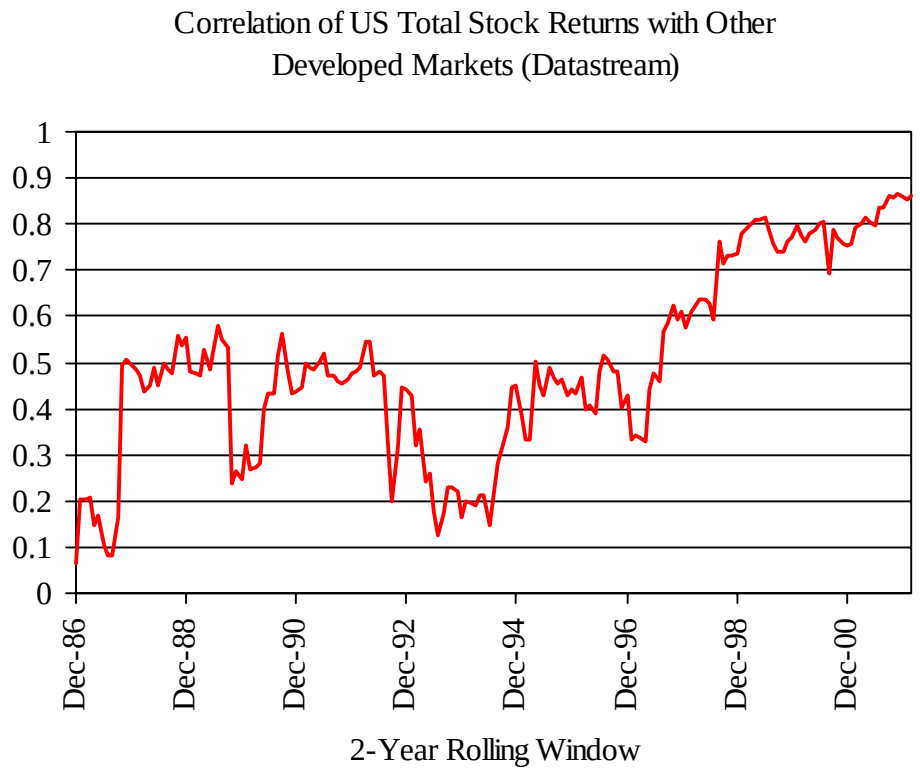
Firm-level Evidence on Globalization

Robin Brooks and Marco Del Negro

IMF and FRB Atlanta

Motivation

- What is driving the rise in comovement across national stock markets:
  - Financial integration?
  - Real integration?
  - Temporary factors?



Starting Point

- How best to diversify portfolio risk in stock returns: across countries or industries?
- Heston and Rouwenhorst (1995) & Griffin and Karolyi (1998) find country effects dominate global industry effects by a large margin.
- Baca et al. (2000) & Cavaglia et al. (2000) find that the importance of global industry effects has grown in recent years.
- What are the industry effects capturing?

Innovations

- Different data set:
  - Wide coverage.
  - Less survivorship bias in the data.
- Different model: ‘identified’ factor model
  - Relax key assumption in dummy variable model.
- Balance sheet data on sales growth, asset growth and the return on assets: is there real integration in addition to integration in financial markets?

