



# Credit Default Swap Market Perception of the “Too Big To Fail” Phenomenon in Banking

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# The Problem (1)

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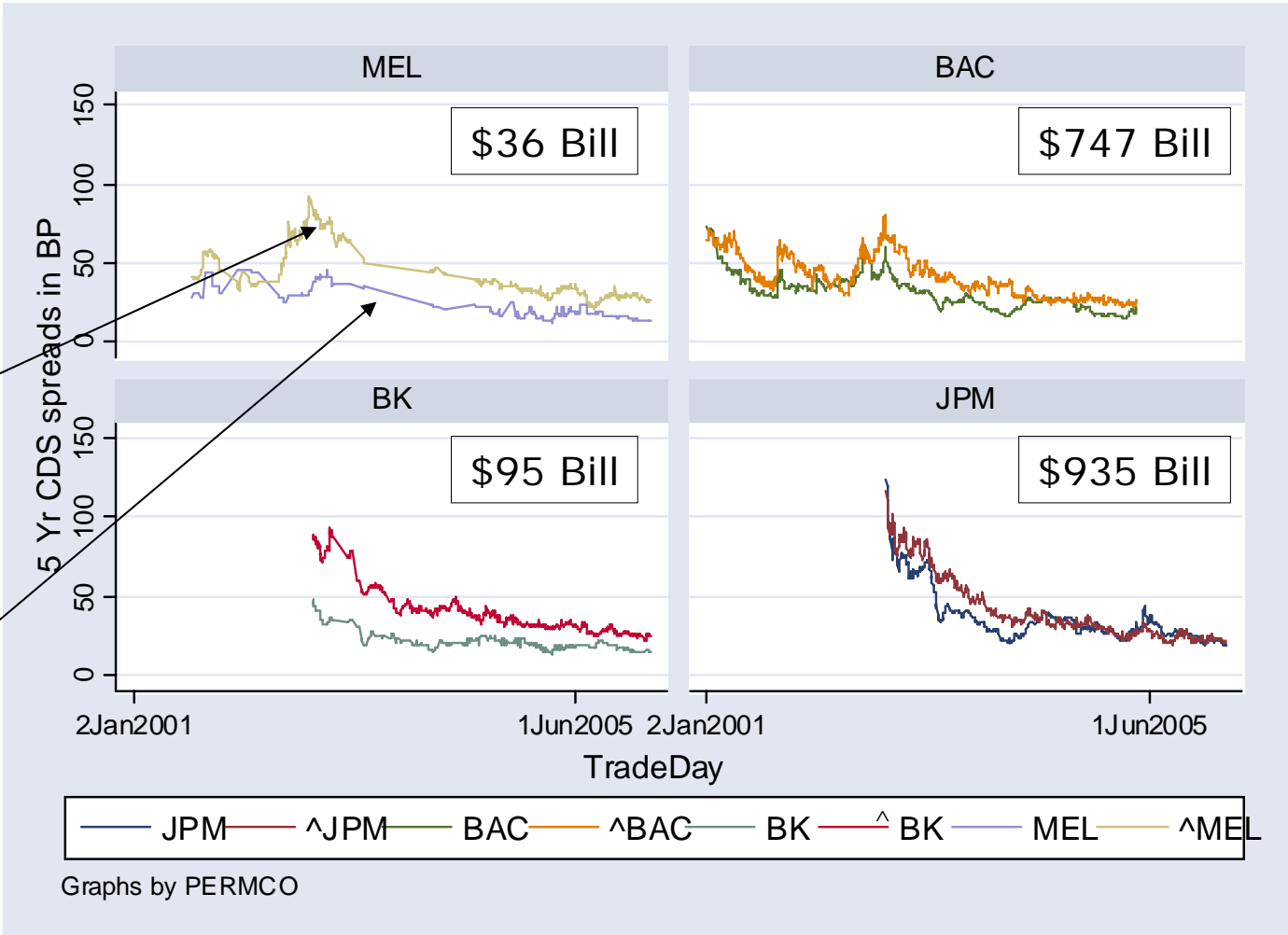
- One of the primary differences between banks and other financial firms is the government subsidized explicit deposit insurance scheme
- Numerous studies (Merton 1977 & 1978, Marcus and Shaked 1984, Pennacchi 1984, Ronn and Verma 1986) value this deposit insurance as a put option.
- This put has an unobservable but explicit strike price based on some subset of the bank's deposits
- There is a widespread belief and limited academic research regarding the existence of more extensive guarantees for very large banking firms labeled "Too Big To Fail"
- The existence of this additional implicit insurance increases the strike price and value of the put option
- Do market determined credit default swap (CDS) spreads for banks and other financial companies provide evidence regarding:
  - Does this extra insurance exist?
  - What is its magnitude?
  - Does its magnitude vary with the size of the bank?

