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PRACTITIONER'S CHALLENGE

Group 6

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TABLE OF CONTENTS

- Introduction
- Data Collection
- Methodology
- Results
- Evaluation
- References



INTRODUCTION

1. **2020:** default rate of 3.95%

2019: default rate of 1.22%

- COVID-19 pandemic
- Oil price shocks

2. **2016:** 15 defaults, mainly Brazil:

- Political and economical challenges

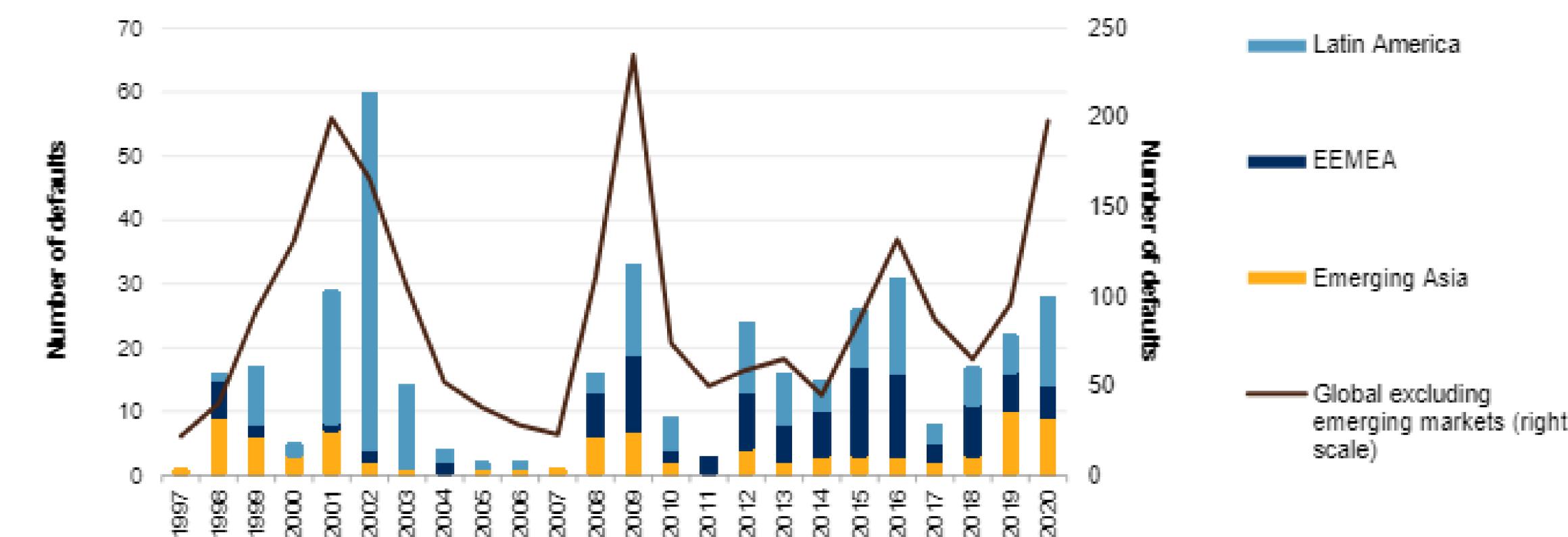
3. **2009:** 14 defaults

- Global financial crisis

4. **2002:** 56 defaults, mainly Argentina

- Financial and economic crisis

Annual Emerging Markets Corporate Defaults



EEMEA--Eastern Europe, Middle East, and Africa. Sources: S&P Global Ratings Research and S&P Global Market Intelligence's CreditPro®.

