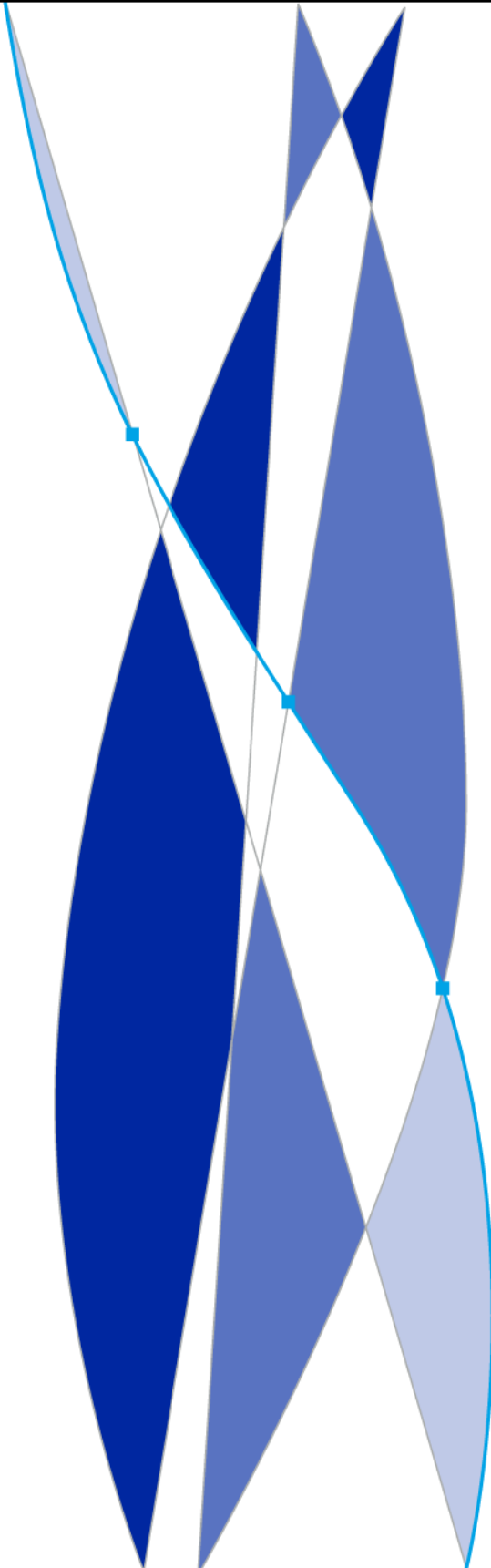




## The New Role of PD Models



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GEFRI Conference on  
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# PD Models and Their Importance

## PD Models

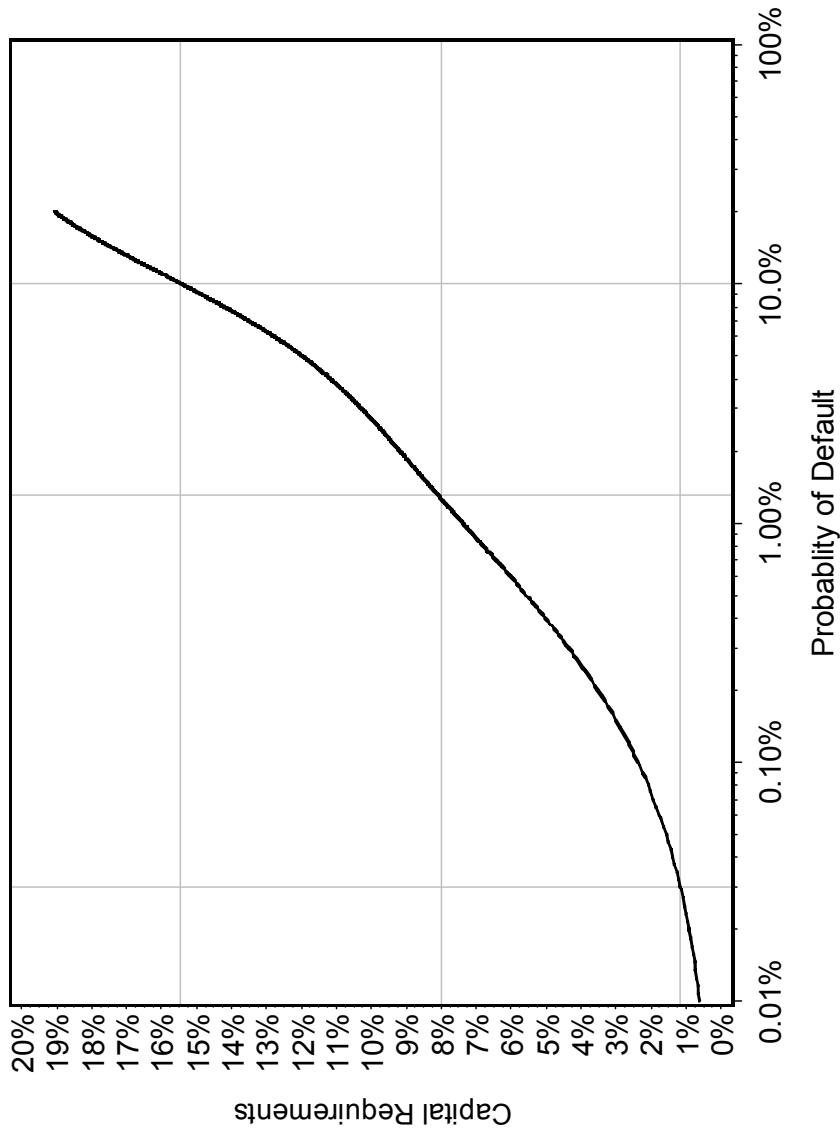
- Why they are important?
- How are they developed?
- What can they tell use about the level of risk in a particular sector?

