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Does size of banks really matter? Evidence from CDS market data

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Does Size of Banks Really Matter? Evidence from CDS Market Data

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Evidence from CDS Market Data

Abstract

In this study we try to find that whether markets take into account the phenomenon of Too Big to Fail. With the help of CDS market data, which reflects the risk, markets attribute on banks, we calculate the default probabilities of banks in one, two, and three years. Then we regress these results with financial values like total assets, total shareholders' equity and net income. Later on we extend our study and repeat our regression analysis using Return on Assets as dependent variable. We find that markets give more importance to profitability of a bank than its size when pricing the riskiness of the bank. We conclude that Too Big to Fail is not a valid term as thought but may be Too Profitable to Fail may be better.

Keywords: Banking, Too Big to Fail, CDS Market

JEL Classifications: G21, G28

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1 Introduction

“Too Big to Fail” is a well known phenomenon which is widely used even by people who are not well-informed in economics and banking. On the other hand the subject is a matter of debate among academicians. Is it really true that a bank that is huge in size must be rescued from bankruptcy? Is it good for the economy as a whole? What is the criterion that makes a bank too big to fail? Do markets really care about this phenomenon in pricing the banks? Why policy makers rely on Too Big to Fail policies so much? Although many people investigate about the subject there are still many questions waiting to be answered?

Bailout of a large bank by a government as seen frequently in the large financial turmoil of 2008 is called as “Too Big to Fail (TBTF)” policy. People who support TBTF policies say that, by rescuing large banks from bankruptcy, impacts of the failure on other institutions or on real economy is eliminated. On the other hand, people who oppose TBTF policies argue that, these policies seem attractive in the short run in spite of the large financial costs to governments; but in the long run the costs are even larger.

Shull (2010), takes the history of TBTF back to the 10th century Abbasid Caliphate and mentions about Jewish Bankers that are protected by the state, or about Bank of England that’s rescued from a run in 1696, in his comprehensive and illuminating study. So we can say that the subject is not new and can be an interesting area for economic historians but the history of TBTF is out of this papers scope.

The phenomenon of “Too Big to Fail” has been one of the most important issues of discussion for the last 25-30 years. The 1960s and 1970s were a transition period in banking from a highly regulated system established in 1930s to a relatively deregulated system. In the course of the transition, bank failures increased (Shull, 2010). Although it is known that in 1931 German government rescued four large banks, which were having difficulties, from bankruptcy; the time when TBTF discussions increased was in 1984, when seventh largest bank of USA, Continental Illinois, came near bankruptcy and Federal Deposit Insurance Corporation (FDIC), gave 100% guarantee for the deposits and bonds of the bank. At the beginning, after the case of Continental Illinois, it was accepted that the largest ten banks would not be allowed for bankruptcy. Later on the number increased to eleven. However, the number of banks that were included in TBTF policy increased implicitly in following years. The issue of TBTF was regulated with Federal Insurance Corporation Improvement Act (FICIA) (1991), and National Depositor Preference Law (1993) in USA.

As one might expect, research about TBTF is abundant. Especially with the recent global economic crisis, the issue became hot again. Debate over the TBTF policies mounted. In March 2010, Federal Reserve Chairman Ben Bernanke claimed TBTF was a pernicious problem. Bernanke also added, regulators had to be significantly tougher on large and complex financial firms to limit wider risks. He said TBTF to be among the most insidious problems that make barriers to competition in financial markets.

It is a matter of discussion why governments need TBTF policies or generally why TBTF phenomenon is needed in a so-called free market world. In our study we will investigate whether markets really value TBTF while pricing riskiness of banks.

2 Literature Review

One of the studies that support TBTF, is Todd & Thomson's (1990) which argues that, high levels of interbank exposure reduce safety and soundness of the banking system; interbank exposure affects the ability of the FDIC and bank regulators to use market discipline as a constraint on banks' risk taking, and a rising level of interbank exposure is indicative of reduced stability of the financial system.

On the other hand, Ohara & Shaw (1990) argue that TBTF policies create inequalities among banks. According to them the selective policy of charging the same insurance premium to institutions but providing some with greater coverage, imposes unnecessary costs on the market. They also conclude setting and telling the policy to the market in an understandable way is very important to get the intended result.

Some authors like Soussa (2000), Rime (2005), and Hughes & Mester (1993) claim that banks that are TBTF get favorable ratings and credit spreads. Some other authors on the other hand, argue that TBTF policies allow large banks grow more more than optimal. Kane (2000) and Penas & Unal (2004) are among those authors. Similarly, Boyd & Gertler (1993) argues that TBTF policies encourage banks to take excessive risks. On the other hand some other authors do not accept this argument. For example, Demsetz & Strahan (1997) and Soussa (2000) argue large banks do not have excessive risks.