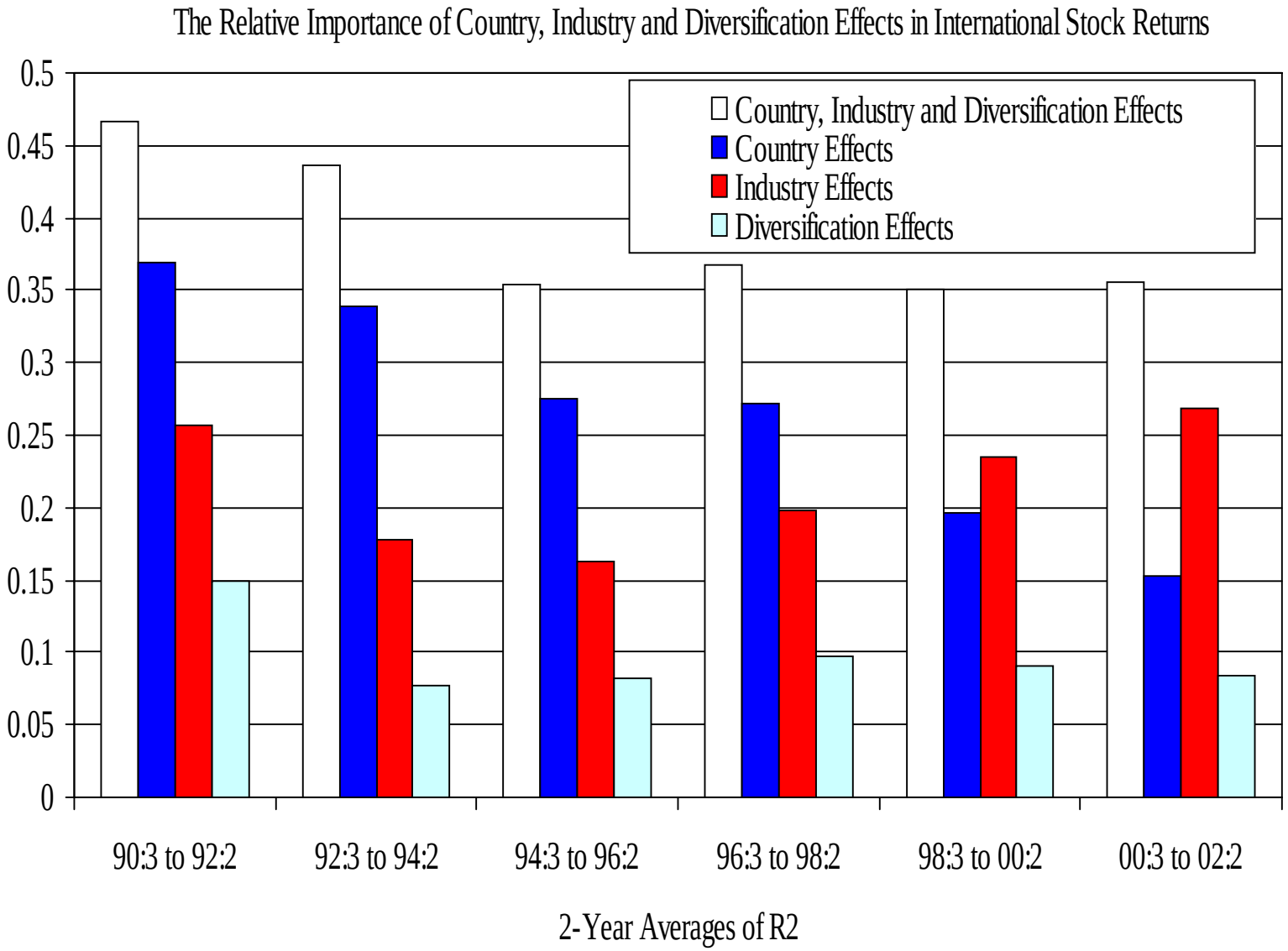
The Data

- Monthly stock market and annual balance sheet data for 10,000 firms in 42 developed and emerging markets from 85:1 – 02:2.
- Data include 2,000 companies that become inactive, due to bankruptcy or merger.
- Firms belong to one of 40 industry sectors.

