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

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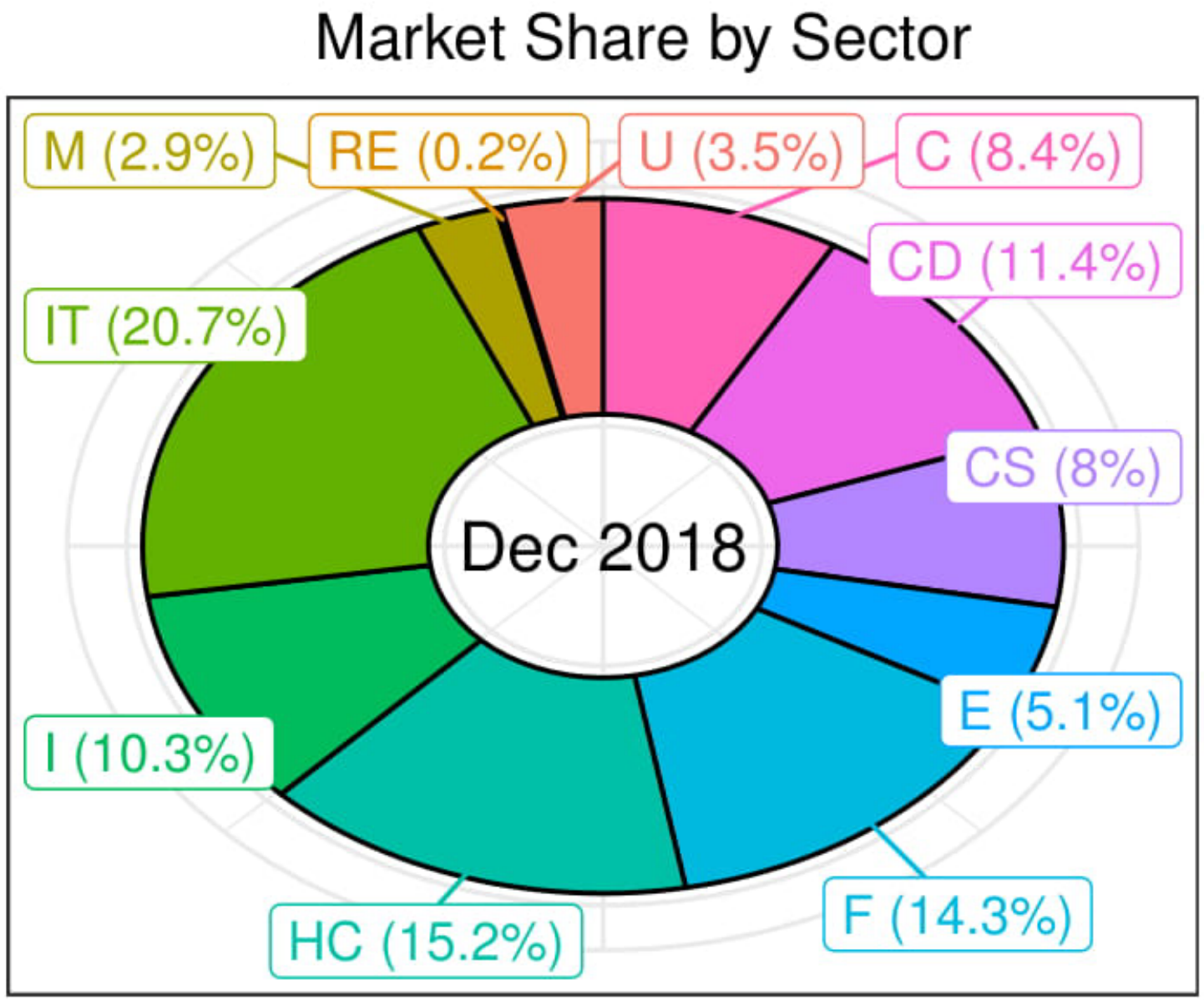
Empirical Asset Pricing Model (p. 3)

- General Form : $\left(R_{asset} - R_{riskfree}\right) = \alpha + \mathrm{X}\boldsymbol{\beta} + \varepsilon$
- CAPM (1962) : $\mathrm{X} = [Market\ Returns]$
- FF3 (1993) : $\mathrm{X} = [Market\ Ret, Size, Value]$
- FF5 (2015) : $\mathrm{X} = [Market\ Ret\ , Size, Value, Profits, Investment]$
- **SHM (2019) :** $\mathbf{X} = [\boldsymbol{Market\ FF5}] + [\boldsymbol{Sector\ FF5}]$



