



研究报告

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中国家族财富研究中心

26.4%

(Duffie, 2010)



Research report

2015- edition

TSINGHUA UNIVERSITY NATIONAL INSTITUTE OF FINANCIAL RESEARCH

October, 14, 2015

Fire Sales and Liquidity Provision in the Corporate Bond Market

Entrepreneurial Finance and Economy Growth Research Center and China Family Wealth
Research Center

Abstract

We investigate the role of corporate-bond mutual funds in providing liquidity to insurance companies that are forced to sell downgraded corporate bonds due to regulatory constraints (Ellul, Jotikasthira, and Lundblad, 2011). First, corporate-bond mutual funds are important liquidity providers to insurance companies during fire sale events, purchasing about 26.4% of fire sale bonds during the downgrading quarter. Second, our results support the slow-moving capital theories (Duffie, 2010) based on searching costs and



1

Shleifer and Vishny (1992)

Duffie(2010)

OTC)

and Stafford (2007)

Jotikasthira, and Lundblad (2011)

Coval

Ellul,

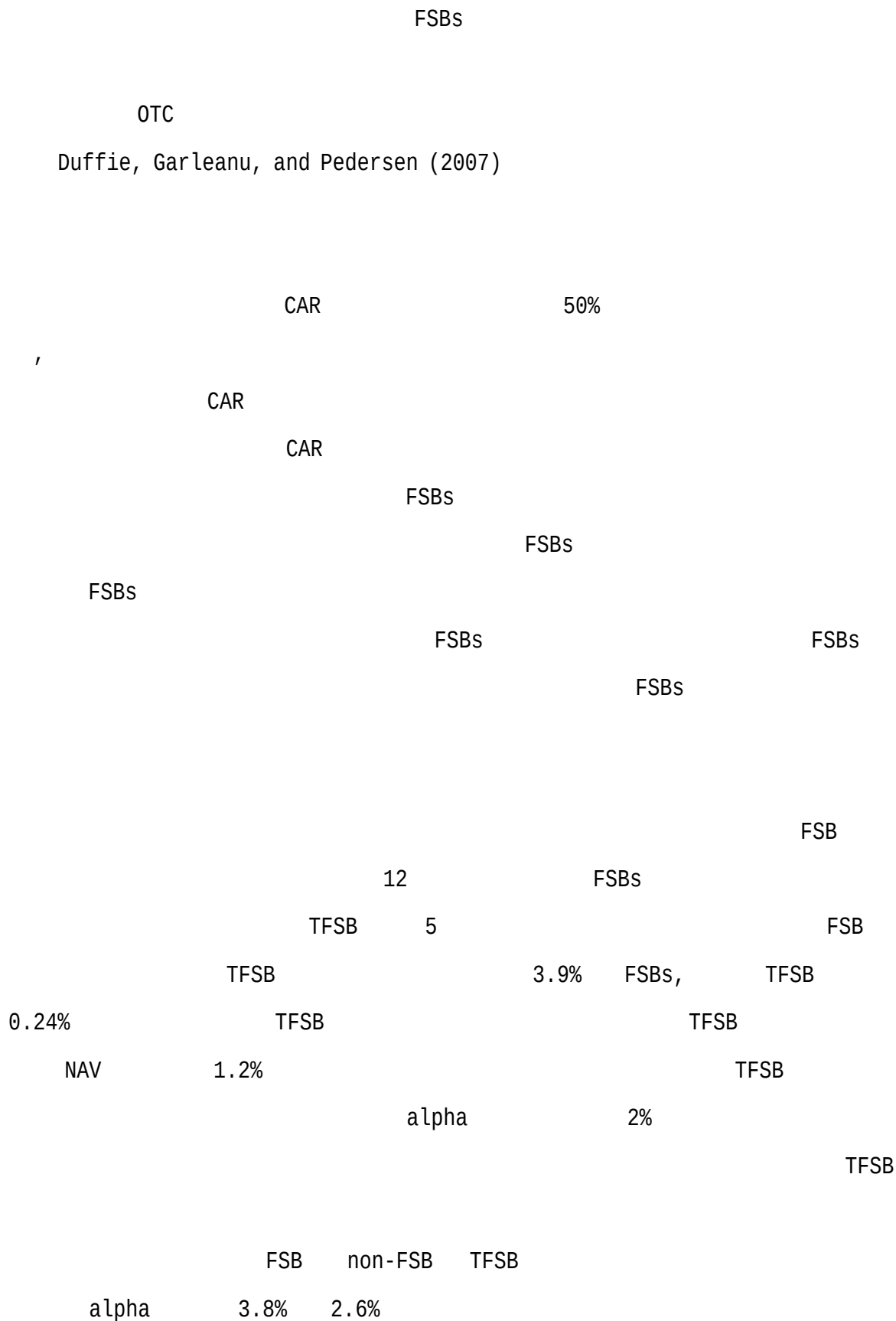
Ellul, Jotikasthira, and Lundblad (2011)