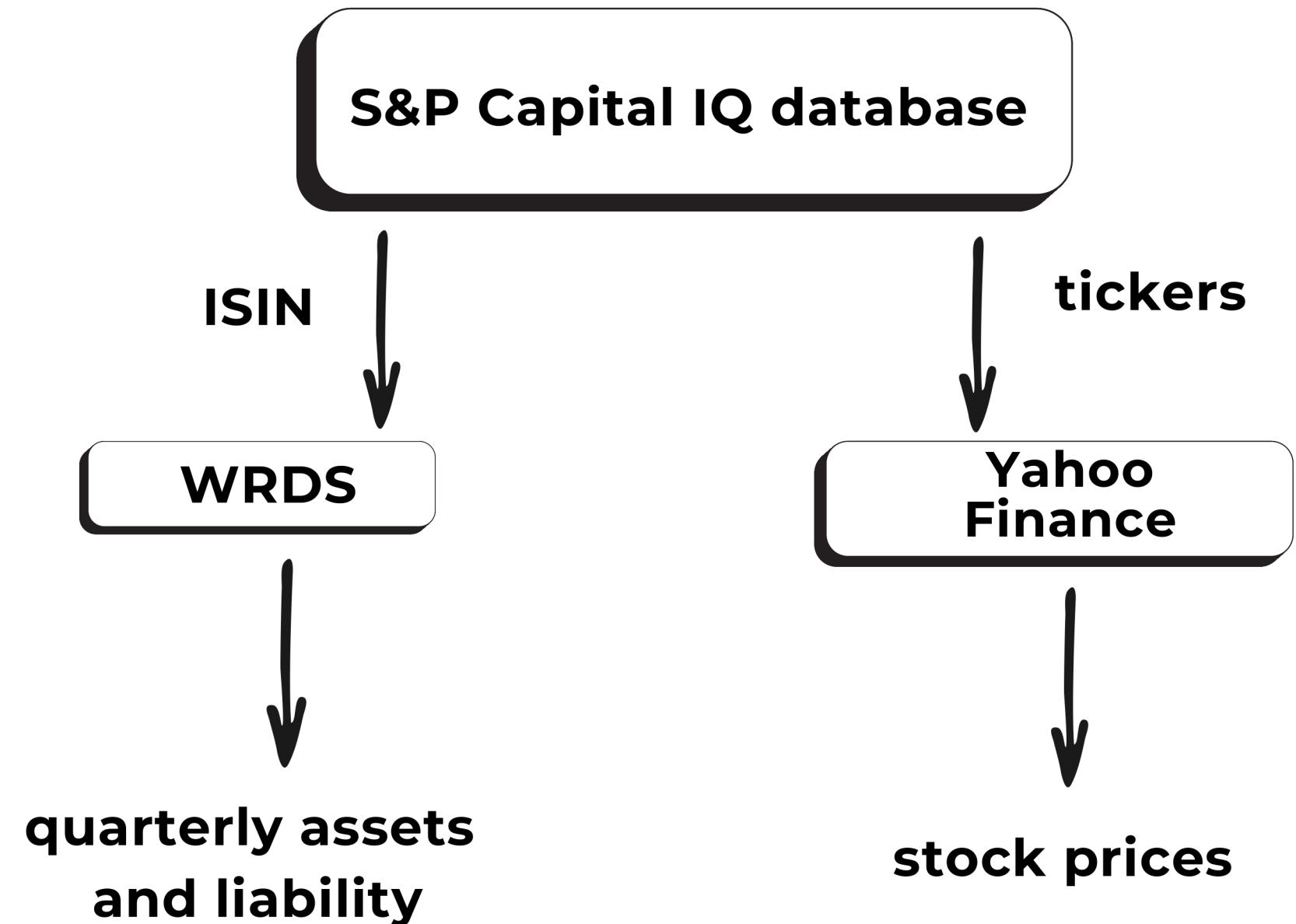
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DATA COLLECTION

We approximate a firm's **credit quality** based on:

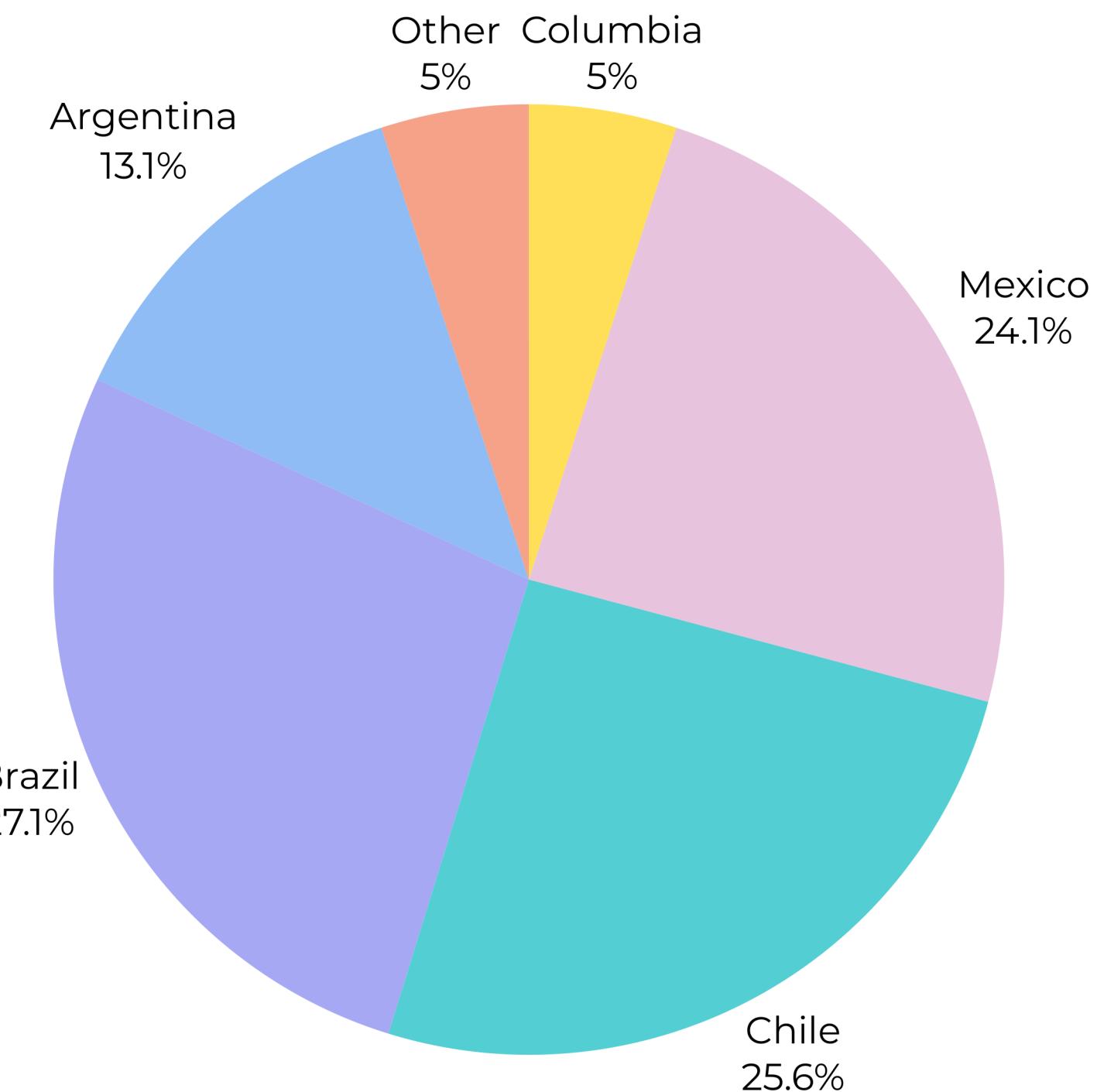
- quarterly total assets
- quarterly total liabilities
- quarterly stock prices

We decided to study the period of
2006-2023



DATA COLLECTION

Composition of Latin American Countries
in the Default Correlation Database



Distribution of Financial and Non-
Financial Companies in Latin America



DEFAULT CORRELATION

Two random variables $D_1(t)$, $D_2(t)$, representing whether firms 1 and 2 respectively will default within a certain time period, t :

$$D_i(t) := \begin{cases} 1 & \text{if firm } i \text{ defaults by } t \\ 0 & \text{otherwise} \end{cases}$$

For simplicity, we denote $P(D_i(t))$ as P_i .

Then we can calculate the default correlation as following equation:

$$\text{corr}(D_1(t), D_2(t)) = \frac{(P_1 = 1) + (P_2 = 1) - (P_{1\text{or}2} = 1) - (P_1 = 1) \cdot (P_2 = 1)}{\sqrt{(P_1 = 1) \cdot (1 - P_1 = 1) \cdot (P_2 = 1) \cdot (1 - P_2 = 1)}}$$

METHODOLOGY

Probability of either firm default are derived by solving by Kolmogorov forward equation

Model of Zhou(2001)

Model of Li(2016)

- Solution consists of integral of bassel function
- Solution consists of cdf of 2-d standard normal

METHODOLOGY

Parameters

- ρ : Asset return correlation, approximated by equity correlation
- σ_i : Asset volatility of i_{th} firm, approximated by the classic annualised closed-to-closed stock price volatility
- V_i : Asset value of i_{th} firm at the beginning of the time horizon
- K_i : The Capital structure of i_{th} firm, approximated by 0.75total liability

A COMPARATIVE OVERVIEW

Structural Model Benefits

Uses firm-specific data
(Asset Value, Liability,
Stock Price)

Data Availability Issue

Insufficient data for
implementing reduced form
models (e.g., Credit Ratings)

Merton Model Shortcoming

Overlooks early default risk,
leading to underestimation
of default probabilities

Analytical Strength

Zhou and Li provide a
closed-formula for
estimating joint default
probabilities

ADVANTAGES OF LI'S MODEL OVER ZHOU'S

- Computational more efficient
- Consistent assumption
- Produce more reliable results on extreme cases

RESULTS

	2022-2023 1-year	2021-2023 3-year	2018-2023 5-year	2006-2023 17-year
Global	2.45%	2.10%	7.60%	8.20%
Country (weighted average)	3.77%	7.49%	17.00%	30.00%
Financial (weighted average)	12.36%	13.00%	20.88%	38.00%
Non-financial (weighted average)	2.00%	4.60%	13.1%	20.9%

*In this table, the country-specific and sector-specific default correlation coefficient is the weighted average based on the number of company pairs in each country. The financial and non-financial default correlation coefficient of each country in Latin America and Caribbean region could be found in the technical report.