# The Problem (2)

Average Book Assets

CDS Spread model reflecting firm leverage and volatility fitted to S&P rated "A+" non-bank financial firms and used to predict spreads on "A+" rated banks generally produces spread estimates above the actual observed spreads.

What explains this difference and is bank size a factor in that explanation?



# Preliminary Results

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- Naive spread examination at fixed credit rating provides no obvious differences – perhaps the entire sample is too big to fail?
- Banks appear to be different from other financial firms as priced within the CDS market
  - Linear panel models for 5 year CDS spread using Market Leverage, Historical equity volatility, and Implied equity volatility of combinations of non-bank financial firms (Insurers, Brokers, etc.) consistently overestimate bank 5 year CDS spreads

# What is “Too Big To Fail” (TBTF)?

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- Unlike commercial firms subject to the bankruptcy code, failing banks are taken over by governments
- A Too Big To Fail Bank (per Stern and Feldman, 2004) is one whose size or function is such that its failure may lead to
  - The failure of other banks
  - The inability of the financial system to carry out its functions
  - A diminution in economic activity
- Thus TBTF encompasses:
  - A policy of protecting uninsured creditors at banks from losses they might suffer
  - A definition of a big bank
- Regulators believe they can mitigate the economic spillover effects by bailing out the TBTF institution
- Too big to fail often more accurately described as too big to liquidate

# Who Cares?

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- TBTF policies expand insurance coverage and exacerbate moral hazard
- TBTF Banks experience limited or no market discipline in the pricing of their source of funds leading to inefficient resource allocation and excessive risk taking
- In order to maintain market discipline regulators are left attempting to “convince” investors that no institution is too big to fail

# TBTF: A Brief History

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- Term first used in 1975 Business Week article related to loan guarantees given to Lockheed in 1971 and correctly foreshadowing future government support of Chrysler
- During congressional testimony by the Comptroller of the Currency (lead regulator) following the Continental Illinois Bank rescue in 1984 the congressional committee chairman stated in regards to the 11 multinational banks at the time under OCC purview:

*"We have a new kind of bank. It is called too big to fail. TBTF and it is a wonderful bank."*

(Kaufman, 2002)

## Continental Illinois Bank Failure and Rescue (1984)

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- 7<sup>th</sup> largest bank but largest correspondent bank in terms of inter-bank deposit and Federal Funds relationships
- Initial \$1 Billion injected directly into the bank holding company (BHC) protecting even common stock holders
- This was not enough, however, with energy lending and less developed country (LDC) debt problems the common was eventually wiped out the bank put under government control and eventually sold to Bank of America in 1994
- Regulators have been trying to overcome the implications ever since  
(FDIC, 1997)