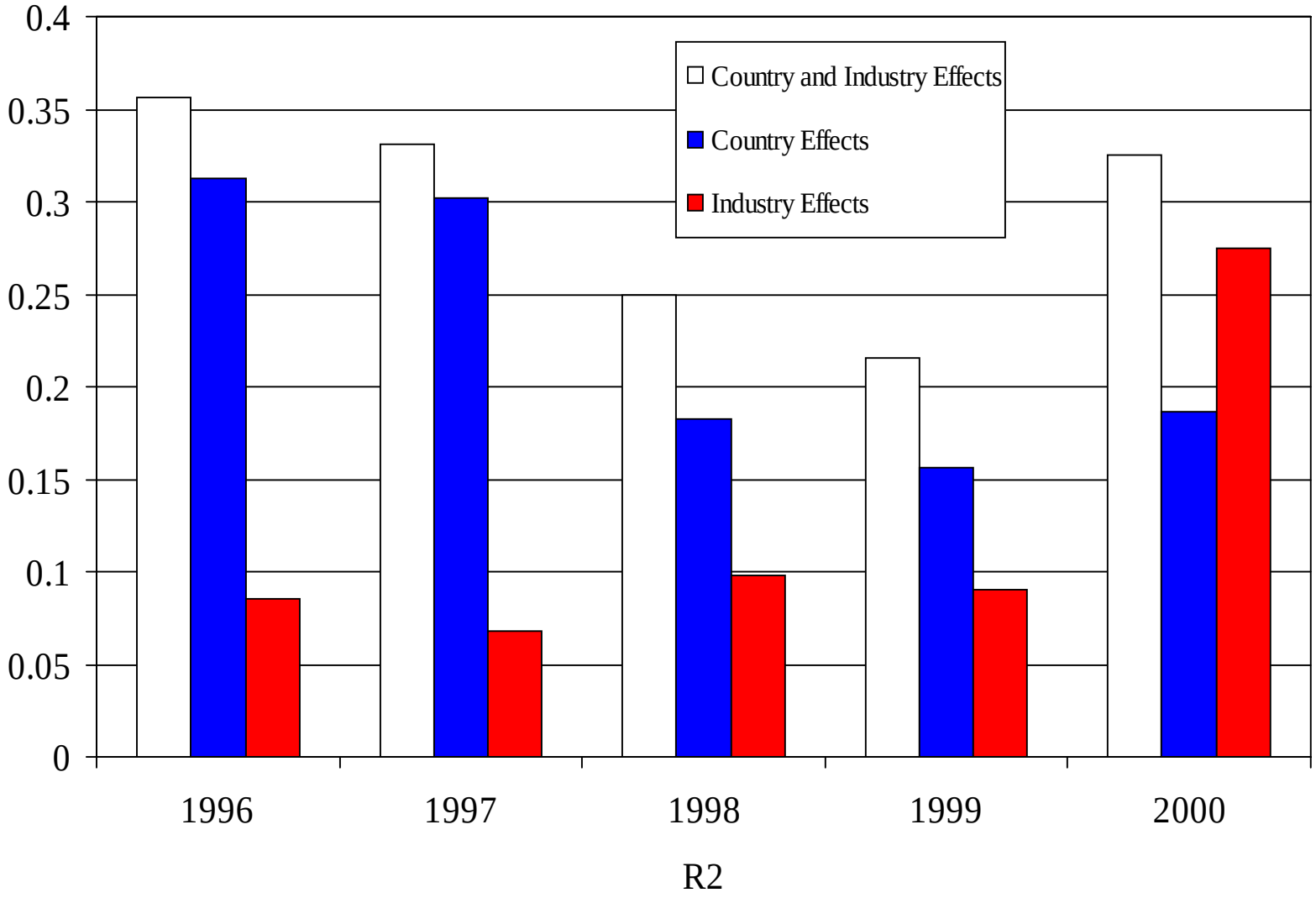
Dummy Variable Model

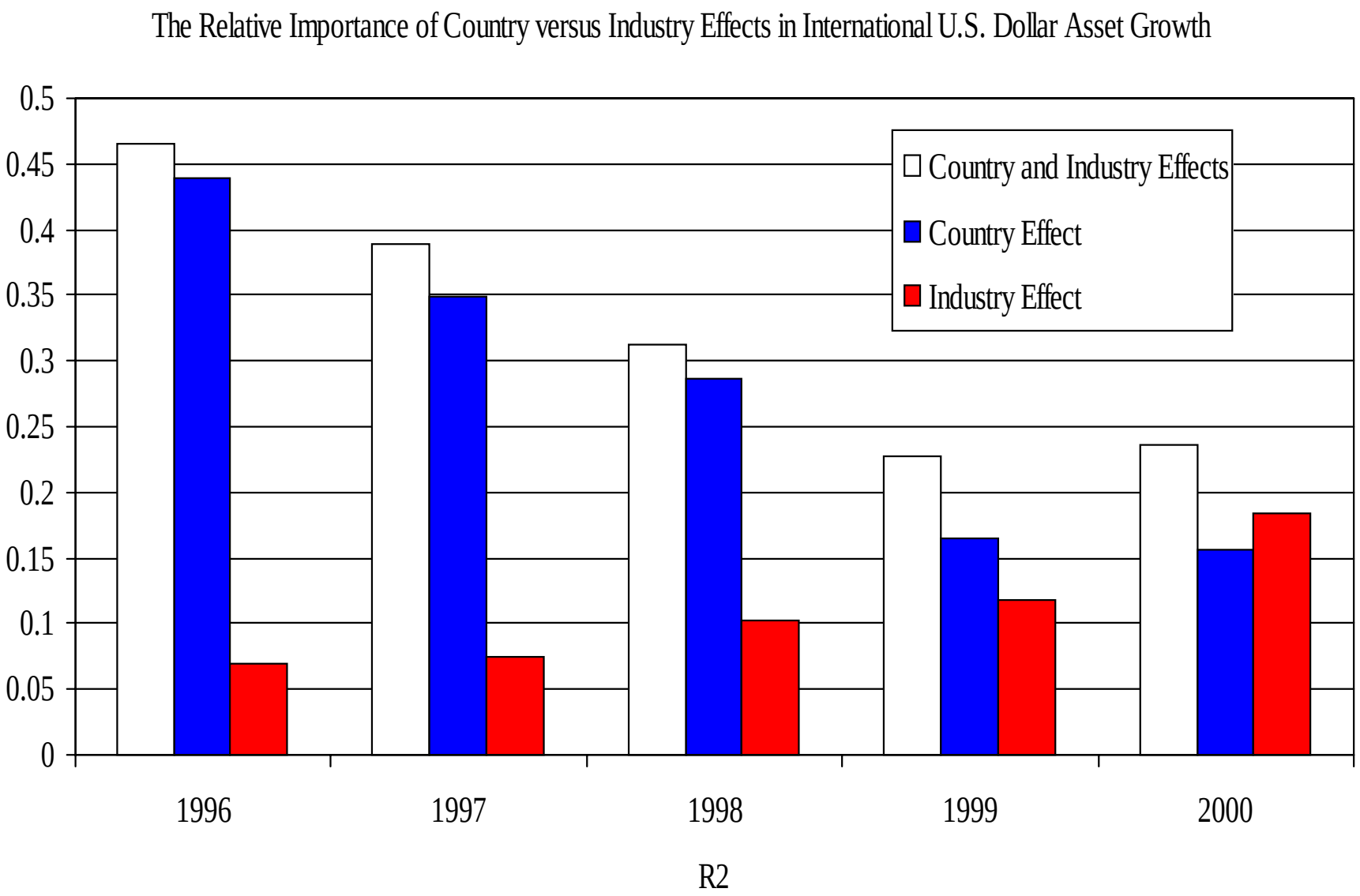
- Fixed effects model: following Heston and Rouwenhorst (1994) regress value-weighted cross-section of international stock returns on country and industry dummies.
- Factor model in which factor loadings are assumed to be 0 or 1. Coefficients are the factor realizations.