(p. 7)

<u>Largest (Dec 2018) :</u>

Info Tech (20.7%)

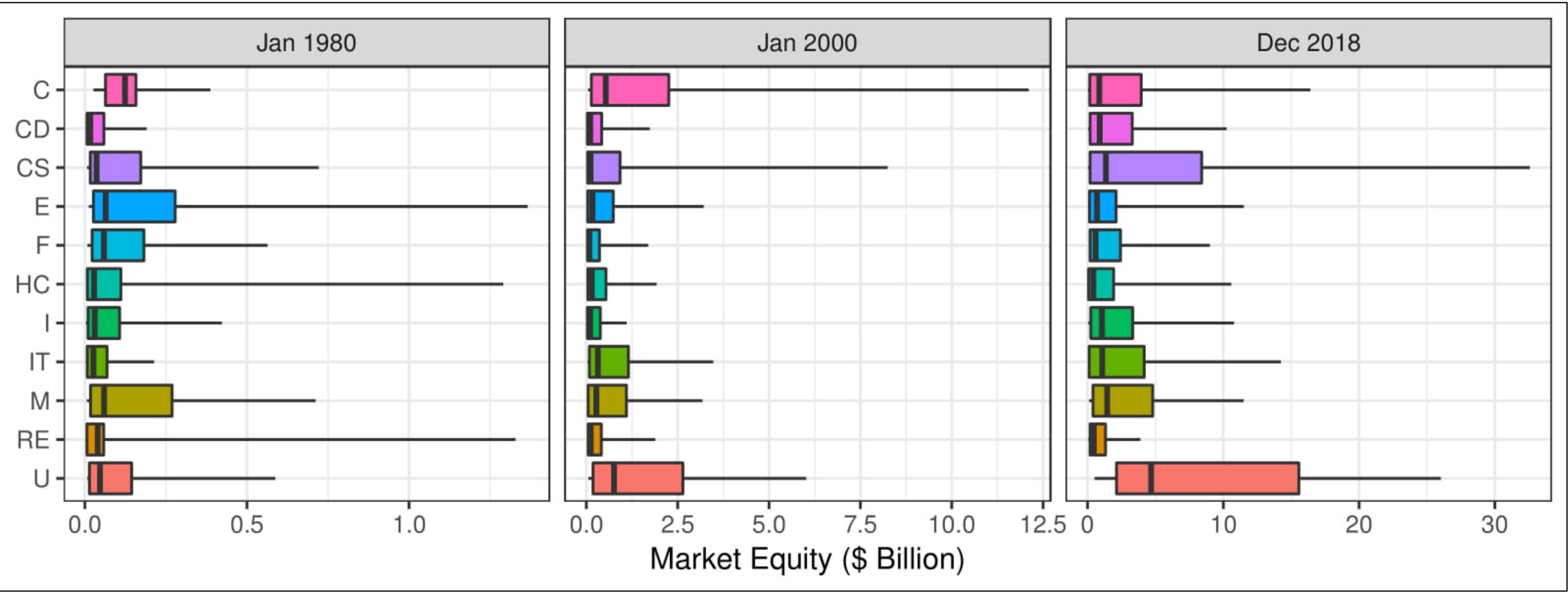
Health Care (15.2%)