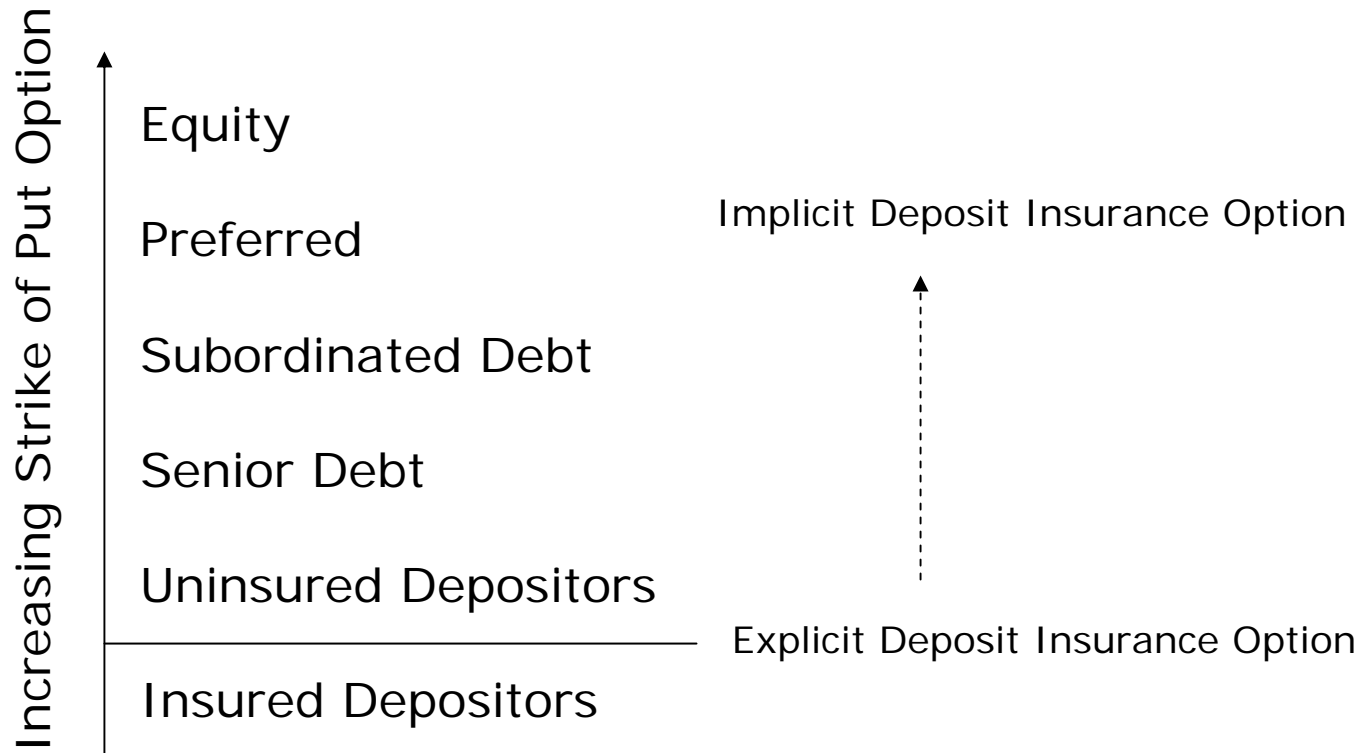


# Changes Since

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- Federal Deposit Insurance Improvement Act (FDICIA, 1991)
  - Introduces Prompt Corrective Action (PCA) – a series of corrective steps by regulators as capital levels decline
  - Required Least Cost Resolution (LCR) in determining whether to liquidate (only insured deposits guaranteed) or sell institution (all deposits usually guaranteed)
  - Introduced what is now called the Systemic Risk Exemption (SRE) - only through a series of votes and decisions by regulators, congress, and the executive branch may LCR be waived (Stern and Feldman, 2004)

# Benefits to the TBTF Bank



This option simply extends the benefit of deposit insurance – lower cost funding which increases the wealth of shareholders

# What about Non-Bank Financial Firms?

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- Large but not too big to fail:
  - Drexel Burnham Lambert, 1989 (junk bonds)
  - Barings, 1995 (rogue trader)
  - Enron, 2001 (fictional assets)
  - LTCM, 1998 is unclear given Fed involvement
- In Congressional testimony around the Drexel failure (Stern and Feldman, 2004) the then SEC chairman highlighted his agency's inability to provide funds to the firms it supervises leaving compliance with minimum capital standards or liquidation as the only options (no access to deposit insurance)

# The TBTF Literature

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- O'hara and Shaw (1990) event study around release of WSJ article reviewing the TBTF congressional testimony about Continental.
  - WSJ article used 11 largest multi-national banks as opposed to those 11 under the purview of the OCC
  - Common stock of the 11 WSJ banks had one day average residual returns of 1.3% vs. zero for remaining 52 banks in the study
- Morgan and Stiroh (2005) compare point in time new issue bond spreads and ratings from 1993 to 1998 and find a flatter spread vs. rating curve for the ex-ante WSJ TBTF banks than a similar curve for non-TBTF banks
  - They conclude investors are not as discriminating in their pricing of the bonds of these TBTF institutions
  - This study is complicated by the contamination of TBTF in the ratings of the banks

# TBTF and Agency Credit Ratings

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- Fitch (1980), Moody's (1995), and S&P (1999?) embed their belief of government intervention under TBTF in the Issuer Rating of a given bank
  - Moody's and Fitch produce stand-alone ratings (using a different rating scale) to reflect the bank's strength independent of government support – very pronounced difference in emerging markets
- Rime (2005) compares these two ratings (supported and stand-alone) by bank size finding a TBTF issuer rating bonus of 1 notch at Moody's and 3 notches at Fitch

# This Study

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- CDS market provides a cleaner measure of spread than bond spread to Treasury from a more liquid market enabling a daily time series of values compared to point in time approaches
- Specify a model of spread for non-bank financial firms based upon some combination of market leverage, historical and implied equity volatility and a measure of the market interest rate
- Predict bank spreads with the financial model and examine the differences between predicted and actual
- Ultimately, explain the differences with size, deposits, complexity and other proxies

# The Data (1)

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- Markit Partners collects daily market-maker CDS closing spreads worldwide at multiple points on the yield curve (6mo-30years) as well as recovery specified by
  - Issuer
  - Currency
  - Seniority of Reference
  - Treatment of Restructuring as a Bankruptcy event in contract documentation
- North American Financial Firms in \$USD (~140)
- Data range: 1/2/2001 to 3/6/2006
- 5 year tenor is most liquid
- Utilize Senior Unsecured seniority
- Use Modified Restructuring
- Use minimum of two dealers quoting
- Results in approximately 97,000 day/firm spread observations

