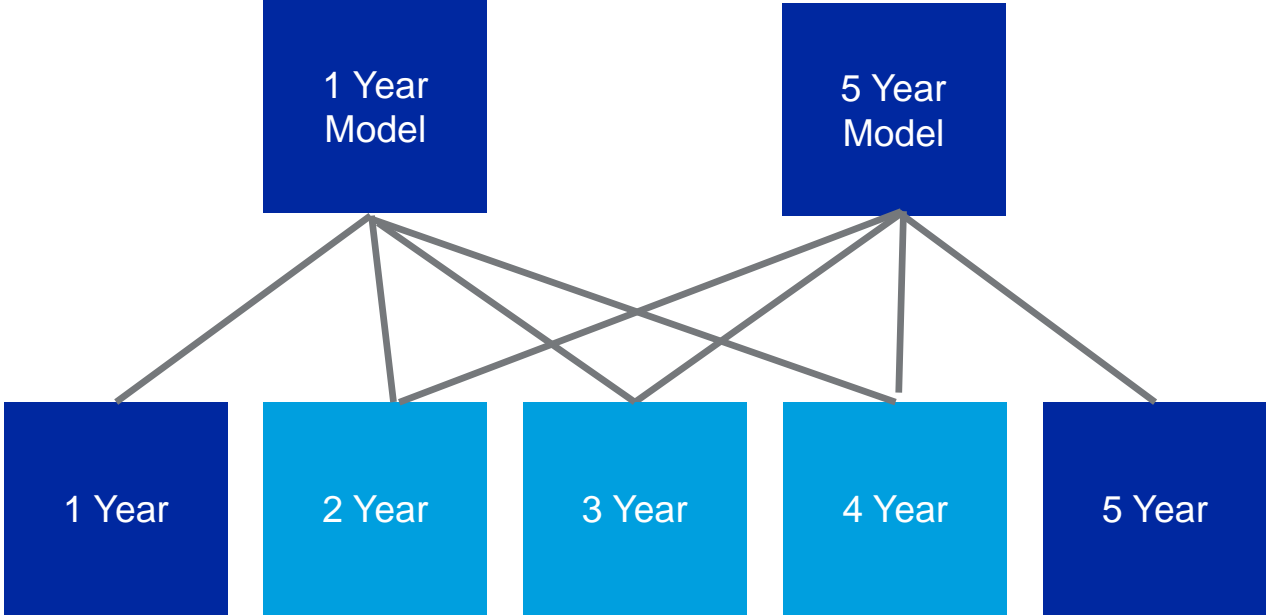
Sector	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa/C
Agriculture	-1%	-1%	-1%	-3%	-5%	-5%	-5%	-4%	-4%	-4%	-4%	-5%	-6%
Business Products	1%	1%	2%	5%	7%	9%	5%	5%	6%	6%	4%	6%	8%
CommHiTech	-1%	-1%	-1%	-3%	-5%	-6%	-4%	-4%	-3%	-2%	-3%	-2%	-6%
Construction	1%	1%	2%	7%	10%	11%	8%	6%	5%	3%	5%	4%	11%
Consumer Products	1%	1%	1%	4%	6%	7%	5%	4%	5%	6%	4%	6%	7%
MiningTransUtility	2%	2%	3%	8%	12%	12%	12%	9%	9%	10%	10%	11%	15%
Services	3%	3%	5%	14%	22%	22%	17%	13%	12%	11%	10%	11%	24%
Trade	2%	2%	3%	10%	15%	16%	15%	11%	10%	12%	14%	13%	18%
Unassigned	2%	2%	3%	8%	12%	13%	10%	9%	9%	10%	8%	11%	14%

Applying adjustment factors:

- For a Construction firm with a risk profile similar to Ba2 risk rating with an FSO EDF-5yr of 6.72%, use the multiplication factor of (1+12%) to get a forward looking PIT 5yr measure of 7.12%