<u>Smallest (Dec 2018) :</u>

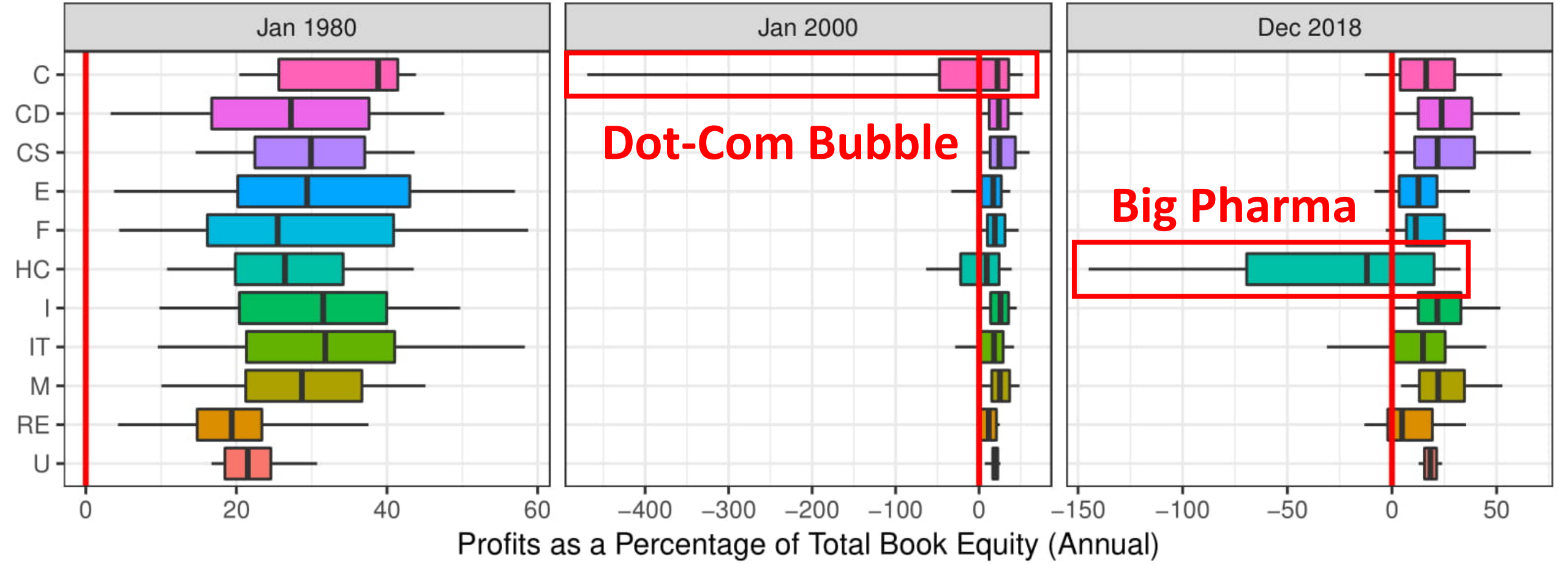
Real Estate (0.2%)

Materials (2.9%)

Total Size Distribution (p. 8)



Total Profitability Distribution (p. 10)