# The Data (2)

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## ○ Other Sources

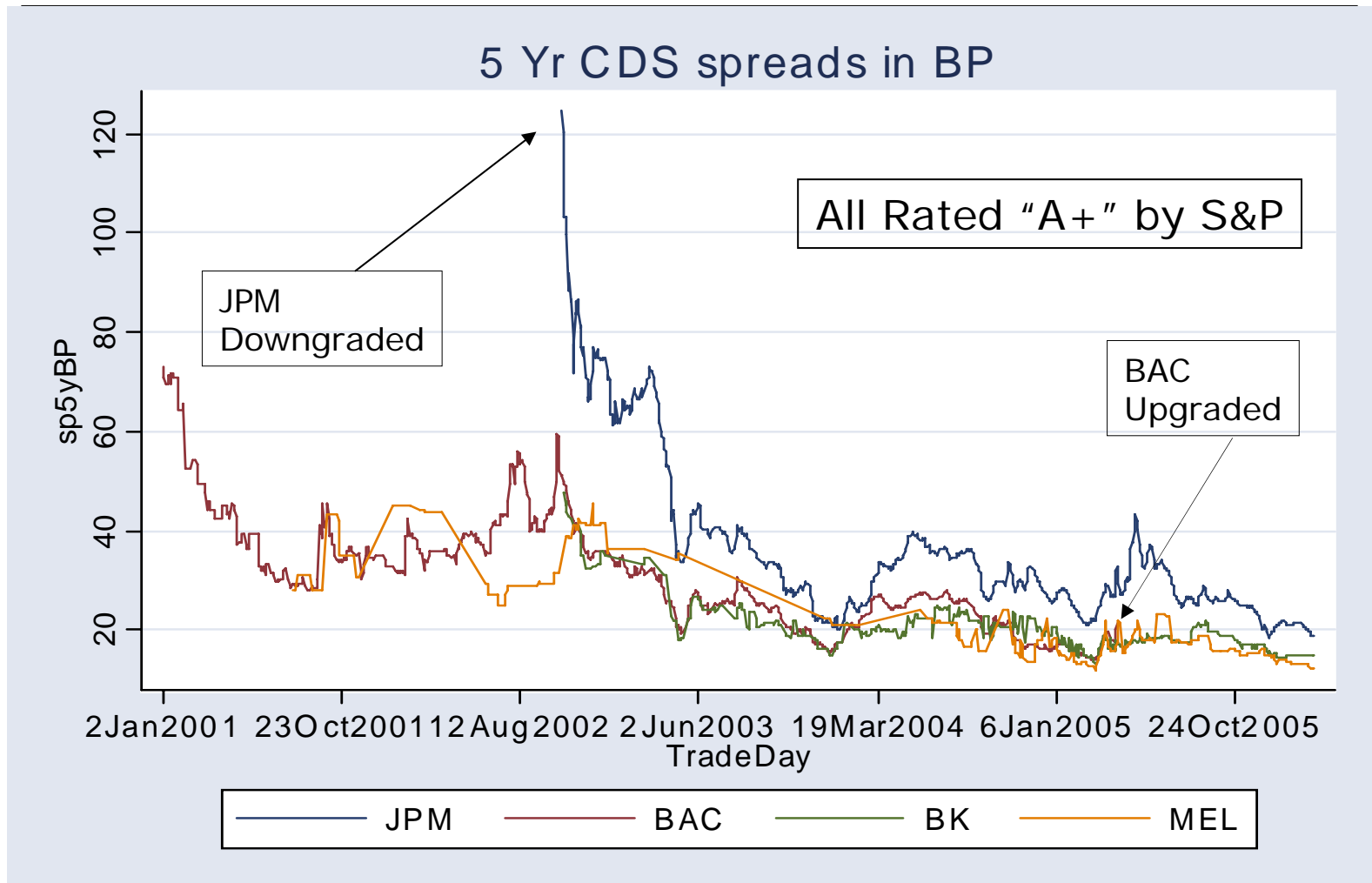
- Daily 5 year swap rate (Federal Reserve FRED site)
- Quarterly Book Assets, Common Equity, Long Term Debt, S&P LT Domestic Issuer Credit Rating, S&P Quarterly Earnings Release Date (Compustat)
- Daily Shares Outstanding and Price (CRSP)
- Daily Historical and ATM Implied 30, 91, and 365 day Volatility (Optionmetrics)