26.4%

OTC



OTC									
5		8.7%		30					
2002									
2012	\$800								
\$2890		\$1.1							
OTC									
2,115 2001 1 2012 12									
Ellul, Jotikasthira, and Lundblad (2011)									969
(FSBs)								FSBs	
1,146						(non-FSBs)			
Ellul, Jotikasthira, and Lundblad (2011)									FSBs
						5%			
FSBs		FSBs		1.2%					
26.4%									
non-FSBs									
FSBs					FSBs				





2

Gaspar, Massa, and Matos

(2006)

Zhang (2009)

Bhattacharya, Lee, and Pool (2013)

Gutierrez, Maxwell, and Xu (2009)

Cici and Gibson

(2012)

FSBs,

FSBs

3

3.1

1

NAIC), (2)

3 CRSP

4 Mergent

FISD), (5)

TRACE)

NAIC

NAIC



AAA BBB TNA)

CRSP

TNA CRSP

TNA TNA TNA

Morningstar CRSP

MERGENT FISD

TRACE

CUSIP Mergent FSID TRACE

2001-2012 2002

1 2012 12 2002 1

2012

Mergent FISD, 2,115

Ellul,

Jotikasthira, and Lundblad (2011)

NAIC

NAIC



RBC

FSBs,

non-FSBs.

3.2

2,115

1

969 FSBs and 1,196

non-FSBs

\$444.86

4.89

9.24

FSBs

non-FSBs,

FSBs

\$564.91

\$343.35)

3.39

6.15

7.97

10.32

1-1

	All Downgrade Bonds			Fire Sale Bonds (FSB)			Non-Fire Sale Bonds (Non-FSB)		
	Mean	Median	STD	Mean	Median	STD	Mean	Median	STD
Offering Amount (\$MM)	444.855	300.000	475.043	564.905	400.000	509.800	343.346	250.000	417.596
Maturity (Years)	9.244	5.593	10.883	7.970	5.114	9.308	10.322	6.031	11.953
Age (Years)	4.885	3.937	4.013	3.391	2.694	2.687	6.148	5.242	4.488
Rating	10.522	11.000	0.953	10.430	11.000	1.072	10.599	11.000	0.832
Duration	5.549	4.692	4.105	5.303	4.570	4.143	5.833	4.883	4.046

1-2

	All Downgrade		FSB		Non-FSB	
	Before	After	Before	After	Before	After
Median Insurance Company Holding (%)	30.707	22.161	27.945	18.305	33.463	28.869
Median Mutual Fund Holding (%)	2.891	4.004	3.334	4.856	2.747	3.153
Median Rating	11.000	12.000	11.000	13.000	11.000	12.000
Average Yield	10.799	14.871	10.840	20.099	10.751	9.262

30.71%

22.16%

3.3

survivorship-bias

2,841

1990

1

2012 12

2002

CUSIP

2001

1,837

TNA,

50%

765



50%				
2			500	5,495
fund/year	TNA	\$13.1	0.91%	123.4%.
	TNA	57.23%		
55.45%	44.55%			
2				