Low global coefficient:

- Diverse economic policies
- Sector shock exposure

Medium non-financial coefficient:

- Same national environment
- Depends on specific industry

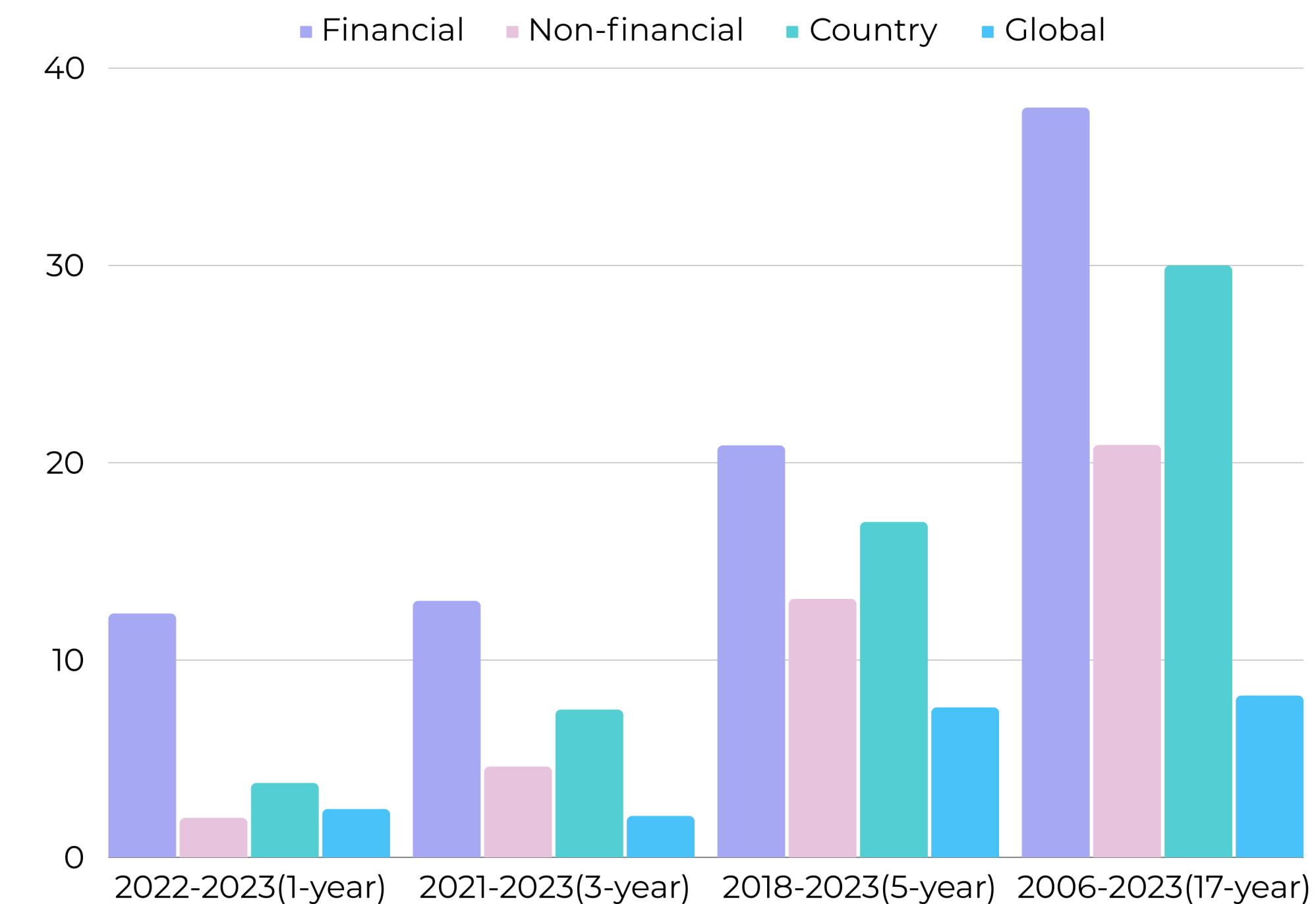
Medium/high country coefficient:

- Same fiscal policy, political stability
- Same economic conditions

High financial coefficient:

- Same financial regulation
- Connection between firms

Comparative Analysis of Sectoral and Geographical Correlation Coefficients Over Time



EVALUATION

Limitations

- Dataset quality concerns
- Lack of long-term liability data
- Equity correlation Issue
- Volatility assumption limitation
- Macroeconomic factors excluded

What we could have done if we have access to more data

- Calibration and comparison using historical default data
- Credit rating analysis
- Industry specific analysis

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THANK YOU

*We look forward to working
with you*

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