## PD Models are Key in Determining Capital Requirements

- Under Basel II, capital requirements are based on a simple portfolio model that assumes
  - One global factor
  - A very large number of exposures in the portfolio
  - Correlation is determined solely by the size of the exposure and the PD
- The required capital for a given exposure is determined by the 1 in a thousand Value-At-Risk
- The **probability of default** plays a central role in determining required capital

## Different PDs yield Different Capital Requirements

PD (%)	Risk Weight (%)	Capital Requirements (%)
0.03	14	1.2
1.30	100	8.0
10.00	193	15.5



Based on an exposure with 50mm Euros of turnover; maturity, LGD and EAD are 2.5, 45% and 100%, respectively. See for example: page 197 of "A Revised Framework."

## Market Data is Powerful, Where Available

- A structural framework can be used to convert equity prices into default probabilities when equity prices are available.
- A substantial portion of bank debt is to private firms – firms without publicly trade common stock.

## Another Approach

### **Requirements of a statistical PD model include:**

- Understood by users
- Variables in the model are a reasonable set of predictors
- Data is representative of the target population to the extent possible
- Calibrated to be consistent with a Basel definition of default
- Documented
- Transparent

# 2

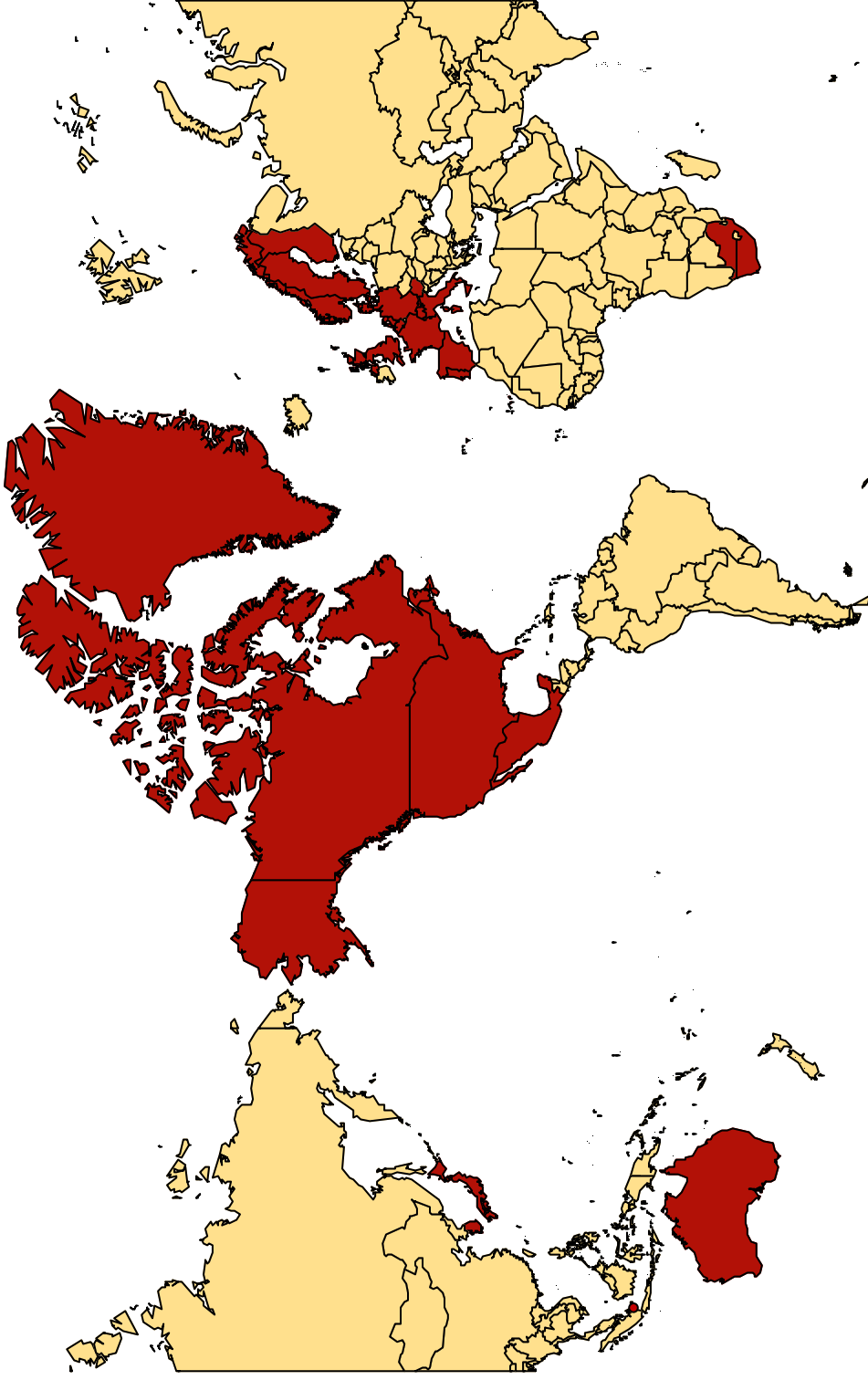
## Introduction to the RiskCalc Network



## RiskCalc Network Since 2000

- Has expanded to cover 22 different countries representing 80% of the world's GDP
- Includes a model for Private US Banks
- Is actively used by over 200 clients
  - Monitoring of both loans and leases