# Banks by Size of Assets (\$Mill)

4Q2000			4Q2005		
Bank	S&P Iss Rat	Assets (\$Mil)	Bank	S&P Iss Rat	Assets (\$Mil)
CITIGROUP INC	AA-	902,210	CITIGROUP INC	AA-	1,494,037
<b>JPMORGAN CHASE &amp; CO</b>	AA-	715,348	<b>BANK OF AMERICA CORP</b>	AA-	1,291,803
<b>BANK OF AMERICA CORP</b>	A+	642,191	<b>JPMORGAN CHASE &amp; CO</b>	A+	1,198,942
WELLS FARGO & CO	A+	272,426	WACHOVIA CORP	A+	520,755
BANK ONE CORP	A	269,300	WELLS FARGO & CO	AA-	481,741
WACHOVIA CORP	A	254,170	WASHINGTON MUTUAL INC	A-	343,839
WASHINGTON MUTUAL INC	BBB+	194,716	U S BANCORP	A+	209,465
FLEETBOSTON FINANCIAL CORP	A	179,519	SUNTRUST BANKS INC	A+	179,713
SUNTRUST BANKS INC	A+	103,496	NATIONAL CITY CORP	A	142,397
NATIONAL CITY CORP	A	88,535	GOLDEN WEST FINANCIAL CORP	A+	124,615
KEYCORP	A-	87,270	BB&T CORP	A	109,170
U S BANCORP	A	77,585	FIFTH THIRD BANCORP	A+	105,225
<b>BANK OF NEW YORK CO INC</b>	A+	77,114	<b>BANK OF NEW YORK CO INC</b>	A+	102,074
PNC FINANCIAL SVCS GROUP INC	A-	69,844	STATE STREET CORP	AA-	97,968
STATE STREET CORP	AA-	69,298	KEYCORP	A-	93,126
BB&T CORP	A-	59,340	PNC FINANCIAL SVCS GROUP INC	A-	91,954
GOLDEN WEST FINANCIAL CORP	A	55,704	REGIONS FINANCIAL CORP	A	84,786
<b>MELLON FINANCIAL CORP</b>	A+	50,364	SOVEREIGN BANCORP INC	BBB-	63,679
FIFTH THIRD BANCORP	AA-	45,857	NORTHERN TRUST CORP	AA-	53,414
SOUTHTRUST CORP	A-	45,147	COMERICA INC.	A	53,013
REGIONS FINANCIAL CORP	A	43,688	AMSOUTH BANCORPORATION	A-	52,607
COMERICA INC.	A	41,985	MARSHALL & ILSLEY CORP	A	46,213
AMSOUTH BANCORPORATION	A-	38,936	<b>MELLON FINANCIAL CORP</b>	A+	38,678
MBNA CORP	BBB	38,678	HUNTINGTON BANCSHARES	BBB+	32,765
NORTHERN TRUST CORP	AA-	36,022			
UNION PLANTERS CORP	BBB	34,721			
SOVEREIGN BANCORP INC	BB+	33,458			
HUNTINGTON BANCSHARES	A-	28,599			
MARSHALL & ILSLEY CORP	A	26,078			
PROVIDIAN FINANCIAL CORP	BB+	18,055			
PROVIDENT FINANCIAL GRP INC	Unk	13,857			

# Naïve Examination of CDS Spreads for Identically Rated Banks of Varying Size



# Distribution of CDS Spread Data

Daily CDS Observations by Rating and Industry

SP_Rat	Bank	Brokers	Finance	Insurance	Real Estate	Other
AAA				1,717		
AA+				119		
AA				2,951		
AA-	3,122	999		498		
A+	6,025	2,923	1,289	3,096		257
A	4,991	3,789	2,872	4,557	564	
A-	2,173	961		6,042	954	
BBB+	828	1,191	72	2,701	7,413	908
BBB	1,275	461	201	1,977	5,969	
BBB-	198		342	1,489	3,571	
BB+	219		791	395		
BB				681		
BB-			22		118	
B+		379	11		704	
B	755		51		352	
B-					558	
CCC			33			

# Industry Average Market Leverage and Proxy Asset Volatilities

Market Leverage = Non Com Eq Book Liab / (Non Com Eq Book Liab + Market Val Com Eq)

Proxy Asset Volatility\* = Equity Volatility • (1 – Market Leverage)

\*More suspect as we decline in rating (ignores default option)

S&P Rating	Banks			Brokers			Finance			Insurance			Real Estate		
	Lev	Equity	Asset	Lev	Equity	Asset	Lev	Equity	Asset	Lev	Equity	Asset	Lev	Equity	Asset
AAA										59%	30%	8%			
AA+										73%	29%	8%			
AA										73%	24%	7%			
AA-	83%	23%	4%	90%	52%	5%				49%	27%	13%			
A+	82%	23%	4%	91%	27%	2%	72%	31%	9%	63%	28%	11%			
A	83%	25%	4%	69%	39%	11%	83%	27%	5%	70%	25%	7%	43%		
A-	83%	19%	3%	54%	44%	20%				86%	32%	4%	36%	18%	12%
BBB+	86%	23%	3%	34%	33%	22%	88%			75%	27%	7%	46%	19%	11%
BBB	71%	30%	10%	38%	30%	18%	85%	26%	4%	76%	36%	8%	47%	19%	10%
BBB-	87%	19%	2%				71%	21%	6%	72%	43%	9%	47%	20%	10%
BB+							73%	56%	15%	89%	29%	3%			
BB										91%	33%	3%			
BB-							96%	81%	3%				75%	32%	8%
B+				85%	32%	5%	98%	89%	2%				59%	25%	10%
B	70%	29%	9%				73%	65%	9%				74%	29%	8%
B-													74%		
CCC							61%	57%	22%						