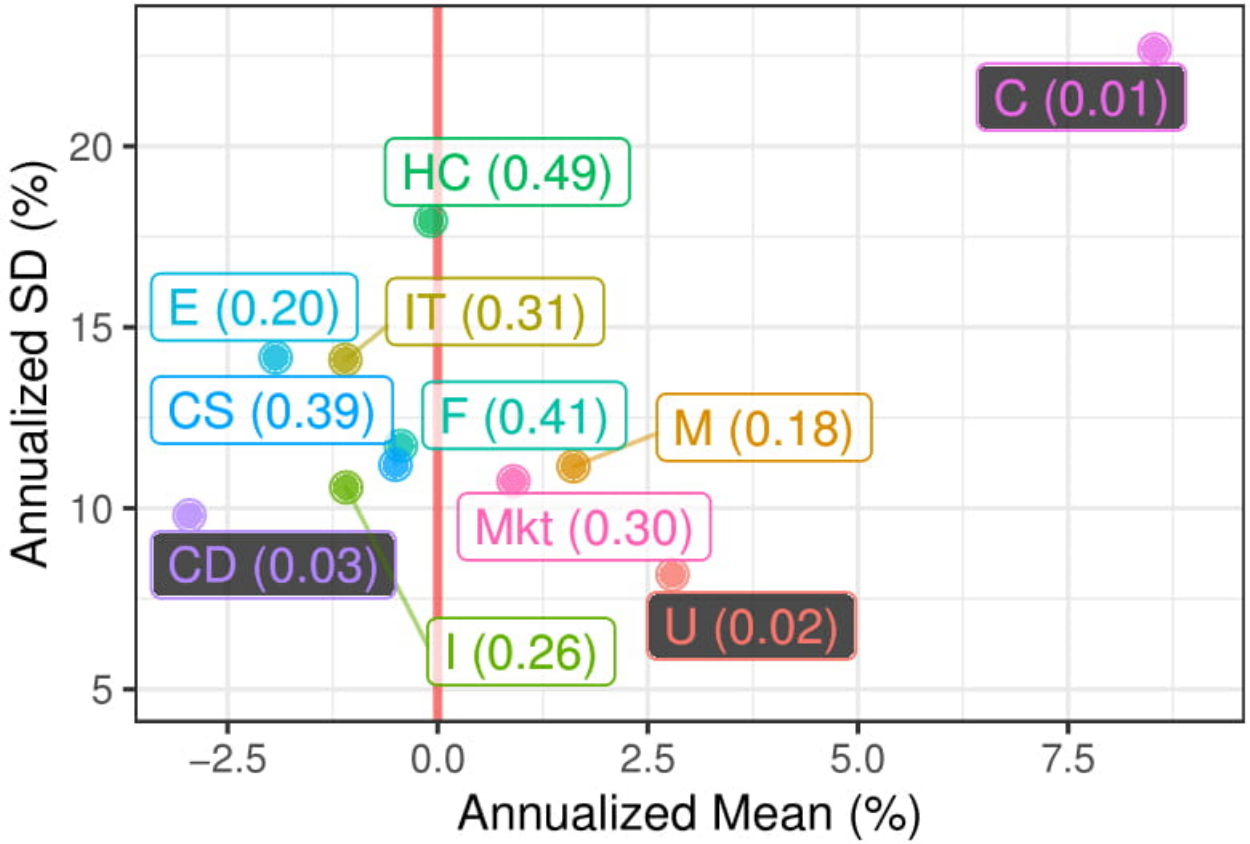


Factor PREMIUM

- 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)

A) Annualized SMB (with P–Value)