$$R_{it} = \alpha_t + \sum_{j=1}^{J} \beta_{jt} I_{ij} + \sum_{k=1}^{K} \gamma_{kt} C_{ik} + e_{it}$$


The Relative Importance of Country, Industry and Diversification Effects in International Stock Returns
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Country, Industry and Diversification Effects
Country Effects
Industry Effects
Diversification Effects
90:3 to 92:2
92:3 to 94:2
94:3 to 96:2
96:3 to 98:2
98:3 to 00:2
00:3 to 02:2
2-Year Averages of R2

The Relative Importance of Country versus Industry Factors in International U.S. Dollar Sales Growth




The Relative Importance of Country versus Industry Effects in International U.S. Dollar Asset Growth
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1996
1997
1998
1999
2000
Country and Industry Effects
Country Effect
Industry Effect
R2

The Results

- Importance of country-specific shocks has fallen from the mid-90s, even though this period coincides with the Asian crisis.
- This is true for international stock returns and for real (balance sheet) variables.
- The importance of global industry effects has grown. Is this globalization?
- Idiosyncratic and global components?

The Factor Model

$$R_{it} = \alpha_t \lambda_i + \sum_{j=1}^{J} \beta_{jt} \lambda^{I}{}_{ij} + \sum_{k=1}^{K} \gamma_{kt} \lambda^{C}{}_{ik} + e_{it}$$

- Fixed effects => Random effects model.
- Relax restriction that factor loadings be 0 or 1.
- Allow different companies in the same country (industry) to have different exposures to country (industry) shocks—as well as to global shocks.
- Test restriction that loadings same across firms.