		Mean	STD	25 Percentile	Median	75 Percentile
757.550	TNA (Million Dollars)	1309.450	7688.481	74.688	246.979	
1.145	Expense Ratio (in % per year)	0.906	0.369	0.650	0.860	
11.000	Age (Years)	12.615	10.435	5.000		
52.612	85.116	Corporate Bond Holdings (% of TNA)	57.226	27.863	34.324	
74.046	96.318	Investable Bond Holdings (%)	55.450	41.791	4.486	
25.954	95.514	Junk Bond Holdings (%)	44.550	41.791	3.682	
0.462	1.557	Trading of FSB (% of Offering Amt)	1.097	1.657	0.000	
0.540	1.270	NAV Return (in % per month)	0.491	1.890	-0.101	
0.631	1.366	NAV Gross Return (in % per month)	0.584	1.911	-0.023	
0.811	1.617	Holding Return (in % per month)	0.716	2.287	-0.117	

4

FSBs,
OTC

FSBs

4.1

ANT)
 j

i t

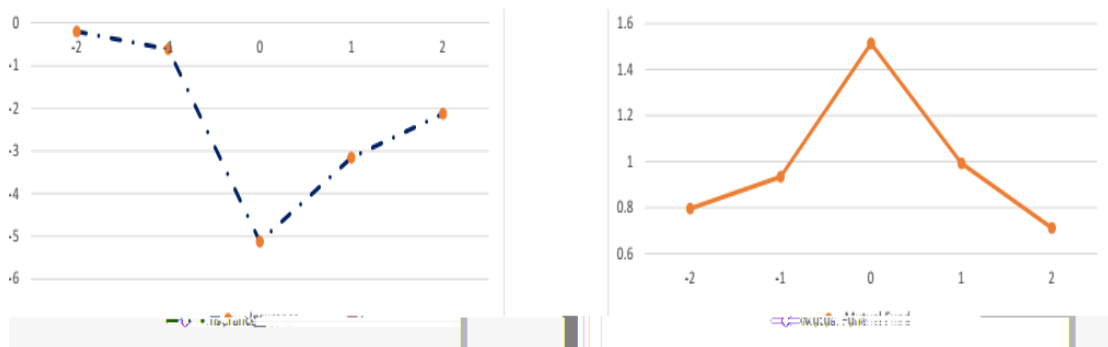
$$ANT_{i,j,t} = \frac{\{ParValueChange\}_{i,j,t}}{AMT_i},$$



AMT

ANT

1 FSBs



1

FSBs

ANT

FSB

1%

4.92%

2%

V

lul, Jotikasthira, and

Lundblad(2011)

ANT

V

1.3%

26.4%

4.2

DID

FSBs

FSBs

ANTs

non-FSBs

non-FSBs

FSBs, non-FSBs



FSB											
Cici and Gibson (2012)											
7	AAA; AA;A;BBB;BB;B;			B	(	CCC CC,C			D	)	
					1-5	Macaulay duration					
1+					7					5	
35					FSBs					625	
FSB					non-FSBs						
non-FSBs	ANT										
non-FSB					FSB					ANT	3
A					non-FSBs						
3											



FSBs	5.15%	FSBs
0.36%	ANT 5.51%	1%

4.3

/

$$ANT_{i,j} = \alpha + \beta_1 FSB_i + \beta_2 MF_j + \beta_3 MF_j \times FSB_i + \beta_4 \ln(AMT_i) + \beta_5 Year_i + \varepsilon_{i,j}.$$

	$ANT_{i,j}$	j	i	
	FSB		FSB	1 0 FSB
MF		AMT		
	MF			
4	1 2	FSBs non-FSBs	3 4	
FSBs		1 2	FSB	
0.01		FSBs	MF	
		3 4 non-FSB		
	DiD			
4				