  - Implementation of risk based pricing
  - Regulatory compliance
  - Transfer pricing
  - Portfolio management
  - Securitization of Small and Medium Size Enterprise (SME) debt into Collateralized Debt Obligations (CDOs)
- Based on data of actual unlisted firms from each country

# RiskCalc's International Coverage Continues to Grow



Greenland is part of the Kingdom of Denmark

## Credit Research Database (CRD)

- Began effort in 1997
- Database of borrower financial statements matched to select credit performance data
- Data includes
  - Balance sheets and income statements
  - Default status
  - Internal loan grades
  - LGD information
  - Other obtainable loan information
    - loan rate pricing, origination/maturity dates, etc.

# A Few of Our 49 CRD participants...



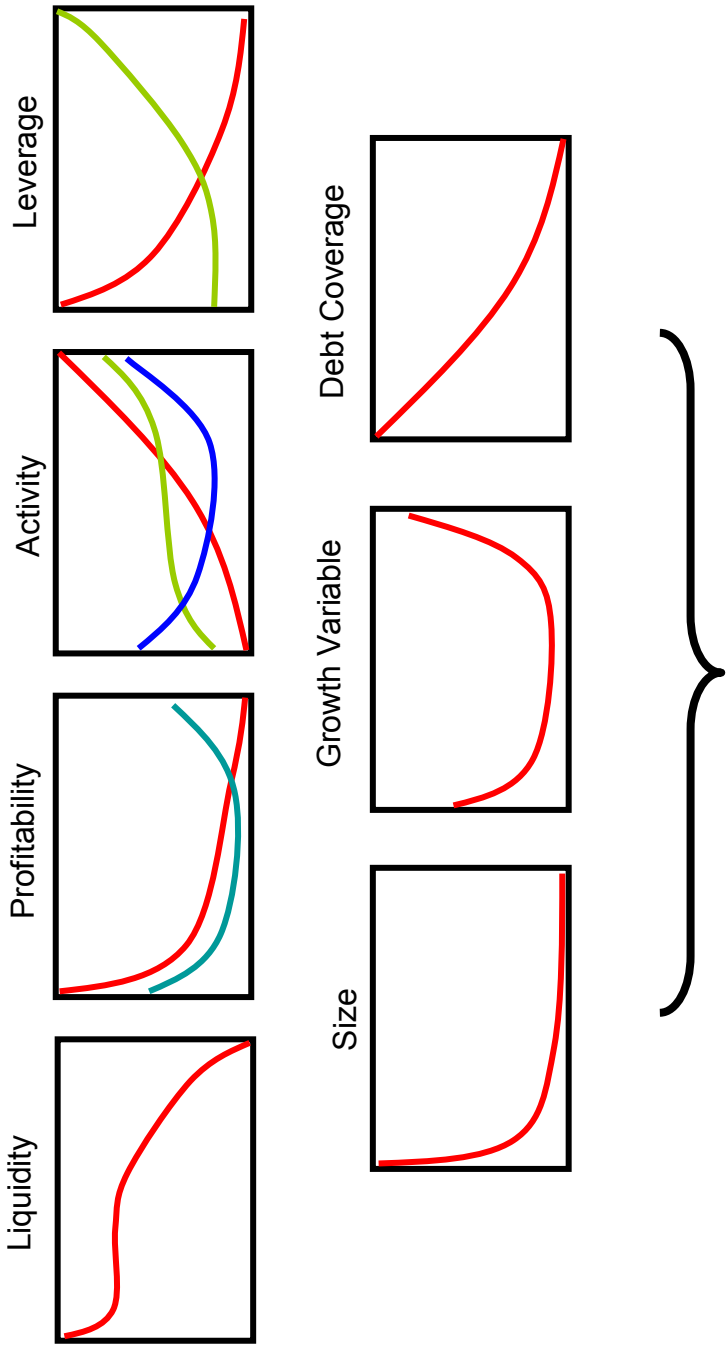
## The Credit Research Database today

	Number of Customers	Defaulted Customers	Number of Fin Stmt
North America	106,052	10,496	536,515
Europe	1,711,990	141,178	9,043,417
Asia	263,083	15,609	1,219,300
Australia	31,576	2,715	102,778
Africa	19,633	415	52,613
<b>GRAND TOTAL</b>	<b>2,132,334</b>	<b>170,413</b>	<b>10,954,623</b>

## RiskCalc Models

- Seek to maximize the predictive power provided the model is
  - Transparent
  - Intuitive
  - Reasonable
- Extract a risk assessment from the financial statements
  - Localized to the specific accounting practices of the country
- Makes an adjustment for industry differences
- Adjusts for the current state of the credit cycle

# RiskCalc Statistically Combines Ratios into a Single PD – an EDF™ Credit Measure



RiskCalc combines several relationships between ratios and default frequencies in a consistent and objective credit risk measure.