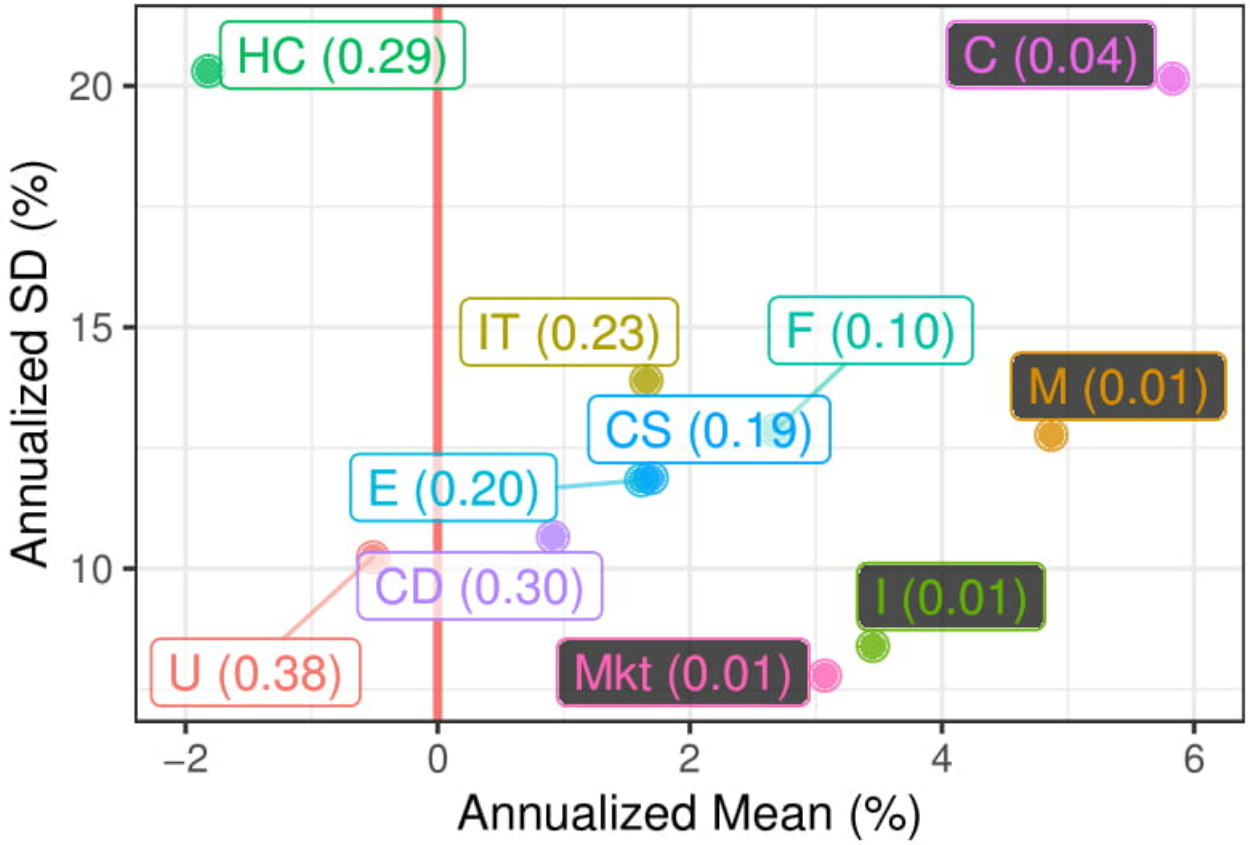


B) Cross–Sector Correlations for SMB

	U	M	IT	I	HC	F	E	CS	CD	C	Mkt
Mkt	0.34	0.54	0.63	0.75	0.81	0.56	0.47	0.52	0.60	0.37	1.00
C	0.18	0.18	0.19	0.23	0.25	0.15	0.16	0.26	0.21	1.00	
CD	0.14	0.34	0.43	0.52	0.43	0.38	0.31	0.37	1.00		
CS	0.19	0.35	0.28	0.40	0.36	0.32	0.24	1.00			
E	0.01	0.19	0.31	0.30	0.33	0.18	1.00				
F	0.18	0.41	0.36	0.50	0.43	1.00					
HC	0.15	0.38	0.48	0.55	1.00						
I	0.24	0.54	0.51	1.00							
IT	0.13	0.40	1.00								
M	0.23	1.00									
U	1.00										

“Profits Effect” by Sector (p. 14)

A) Annualized RMW (with P–Value)



B) Cross–Sector Correlations for RMW

	U	M	IT	I	HC	F	E	CS	CD	C	Mkt
Mkt	0.23	0.24	0.59	0.17	0.63	–0.10	0.15	0.07	0.49	0.36	1.00
C	0.08	0.04	0.20	0.00	0.24	–0.04	0.11	–0.07	0.28	1.00	
CD	0.14	0.16	0.21	0.03	0.20	–0.01	0.08	0.00	1.00		
CS	–0.14	0.08	–0.06	0.12	–0.01	0.13	–0.02	1.00			
E	0.00	0.00	0.05	0.00	0.00	–0.11	1.00				
F	0.00	–0.01	–0.27	0.18	–0.23	1.00					
HC	0.13	0.06	0.38	–0.05	1.00						
I	–0.02	0.11	–0.04	1.00							
IT	0.03	0.14	1.00								
M	0.05	1.00									
U	1.00										