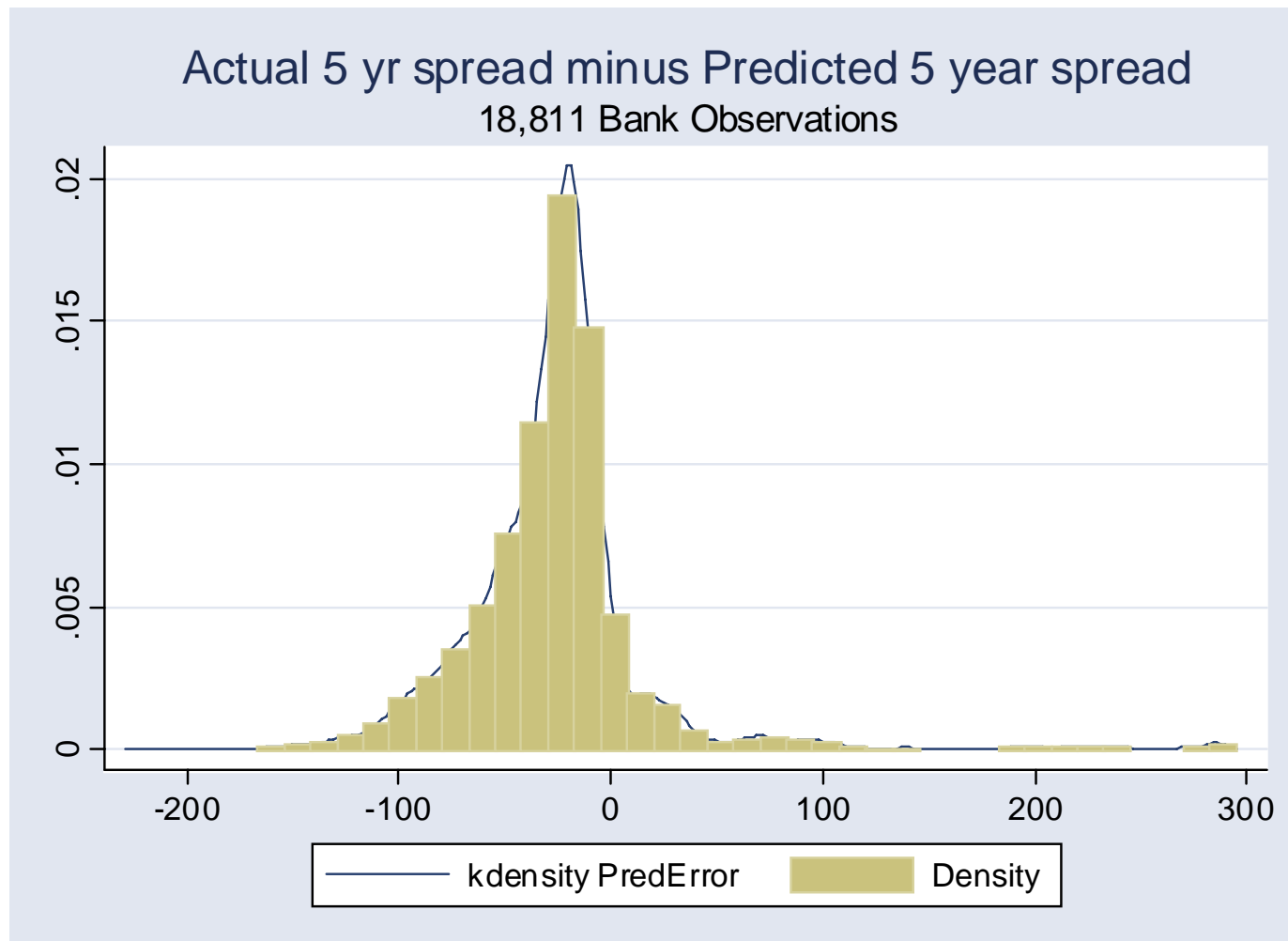
# Modeling Insurance, Brokers and Finance Firms (excluding Consec)

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- Linear panel data model with fixed effects and clustered standard errors along the firm dimension (firm effects dominate time effects)
- We are trying to explain 5 year CDS spread in terms of market leverage, historical and implied volatility and 5 year swap rate (ideally we would include credit rating but currently no daily source)
- Resulting specification:

<b>Variable</b>	<b>Coefficient</b>	<b>Std Err</b>	<b>t Val</b>	<b>p Val</b>
Swap5yBP	-0.09	0.04	-2.48	0.021
MktLev	170.06	53.94	3.15	0.003
Hist30Vol	65.33	20.23	3.23	0.002
Imp91Vol	317.31	62.47	5.08	0.000
Const	-126.78	52.42	-2.42	0.019

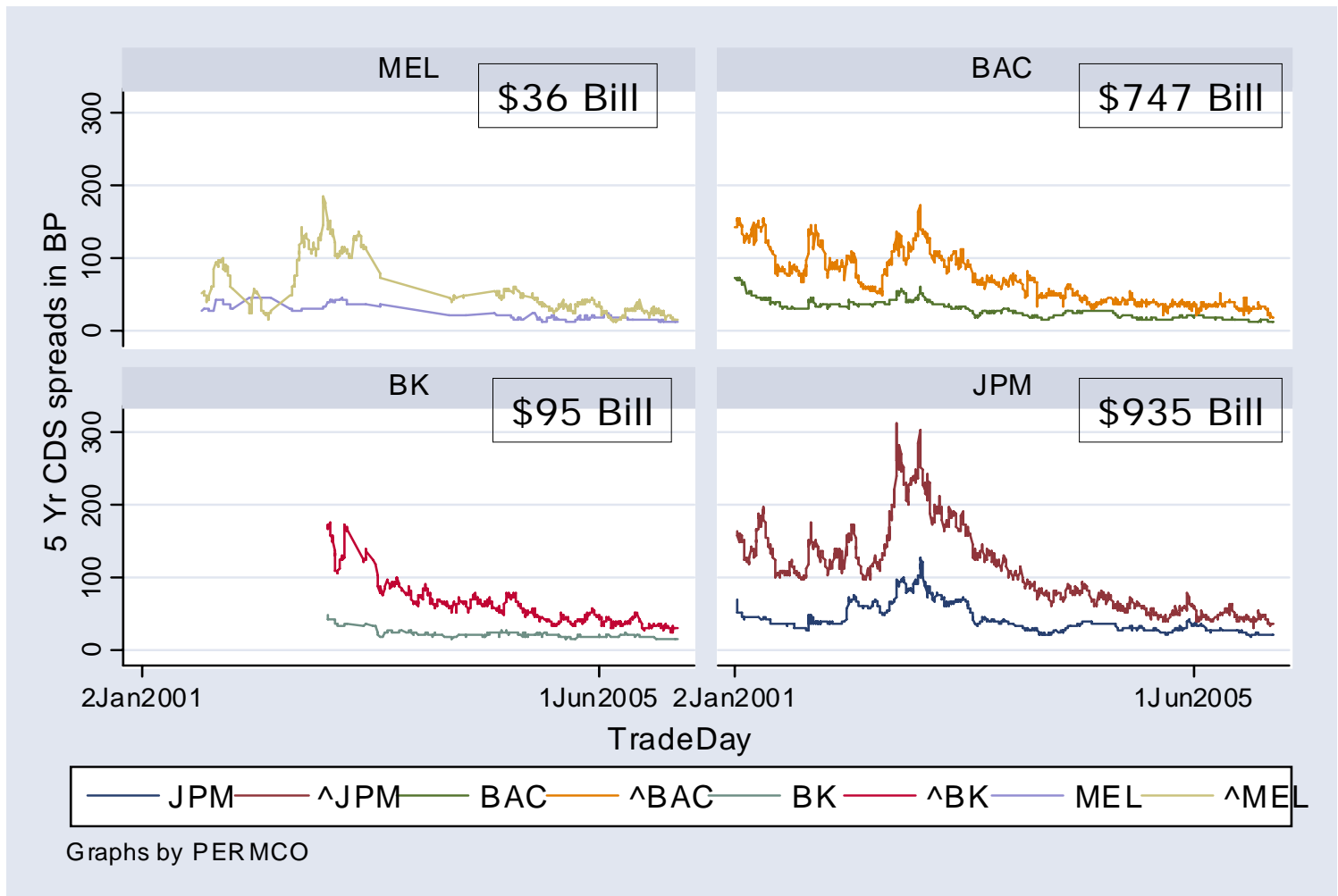
# Model Consistently Over predicts Bank Spreads so either Banks are different or they are all TBTF



# Actual and Fitted Spreads

Average Book Assets

Model now fitted across multiple ratings while displayed banks are A+/AA- of differing size.