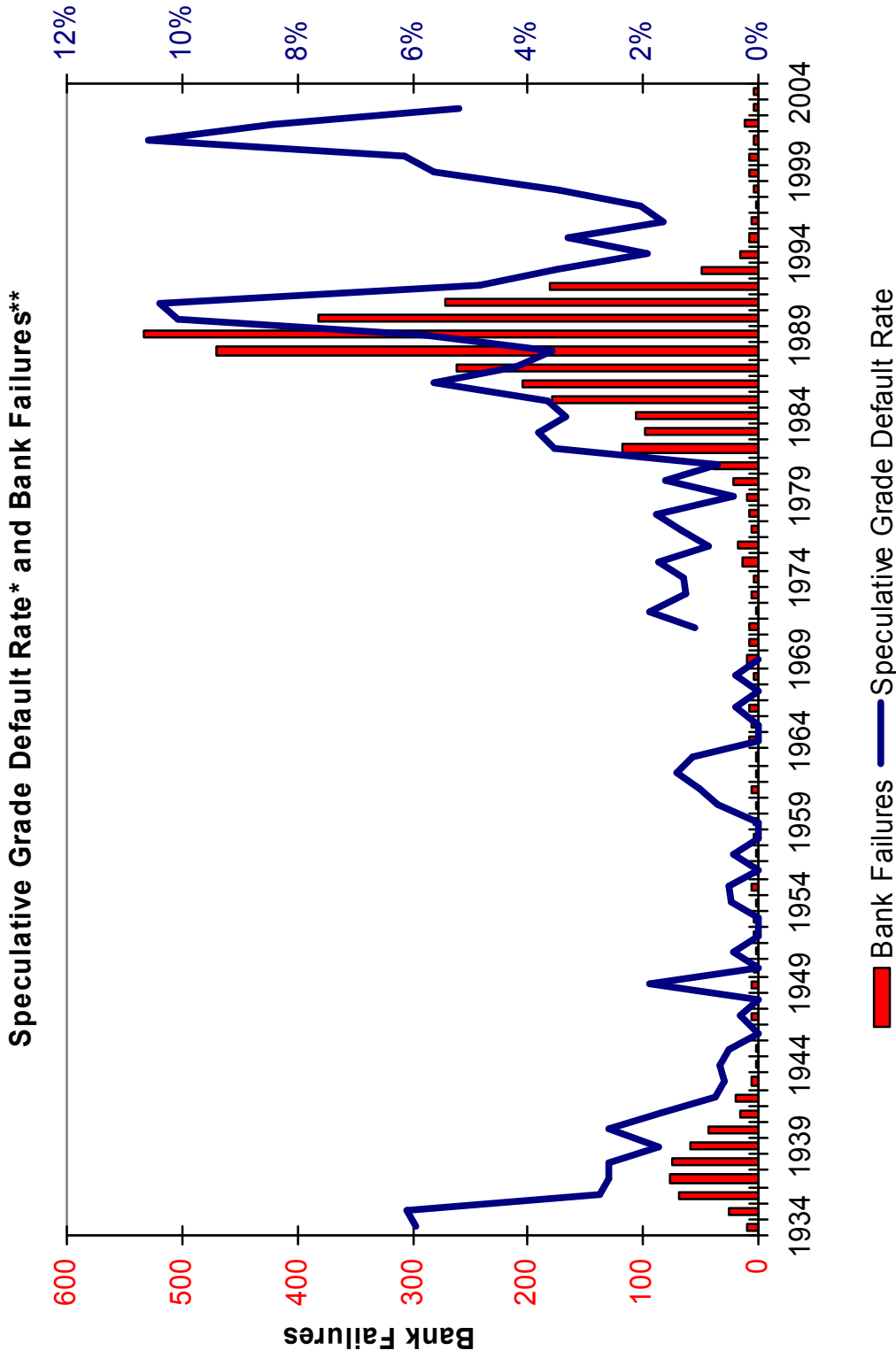
**Probability of Default: EDF™**

# 3

## Application of the US Banking Model: A Tale of Two Recessions



# In the Recent Recession, Bond Defaults Spiked but Not Bank Failures



\*Based on Moody's trailing speculative grade default rate. The value for 1970 is set to missing because the actual rate during this year is highly skewed due to the default of Penn Central Railroad and 25 affiliates.