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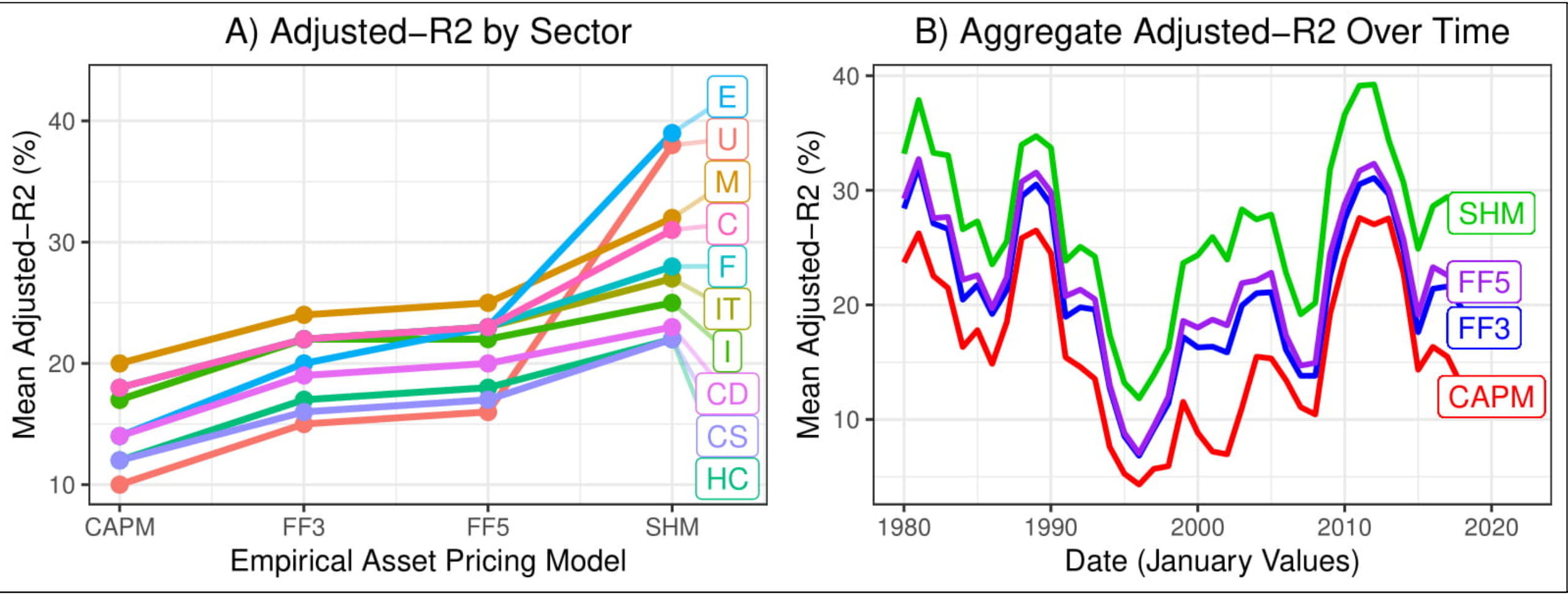
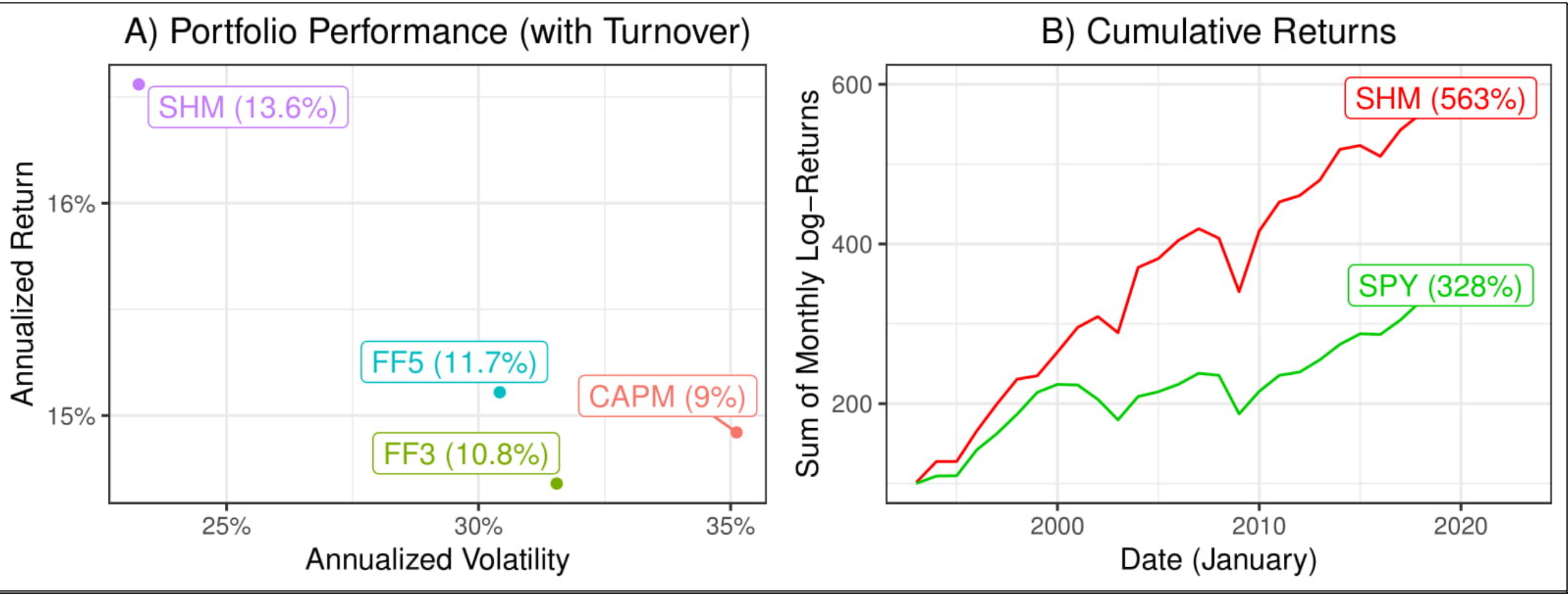
Comparison of Model Explanatory Power (p. 12)



Application : High-Beta Portfolios (p. 19)



Thank you International Atlantic Economics Society!