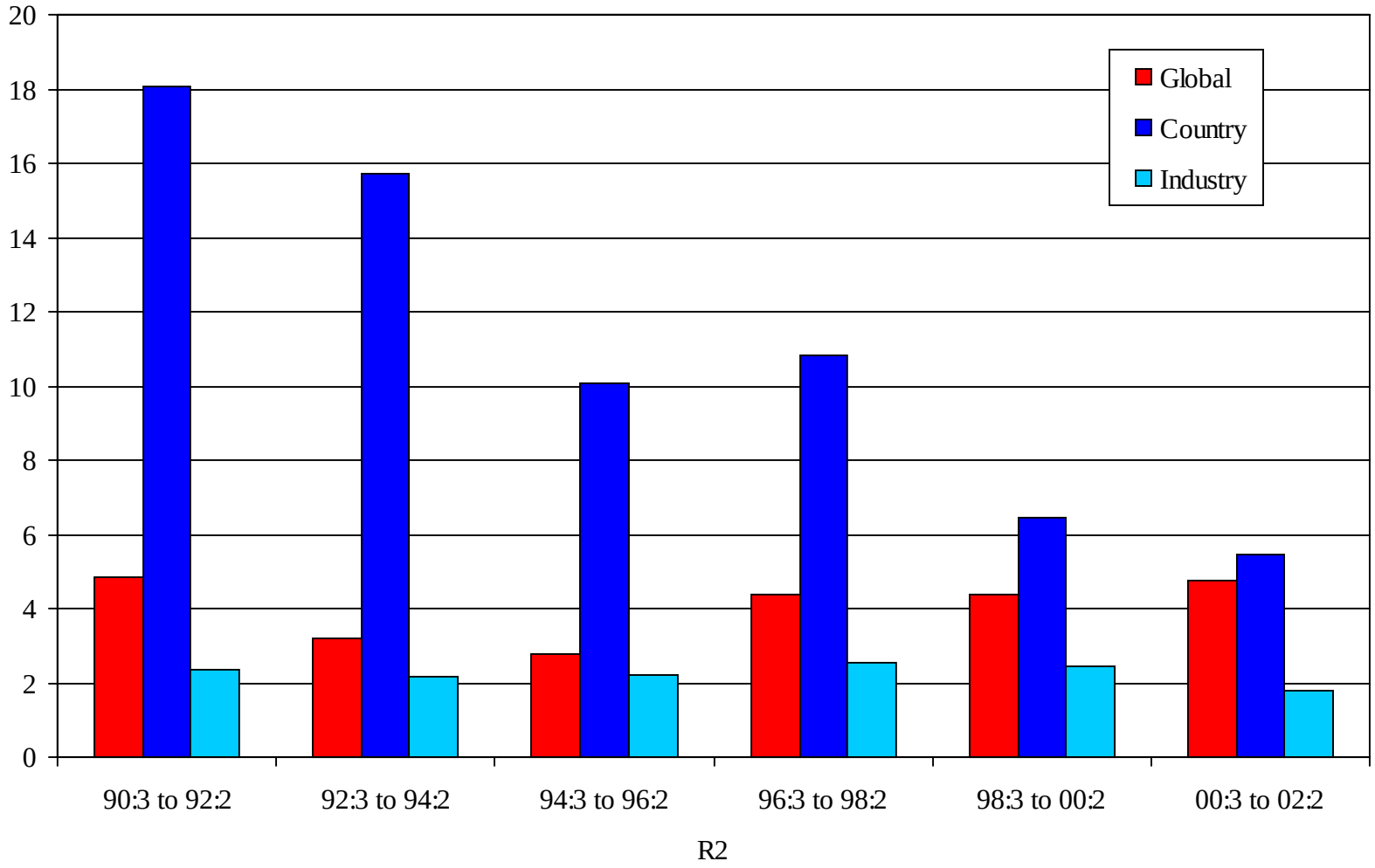
Assumptions

- Same distributional assumptions as in the factor models in the APT literature.
- Key difference: this model is ‘identified’ via zero restrictions on the factor loadings.
- Factors can be given economic interpretation such as global, country and industry shocks:
  - Factors are *ex ante* orthogonal.

$$\mathrm{var}(R_{it}) = \lambda_i^{\,2} + \sum_{j=1}^{J} \lambda^{I}{}_{ij}^{\,2} + \sum_{k=1}^{K} \lambda^{C}{}_{ik}^{\,2} + \sigma_i^2$$

Variance Decomposition (in %) (Equal-weighting and balanced sample: 445 firms)				
	Global	Country	Industry	Idiosync
All firms	8.98	27.93	11.81	51.29
TQIsales	13.40	22.37	11.21	53.02
TQIAssets	12.36	24.35	12.41	50.88

The Explanatory Power of the Global, Country and Industry Factors in the Factor Model
(Based on ex post factor realizations, equal-weighting and balanced sample: 445 firms)



Preliminary Conclusions

- Q: What is driving the rise in comovement across national stock markets?
- A: Decline in the importance of country-specific shocks.
- Q: Is this driven by financial market integration, balance sheet integration, or is this a temporary phenomenon?
- A: Some evidence of balance-sheet integration.

Work Ahead

- Gibbs-sampler:
  - Standard deviation
  - Able to deal with very large cross section
- Factor model with time-varying coefficients.
- Apply factor model to balance sheet data.