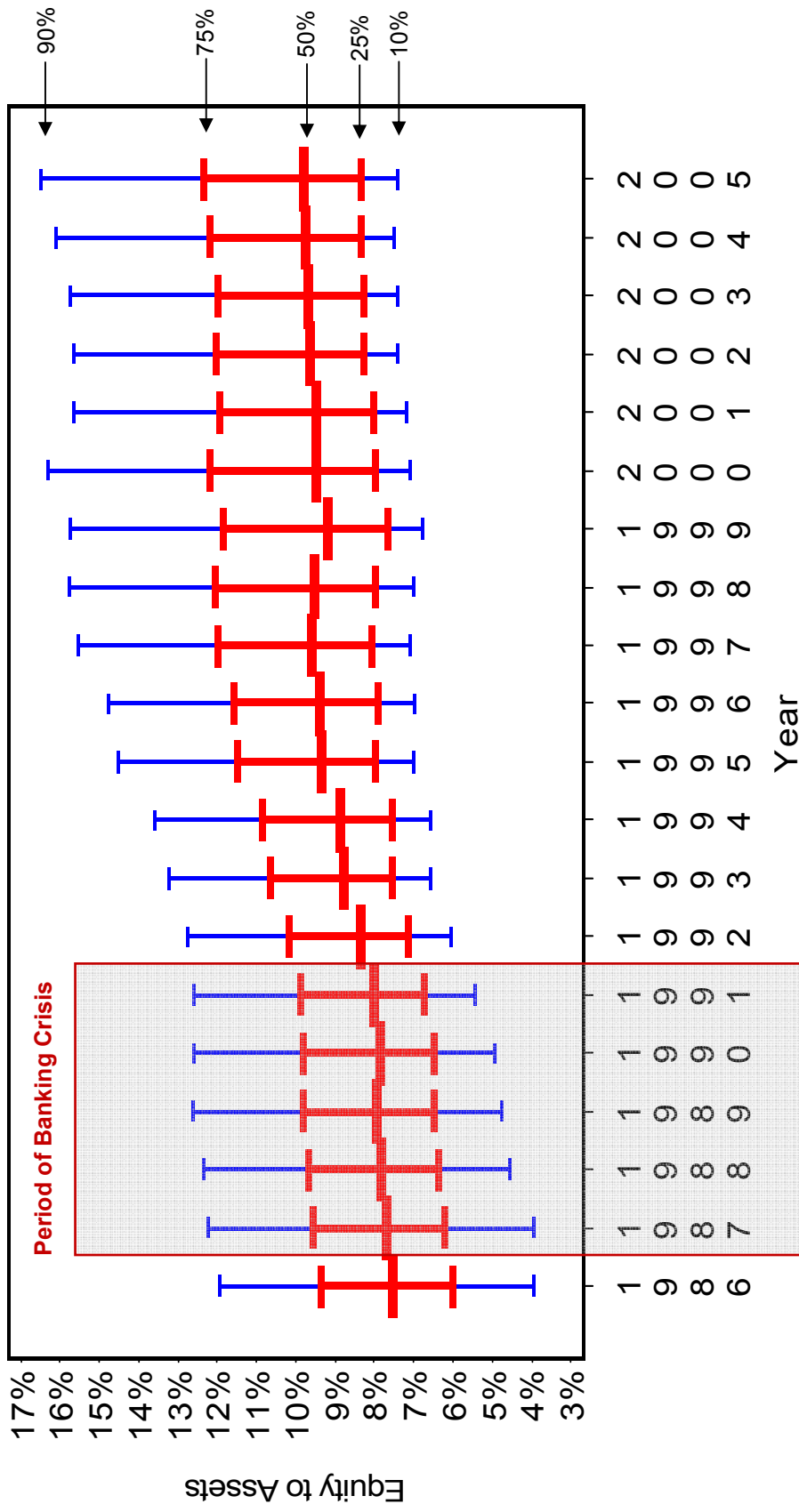
\*\*Based on FDIC data.

## Our Model Captures Banking Crisis of 1987-1991 and the Absence of one in the 2000-2001 Recession

- During the most recent recession, the balance sheets and income statements were much stronger than during the banking crisis of 1987-1991.
- Construction & Commercial real estate asset values were rising dramatically.
- Our model captures both of these outcomes thru several ratios
  - Equity to Assets
  - Net Income to Assets
  - Other Real Estate Owned to Assets
- Even though concentration of Construction, Real Estate and C&I loans is increasing, default risk (as measured by the model) at banks is much lower than in the late 1980s.