	FSB and Non-FSB		FSB and Matched Bond		
	Model 1	Model 2	Model 3	Model 4	
<i>FSB</i>	-1.526*** (-3.552)	-2.043*** (-4.570)	-5.149*** (-12.207)	-5.408*** (-11.873)	
<i>MF</i>	4.007*** (14.546)	4.007*** (14.544)	1.131*** (12.949)	1.132*** (12.951)	
<i>MF × FSB</i>	-5.504*** (-2.844)	-2.210*** (-5.004)	-2.210*** (-5.004)	-5.506*** (-12.846)	(-11.873)
<i>Ln(AMT)</i>	-1.187*** (-3.247)	-1.187*** (-3.981)	-0.744*** (-3.981)	-0.744*** (-3.981)	(-5.004)
<i>Year</i>	-0.220*** (-5.029)	0.779** (2.461)	-14.795*** (-3.823)	Constant	-1.777*** (-5.978)
<i>Year × FSB</i>	0.146*** (3.950)	0.151*** (3.950)	0.227*** (2.499)	Adjusted R ²	-11.873
				N	(-6.029)



FSBs,

FSBs,

5%

5

ANT

1-4

5-8

1-4

MF

1

5-8

MF

1 MF

4

FSBs,

5

FSB

Table 1: Regression Results of the Effect of FSBs on the Issuance of Corporate Bonds									
Sample Period: 2007-2014									
Control Variables: Size, Leverage, Profitability, etc.									
Model 1: FSB and Non-FSB									
Model 2: FSB and Matched Bond									
Model 3: FSB and Non-FSB									
Model 4: FSB and Matched Bond									
Model 5: FSB and Non-FSB									
Model 6: FSB and Matched Bond									
Model 7: FSB and Non-FSB									
Model 8: FSB and Matched Bond									
Model 9: FSB and Non-FSB									
Model 10: FSB and Matched Bond									
Model 11: FSB and Non-FSB									
Model 12: FSB and Matched Bond									
Model 13: FSB and Non-FSB									
Model 14: FSB and Matched Bond									
Model 15: FSB and Non-FSB									
Model 16: FSB and Matched Bond									
Model 17: FSB and Non-FSB									
Model 18: FSB and Matched Bond									
Model 19: FSB and Non-FSB									
Model 20: FSB and Matched Bond									
Model 21: FSB and Non-FSB									
Model 22: FSB and Matched Bond									
Model 23: FSB and Non-FSB									
Model 24: FSB and Matched Bond									
Model 25: FSB and Non-FSB									
Model 26: FSB and Matched Bond									
Model 27: FSB and Non-FSB									
Model 28: FSB and Matched Bond									
Model 29: FSB and Non-FSB									
Model 30: FSB and Matched Bond									
Model 31: FSB and Non-FSB									
Model 32: FSB and Matched Bond									
Model 33: FSB and Non-FSB									
Model 34: FSB and Matched Bond									
Model 35: FSB and Non-FSB									
Model 36: FSB and Matched Bond									
Model 37: FSB and Non-FSB									
Model 38: FSB and Matched Bond									
Model 39: FSB and Non-FSB									
Model 40: FSB and Matched Bond									
Model 41: FSB and Non-FSB									
Model 42: FSB and Matched Bond									
Model 43: FSB and Non-FSB									
Model 44: FSB and Matched Bond									
Model 45: FSB and Non-FSB									
Model 46: FSB and Matched Bond									
Model 47: FSB and Non-FSB									
Model 48: FSB and Matched Bond									
Model 49: FSB and Non-FSB									
Model 50: FSB and Matched Bond									
Model 51: FSB and Non-FSB									
Model 52: FSB and Matched Bond									
Model 53: FSB and Non-FSB									
Model 54: FSB and Matched Bond									
Model 55: FSB and Non-FSB									
Model 56: FSB and Matched Bond									
Model 57: FSB and Non-FSB									
Model 58: FSB and Matched Bond									
Model 59: FSB and Non-FSB									
Model 60: FSB and Matched Bond									
Model 61: FSB and Non-FSB									
Model 62: FSB and Matched Bond									
Model 63: FSB and Non-FSB									
Model 64: FSB and Matched Bond									
Model 65: FSB and Non-FSB									
Model 66: FSB and Matched Bond									
Model 67: FSB and Non-FSB									
Model 68: FSB and Matched Bond									
Model 69: FSB and Non-FSB									
Model 70: FSB and Matched Bond									
Model 71: FSB and Non-FSB									
Model 72: FSB and Matched Bond									
Model 73: FSB and Non-FSB									
Model 74: FSB and Matched Bond									
Model 75: FSB and Non-FSB									
Model 76: FSB and Matched Bond									
Model 77: FSB and Non-FSB									
Model 78: FSB and Matched Bond									
Model 79: FSB and Non-FSB									
Model 80: FSB and Matched Bond									
Model 81: FSB and Non-FSB									
Model 82: FSB and Matched Bond									
Model 83: FSB and Non-FSB									
Model 84: FSB and Matched Bond									
Model 85: FSB and Non-FSB									
Model 86: FSB and Matched Bond									
Model 87: FSB and Non-FSB									
Model 88: FSB and Matched Bond									
Model 89: FSB and Non-FSB									
Model 90: FSB and Matched Bond									
Model 91: FSB and Non-FSB									
Model 92: FSB and Matched Bond									
Model 93: FSB and Non-FSB									
Model 94: FSB and Matched Bond									
Model 95: FSB and Non-FSB									
Model 96: FSB and Matched Bond									
Model 97: FSB and Non-FSB									
Model 98: FSB and Matched Bond									
Model 99: FSB and Non-FSB									
Model 100: FSB and Matched Bond									
Model 101: FSB and Non-FSB									
Model 102: FSB and Matched Bond									
Model 103: FSB and Non-FSB									
Model 104: FSB and Matched Bond									
Model 105: FSB and Non-FSB									
Model 106: FSB and Matched Bond									
Model 107: FSB and Non-FSB									
Model 108: FSB and Matched Bond									
Model 109: FSB and Non-FSB									
Model 110: FSB and Matched Bond									
Model 111: FSB									