Obtaining a Term structure of Adjusted PDs

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



4

Implications for Expected Loss

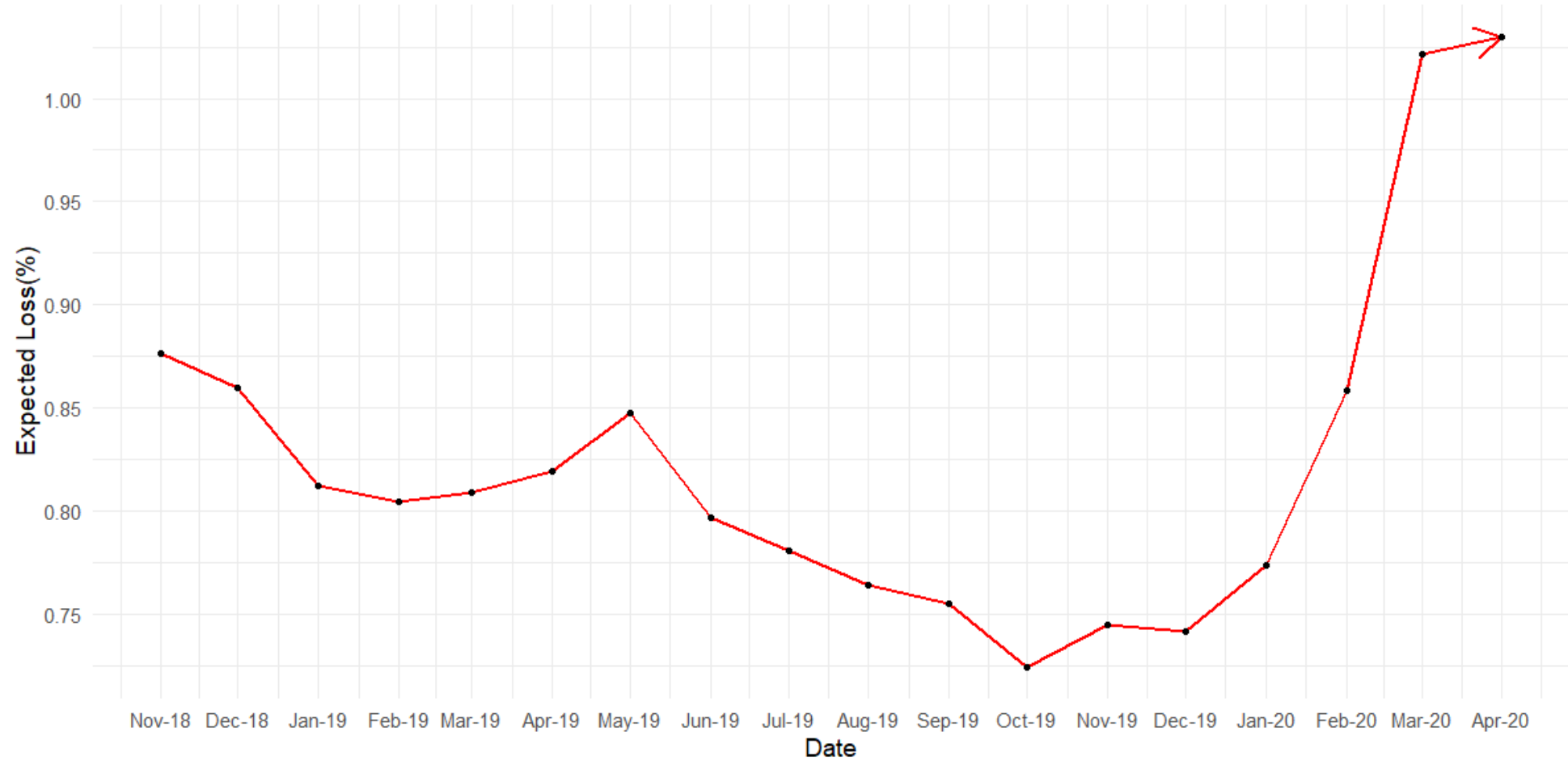
Results

Expected Loss – Emerging Markets

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

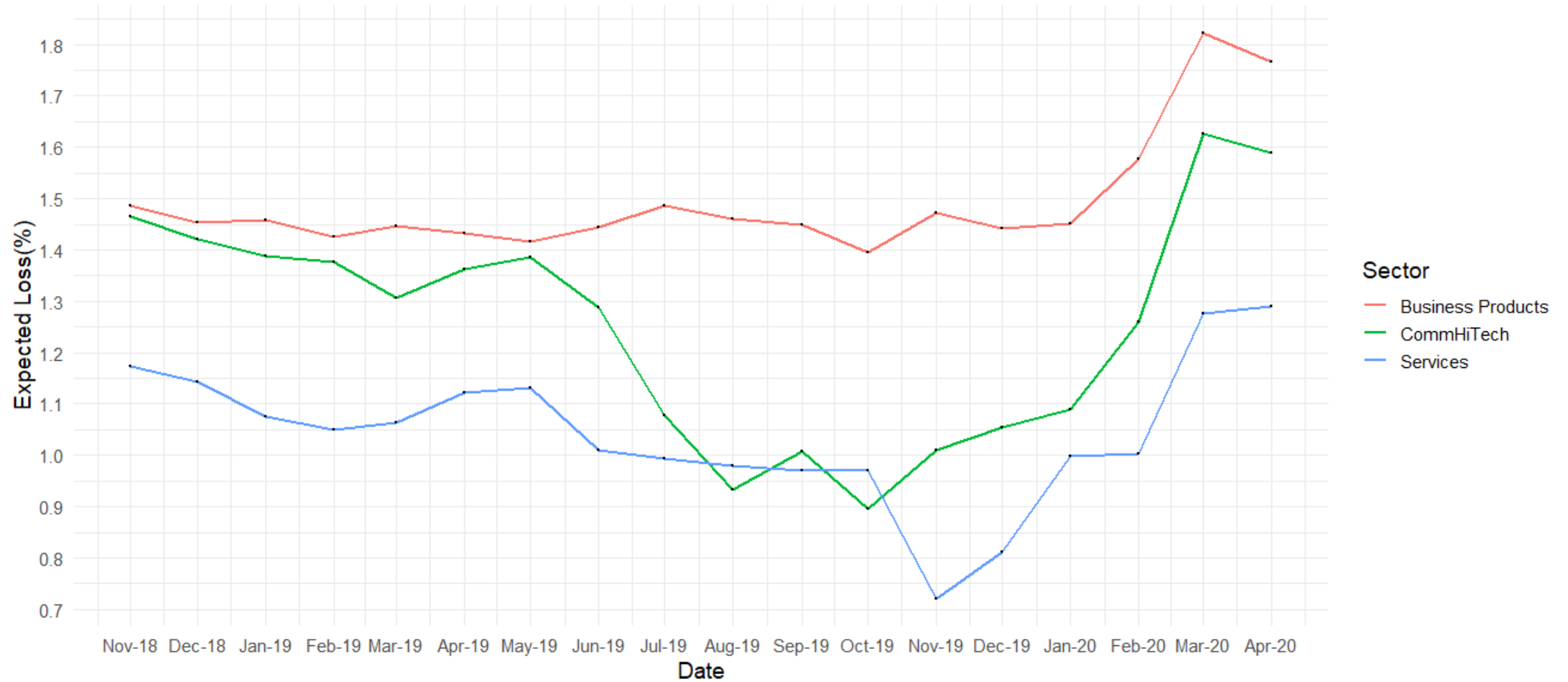
Results

Expected Loss – Overall



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 Services and Construction deteriorating the most
- » Size weighted Expected Loss expected to increased by close to 33% at an aggregate level for Emerging Markets
- » 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 1yr	Average PD 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 – EMM 3.1

- » 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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