# In 1986-1991, Insufficient Equity Reflected High Bank Risk

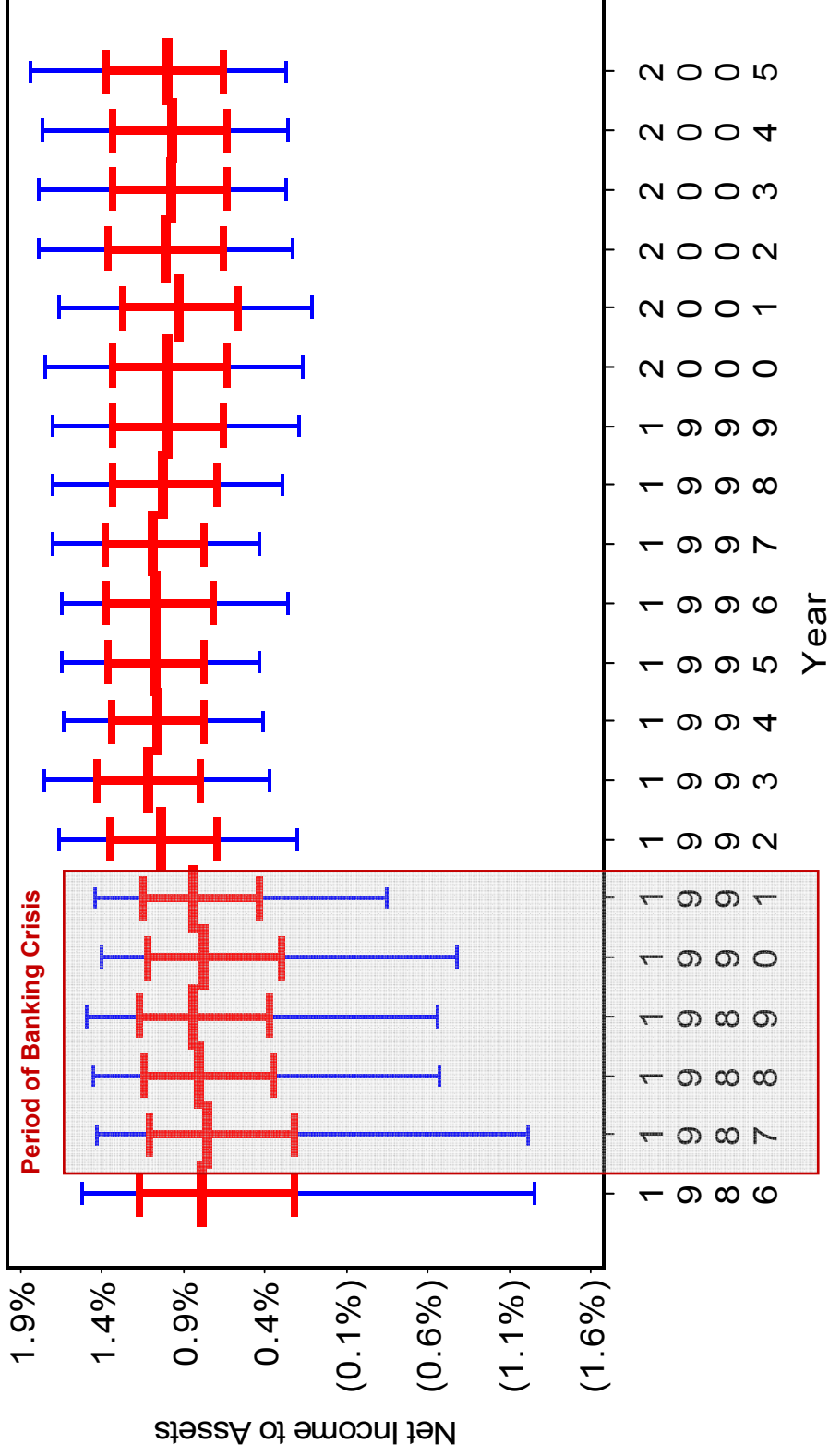
## Equity to Assets



Presents the distribution of this ratio by year for the FDIC insured banks that had not yet failed. The upper and lower whiskers of the blue box plot represent the 90<sup>th</sup> and 10<sup>th</sup> percentile of the distribution, respectively. The upper and lower whiskers of the red box plot represent the 75<sup>th</sup> and 25<sup>th</sup> percentile of the distribution, respectively. The bar in the middle represents the median of this distribution.