FSBs

OTC
and Pedersen (2007) OTC Duffie, Garleanu,

Duffie and Strulovici (2012)

FSBs

FSBs

MinCAR,
Ellul, Jotikasthira, and
Lundblad(2011) CAR

50% DaysRecover, 50%
50% FSBs

Ellul,
Jotikasthira, and Lundblad (2011)

MinCAR FSBs DaysRecover

$$\begin{aligned} MinCAR_i = & \alpha + \beta_1 ANT_{i,MF} + \beta_2 ANT_{i,INS} + \\ & \beta_3 \ln(Days2MinCAR_i) + \beta_4 Z_i + \beta_5 I_i + \beta_6 Year_i + \epsilon_i, \end{aligned}$$



$$\ln(DaysRecover_i) = \alpha + \beta_1 ANT_{i,MF} + \beta_2 ANT_{i,INS} +$$

$$\beta_3 \ln(Days2MinCAR_i) + \beta_4 Z_i + \beta_5 I_i + \beta_6 Year_i + \epsilon_i$$

MinCAR FSB / DaysRecover

ANT(ANT_{MF}),

ANT (ANT_{INS}

MinCAR

(Days2MinCAR) ANT_{MF}

ANT_{INS}

MinCAR

Days2MinCAR

ANT_{MF} ANT_{INS}

Z

1

0

I

10

1

(Moody's

Baa

Aaa

6

FSB

CAR

MinCAR

ANT_{MF}

FSBs

ANT_{MF}

1.3%

1.369

MinCAR 1.78% (=

1.3% × 1.369)

\$1050

5.885

1.78% × 588.5 = 1050

843

MinCAR

\$88.5 (= 843 × 588.5 = 8851.5)