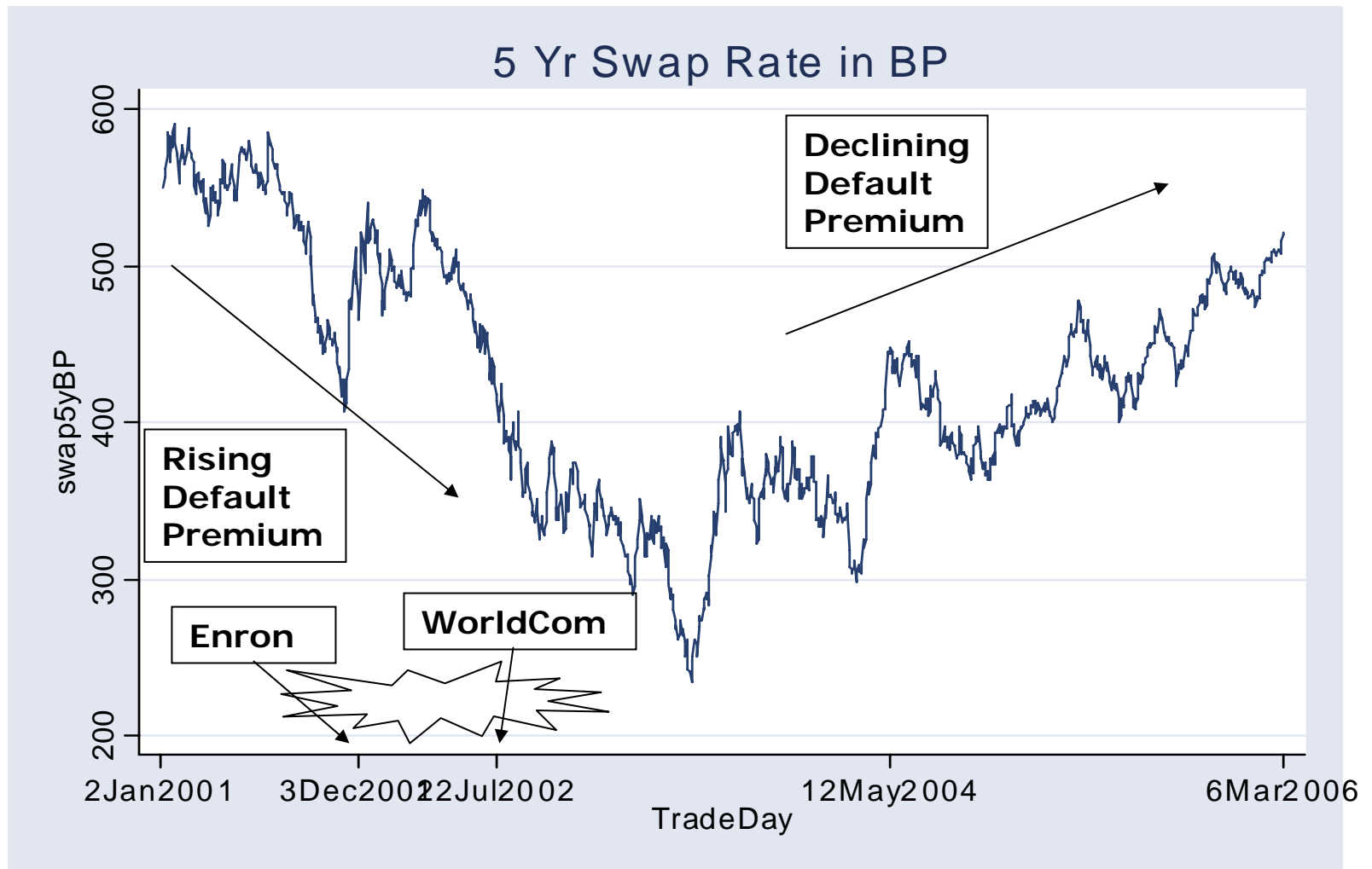
# Explaining the Difference (1)

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- Linear model of spread
- No proxy for default
  - using equity volatility and leverage as opposed to a model for asset volatility inclusive of default
  - No daily credit ratings
- Value of explicit deposit insurance and each bank's level of deposits
- Too big to fail (implicit insurance) as a function of
  - Size
  - Complexity – large role in the payments system, derivative markets, trust processing (Stern and Feldman, 2004)
- Changing economic value of default likelihood based upon the state of the economy (the difference appears to tighten as we move through time and the economy improves)



# Explaining the Difference (2)



# Conclusions

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- Naïve bank CDS spread comparisons at fixed credit rating based upon size are inconclusive, unless the entire sample of studied banks is too big to fail
- A linear model of CDS spread based upon equity volatility and leverage from non-bank financial firms overstates observed CDS spreads for banks consistent with the existence of bank deposit insurance and past TBTF treatment differences between banks and other financial firms
- Same rated differences between actual and modeled bank CDS spreads show no naïve pattern with respect to bank size
- A model of these CDS spread differences reflecting deposits, economic conditions, size of banking and other assets is needed to make a more conclusive statement regarding TBTF