An Empirical Asset Pricing Model
Accounting for the Sector-Heterogeneity of Risk

Maksim Papenkov
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Empirical Asset Pricing Model (p. 3)

• General Form: \( (R_{\text{asset}} - R_{\text{riskfree}}) = \alpha + X\beta + \varepsilon \)

• CAPM (1962): \( X = \text{[Market Returns]} \)

• FF3 (1993): \( X = \text{[Market Ret, Size, Value]} \)

• FF5 (2015): \( X = \text{[Market Ret, Size, Value, Profits, Investment]} \)

• SHM (2019): \( X = \text{[Market FF5]} + \text{[Sector FF5]} \)
Largest (Dec 2018):
- Info Tech (20.7%)
- Health Care (15.2%)

Smallest (Dec 2018):
- Real Estate (0.2%)
- Materials (2.9%)
Total Size Distribution (p. 8)
Total Profitability Distribution (p. 10)

Profits as a Percentage of Total Book Equity (Annual)

Dot-Com Bubble

Big Pharma
Factor PREMIUM

• Example: Company Size (Total Market Equity)

• SMALL Portfolio = 30% of all smallest companies (i.e. 5%)

• BIG Portfolio = 30% of all biggest companies (i.e. 2%)

• SMB (SMALL minus BIG) = Returns on SMALL – Returns on BIG (i.e. 3%)
“Size Effect” by Sector (p. 12)
“Profits Effect” by Sector (p. 14)

A) Annualized RMW (with P–Value)

B) Cross–Sector Correlations for RMW

- HC (0.29)
- Dot-Com Bubble (0.38)
- CD (0.30)
- IT (0.23)
- F (0.10)
- M (0.01)
- C (0.04)
- Mkt (0.01)

Correlation Matrix:

<table>
<thead>
<tr>
<th></th>
<th>Mkt</th>
<th>C</th>
<th>CD</th>
<th>CS</th>
<th>E</th>
<th>F</th>
<th>HC</th>
<th>I</th>
<th>IT</th>
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Empirical Asset Pricing Model (p. 3)

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Comparison of Model Explanatory Power (p. 12)

**A) Adjusted-R2 by Sector**

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**B) Aggregate Adjusted-R2 Over Time**

- SHM
- FF5
- FF3
- CAPM

Date (January Values)
Application: High-Beta Portfolios (p. 19)
Thank you International Atlantic Economics Society!