# As Did Negative Returns

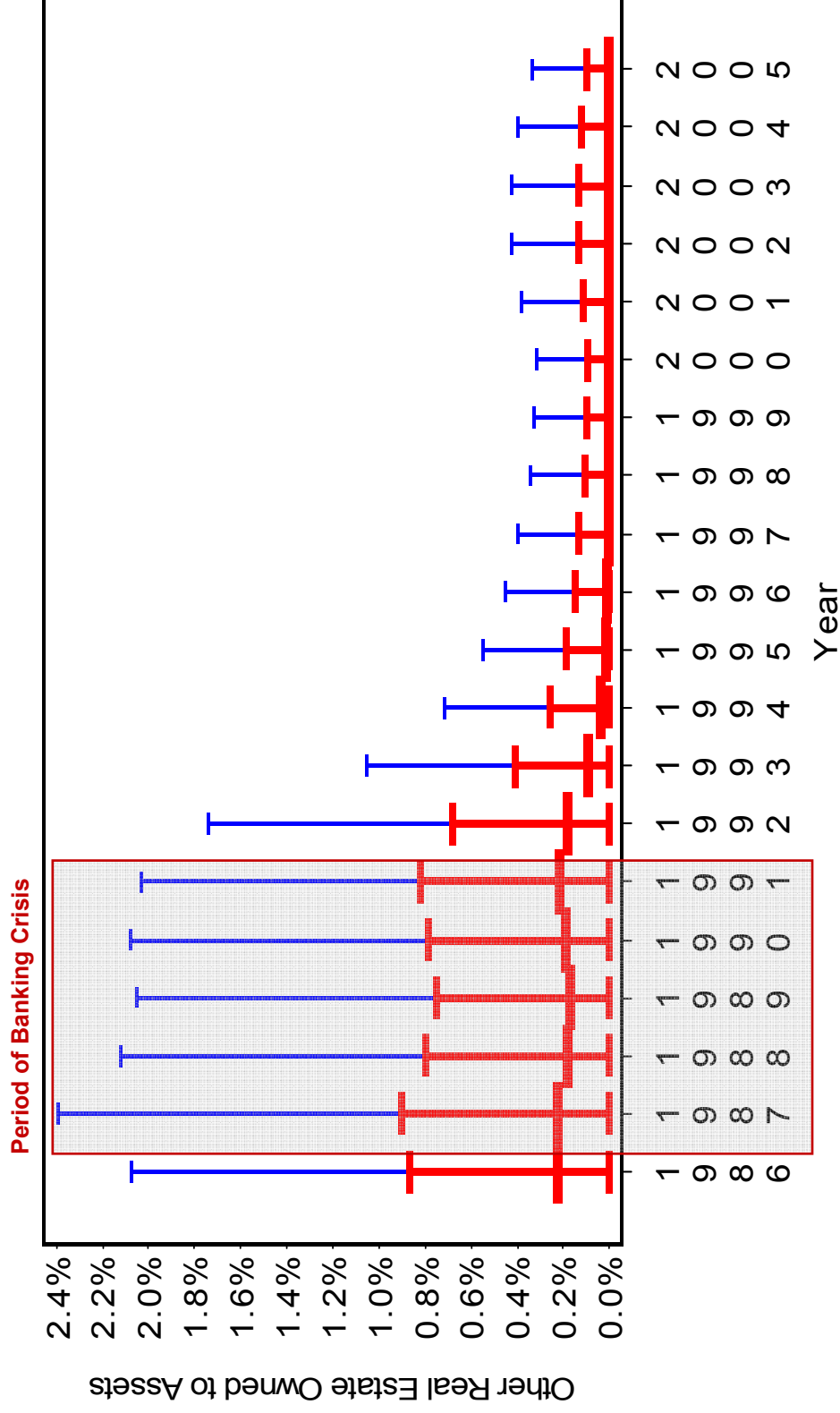
## Net Income to Assets



Presents the distribution of this ratio for the FDIC insured banks that were not yet in default.

# And Foreclosed Properties

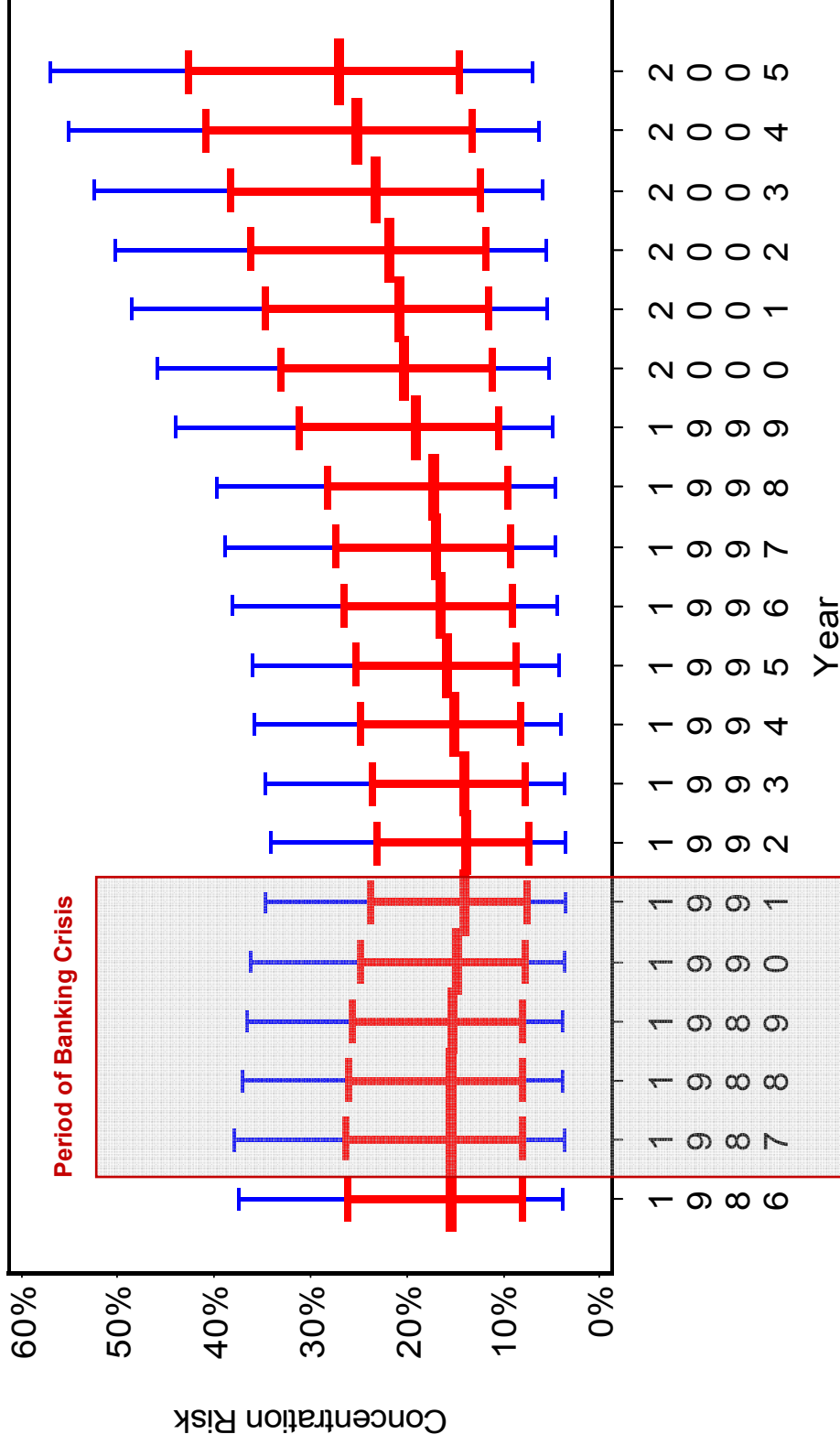
## Other Real Estate Owned to Assets



Presents the distribution of this ratio for the FDIC insured banks that were not yet in default.