6

	MinCAR			Ln(DaysRecover)		
ANT_{MF}	0.902	1.446**	1.369**	-4.910***	-3.924**	-4.560**
	(1.643)	(2.123)	(1.996)	(-2.735)	(-2.099)	(-2.533)
ANT_{INS}	0.927***	0.740**	0.775**	-1.310*	-1.086	-0.911
	(2.738)	(2.496)	(2.444)	(-1.821)	(-1.431)	(-1.230)
Ln(Days2Min)	-0.104***	-0.086***	-0.084***	0.227***	0.247***	0.243***
	(-5.736)	(-6.532)	(-6.517)	(6.685)	(7.260)	(7.078)
Size		-0.184*	-0.184*		-0.277***	-0.309***
		(-1.876)	(-1.889)		(-2.993)	(-3.325)
Age		-0.009	-0.010		0.015	0.001
		(-0.248)	(-0.258)		(0.195)	(0.012)
Minority		-0.134	-0.128		-0.024	-0.110
		(-3.462)	(-3.412)		(-0.332)	(-0.108)
netos		0.268**	0.248**		0.218**	0.130
		(0.688)	(2.262)		(2.379)	(0.852)
Interest Rate	0.472**			0.051		
	(2.340)			(0.294)		
Slope	0.045			-0.196		
	(0.183)			(-1.583)		
Default Spread	-0.390***			-0.304**		
	(-2.698)			(-2.219)		
Constant	7.422***	-0.084	2.619**	3.431**	4.069***	7.516***
	(5.472)	(-0.930)	(1.968)	(2.306)	(27.996)	(6.316)
Adjusted R^2	0.151	0.197	0.237	0.241	0.131	0.142
N	686	843	843	843	686	686

ANT_{INS}

FSBs

Days2MinCAR

FSBs

ANT_{MF}

Days2MinCAR

7

FSBs

0.89%

1.35%

5.15%

1.06%



7

Transaction difference of		INS FSBs -INS Matched	MF FSBs -MF Matched	MT
Quarter -2		-0.891*** (-2.983)	-0.716*** (-4.757)	0.176 (0.519)
***	Quarter -1	-1.346*** (-5.213)	-0.453*** (-3.424)	0.892 (3.039)
***	Quarter 0	-5.149*** (-12.261)	0.358** (2.438)	5.507 (12.375)
***	Quarter +1	-2.302*** (-10.622)	0.680*** (6.414)	2.981 (12.36)
***	Quarter +2	-1.064*** (-5.124)	0.412*** (6.012)	1.476 (6.512)

FSBs

0.68% FSBs

0.68%

0.41%

FSBs,

FSBs

6

6.1

TFSB

FSBs

$$QTFSB_{j,t} = \frac{\sum_i (\max(0, \Delta Shares_{i,j,t}) \times Price_{i,t}) | i \in FSB_{t-3,t}}{Total_Purchases_{j,t}},$$

$Shares_{i,j,t}$

$t,$

j

i

$Price_{i,t}$

i

t



QTFBS

FSBs

12

TFSB

QTFBSs,

$$TFSB_{j,t} = \frac{\sum_{s=t-11}^t (QTFBS_{j,s})}{12}$$

TFSB

6.2

TFSB

TFSB

TFSB

75%

8

TFSB

TFSB

8 TFSB

FSB Portfolio	TFSB	Gross NAV Return Alpha	Holding Return Alpha	Characteristic Selectivity Alpha	Characteristic Timing Alpha
Low	0.24%	−0.076** (−2.048)	−0.075* (−1.93)	0.025* (1.678)	0.010 (0.989)
P2	0.77%	−0.019 (−0.652)	−0.021 (−0.562)	0.033* (1.84)	0.022 (1.43)
P3	1.36%	0.005 (0.156)	0.049 (1.164)	0.064*** (3.049)	0.040*** (2.895)
P4	2.06%	0.066 (1.610)	0.059 (1.301)	0.022 (0.882)	0.033*** (2.649)
High	3.90%	0.095*** (2.621)	0.124*** (2.984)	0.077*** (2.835)	0.034** (2.539)
High-Low	3.67%	0.171*** (3.436)	0.199*** (4.257)	0.052*** (2.621)	0.024*** (3.185)



8 2

TFSB 3 6 TFSB (Elton,
Gruber, and Blake (2011), Gutierrez, Maxwell, and Xu (2009), and Cici and
Gibson (2012) 3 alphas

$$R_t = \alpha + \beta_1 STK_t + \beta_2 BOND_t + \beta_3 DEF_t + \beta_4 OPTION_t + \varepsilon_t$$

t R STK CRSP
BOND Lehman DEF Lehman
OPTION GNMA

8 4 6 5 6
Daniel, Grinblatt, Titman, and Wermers (1997) Cici and
Gibson (2012). 5
7 AAA, AA, A, BBB, BB, B B 35