# Nevertheless, Concentration in Risky Assets is Rising

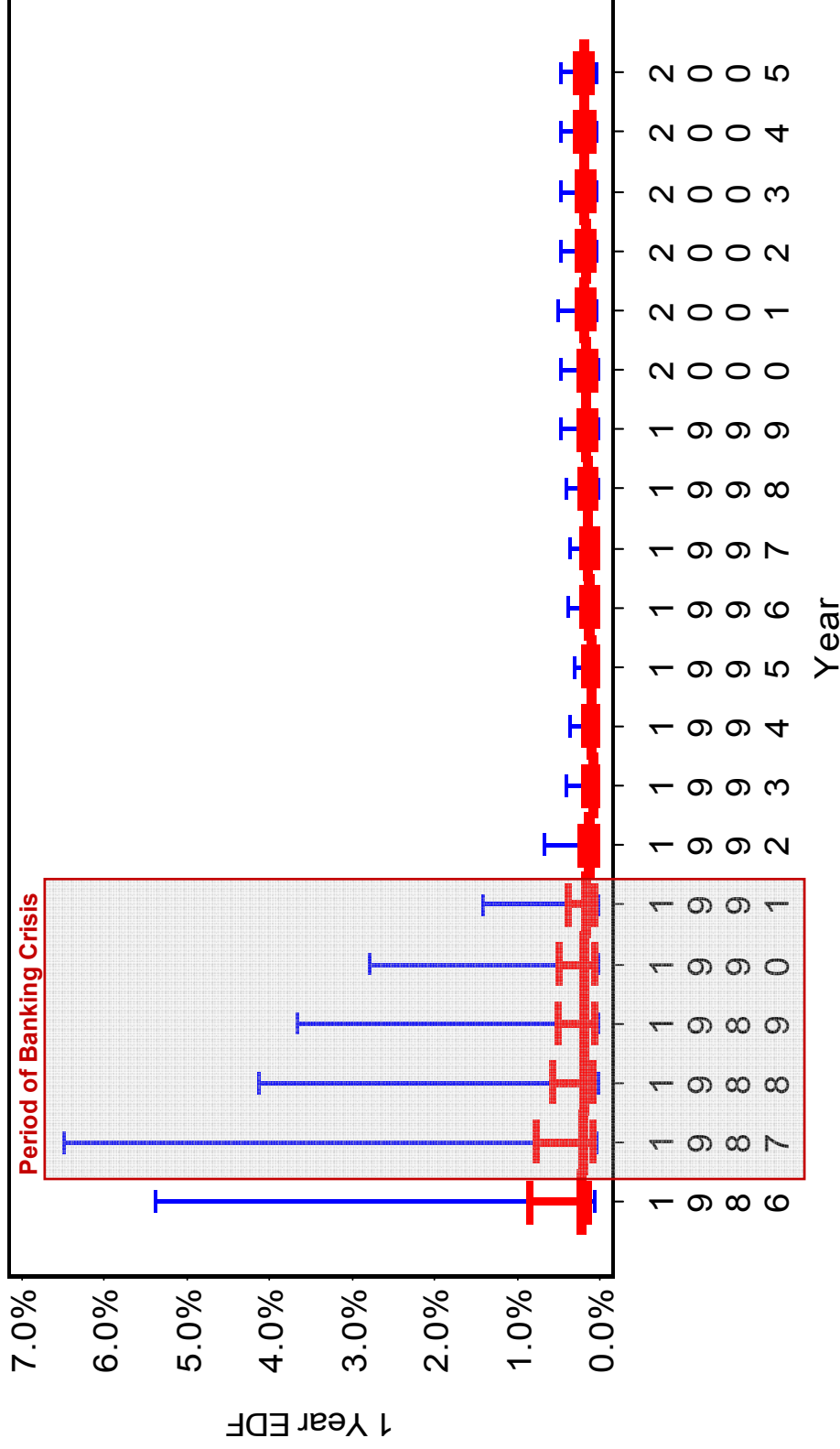
## Concentration Risk



Presents the distribution of this ratio for the FDIC insured banks that were not yet in default. Concentration risk is measured as the sum of Commercial Real Estate, Construction and Commercial & Industrial Loans to Total Assets.

# Default Risk, as Measured by RiskCalc Banks, was Much Higher in the 1987-1991 Period

## 1 Year EDF



Presents the distribution of this 1 year EDF produced by the RiskCalc v3.1 US Banking Model for the FDIC insured banks that were not yet in default.

# 4

## Conclusion



## PD Models are Having a Large Impact on Banking Worldwide

- EDF™ credit measures are used by banks and regulators to manage credit risk
- Play a central role in determining regulatory capital
- Used effectively, they can manage risk and provide early warnings of problems
- EDF measures are currently signaling US Banks appear much safer than in 1987-1991
- Nevertheless, the assets of banks have become increasingly concentrated in risky assets