CS

$$CS_{f,t}^{BF} = \sum_j w_{f,j,t-1} (R_{j,t} - BR_{j,t}),$$

$R_{j,t}$ j t $BR_{j,t}$ t j
 $w_{f,j,t-1}$ f j t

CT

$$CT_{f,t}^{BF} = \sum_j (w_{f,j,t-1} BR_{j,t} - w_{j,t-13} BRL_{j,t})$$

$BRL_{j,t}$ j t

8 TFSB 0.24% FSBs
3.9% FSBs TFSB
TFSB 1.2%



		TFSB	1.44%
CS	CT	8	3

		TFSB		TFSB
	TFSB	2.04%		
20				
	CS	CT		

6.3

9		C		3
---	--	---	--	---



Portfolio	FSB and Non-FSB Component	FSB Holding Component	Other Speculative-Grade Component	Investment -Grade Component
Low	-0.071 (-1.027)	-0.146 (-0.835)	-0.078 (-1.167)	-0.075 (-1.35)
4)	(-0.089)	(1.425)	(-0.368)	(1.65)
8***	0.017	0.135***	-0.004	0.13
9)	(0.093)	(2.578)	(-0.07)	(2.72)
1	0.004	0.077	0.007	0.08
3)	(0.023)	(1.400)	(0.094)	(1.51)
7***	0.174 (0.996)	0.120*** (2.838)	0.047 (0.717)	0.12 (2.834)
0.320** (3.251)	0.217*** (2.117)	0.122** (3.126)	High-Low	0.208*** (2.44)

4

TFSB

non-FSB

2.6%

TFSB

TFSB

6.4

TFSB

Fama-Macbeth

$$PERF_{f,t} = \alpha + \beta_1 TFSB_{f,t-1} + \beta_2 TFSB_{f,t-2} + \beta_3 TFSB_{f,t-3} + \beta_4 TFSB_{f,t-4} + \beta_5 Age_{f,t-1} + \beta_6 Turn_{f,t-1} + \beta_7 Junk_{f,t-1} + \epsilon_{f,t}$$

PERF, f t

TFSB

TFSB

Exp



TNA

Age

1 Turn

TFSB

Junk

Fama-Macbeth

FSBs

10

2

TFSB

TFSB

1.9

5%

FSBs

9.5

1.1%

TFSB

Junk

TFSB

10 TFSB

	Holding Period Return Alpha	Speculative-Grade Fund Return Alpha	Investment-Grade Fund Return Alpha	Speculative-Grade Fund FSB Return Alpha	Speculative-Grade Fund Other Security Return Alpha
Constant	-0.064	0.335***	0.009	0.212	-0.295**
(60)	(-0.806)	(-2.675)	(0.085)	(0.700)	(-2.33)
132***	TFSB-Ratio	1.936**	3.584***	0.409	9.957**
(38)		(2.348)	(3.781)	(0.278)	(2.549)
117***	Rf	0.015***	0.016***	0.014**	-0.001
(2.717)		(3.130)	(2.720)	(2.176)	(-0.057)
-0.003	Size	0.003	0.002	0.001	-0.023
(-0.197)		(0.796)	(0.215)	(0.073)	(-0.879)
0.005	Age	0.018	0.003	0.017	0.020
(0.354)		(0.834)	(0.153)	(0.709)	(0.840)
-0.180	Exp	1.519**	0.418	1.617***	-0.441
(-0.112)		(2.402)	(1.562)	(2.614)	(-0.803)
-0.019	Turn	0.079**	0.000	0.083**	-0.001
(-0.120)		(2.392)	(0.038)	(2.581)	(-0.123)
0.207	Link	0.065	0.053	0.089	0.027
(0.570)		(0.587)	(0.513)	(0.835)	(0.186)

alpha

3 4

TFSB

TFSB

3.6

TFSB

FSB non-FSB

5 6

TFSB

9.9, 3.2

5% FSBs

49.8



non-FSBs

16.2

7

Duffie(2010)



70%

“ ”

OTC

“ ”