As told before discussions about TBTF increased very much after the latest financial and economic crisis. But, actually before that, Stern and Feldman (2004) claimed that TBTF problem had increased. However, later on Mishkin (2006) refused this idea and claimed TBTF problem had been reduced with the help of FDICIA.

In latest years empirical studies about TBTF have increased. Brewer and Jagtiani (2009) try to estimate the value of being TBTF. Using data from the merger boom of 1991-2004, they find that organizations are willing to pay an added premium to reach an asset size of TBTF. According to their estimations the added premiums for the eight mergers which increased the asset size of organizations over \$100 million was \$14 million.

Zhou (2009) examines relationship between three measures on systematic importance and size for the bank. He concludes that TBTF argument is not always valid, and alternative measures on systematic importance should be considered.

Shull (2010) argues that, it is risky to have a relatively few large banking institutions in which a large proportion of financial resources are concentrated. In that case, Shull says, each bank, by virtue of its absolute and relative size, would be system threatening in failure, each would unavoidably exercise powerful influence over regulatory authorities, and each would likely be viewed as an irreplaceable national resource. Shull claims that limiting further growth through restrictions on specific activities, revisions of bank merger policy, and possibly divestiture to reduce concentration can reduce the TBTF problems.

Goodlet (2010) is also one of the people who argue that long run costs of TBTF policies are much greater than short run benefits. Goodlet also claims that the reason of Lehman's bankruptcy in 2008 was that, no one was expecting such a thing after the bailout of Bear Sterns. He adds that the important thing is not rescuing or letting a bank fail but managing the expectations about failures in a consistent and coordinated manner.

3 Methodology

In our study we will focus on the question whether markets price "too big to fail" phenomenon? Or put in other words, do markets care about size of a bank while pricing it? We will use CDS data of international banks and compute their default probabilities with the help of this data. Then we will regress default probabilities of banks with their financial values like total assets, total shareholders' equity, net income and ROA.

To compute the default probabilities of banks, we will apply the methodology of Ranciere (2001). In this study Ranciere used CDS spreads of Argentina and Brazil to obtain default probabilities of these countries. In our study we will use the same methodology to compute default probabilities of the banks analyzed.

The variables that will be used in the study are:

- DS_{t,t'} : Default spread between t and t'
- R_{t,t'} : Risk free rate between t and t'
- Ps_t : Default probability between t and t+6 months conditional on no default before t
- P_t : Default probability between t and t+1 conditional on no default before t
- S_t : Survival probability of an obligation at time t
- D_t : Cumulative default probability of an obligation at time t
- H_t : Probability of a default between t and t+1
- R : The recovery rate

With indicative levels for annualized default spread with a maturity of 1, 2 and 3 years, the no arbitrage condition may be applied iteratively to extract one year forward default spreads in years 1,2, and 3:

$$(1 + R_{1,2} + DS_{1,2}) = \frac{(1 + R_{0,2} + DS_{0,2})^2}{(1 + R_{0,2} + DS_{0,2})}$$

$$(1 + R_{2,3} + DS_{2,3}) = \frac{(1 + R_{0,3} + DS_{0,3})^3}{(1 + R_{0,1} + DS_{0,1})(1 + R_{1,2} + DS_{1,2})}$$

Similarly, risk free rates R_{1,2} and R_{2,3} are calculated as:

$$(1 + R_{1,2}) = \frac{(1 + R_{0,2})^2}{(1 + R_{0,1})}$$

and

$$(1 + R_{2,3}) = \frac{(1 + R_{0,3})^3}{(1 + R_{0,1})(1 + R_{1,2})}$$

Having extracted the forward default term structure, we can simply treat each interval of one year independently. The forward spread then reflects the conditional risk of default for the given period. Recalling that the default premium paid every 6 months covers the expected cost of default for the given 6-month period, we apply the risk neutral valuation principal to obtain the conditional 6-month default probability Ps_t:

$$\left(1 + \frac{R_{t,t'}}{2}\right) = (1 - P_{S_t}) * \left(1 + \frac{R_{t,t'} + DS_{t,t'}}{2}\right) + P_{S_t} * R$$

Knowing that no default over one year is equivalent to no default in any of the two 6-months period, we obtained the annualized probability of default as $P_t = 1 - (1 - P_{S_t})^2$.

Having derived for each yearly period the conditional default probability, we can then simply compute:

The survival probability : $S_t = (1 - P_0)(1 - P_1) \dots (1 - P_t)$
 The cumulative default probability : $D_t = 1 - S_t$
 The probability of a default between t and t+1 : $(1 - P_0)(1 - P_1) \dots (1 - P_{t-1})P_t$

After obtaining default probabilities for banks we will analyze whether there is consistency between bank size and default probability. To do this we have obtained total assets, total shareholders' equity, and net income data. Banks publish their financial tables quarterly so our regression panel data is also quarterly. We will regress these values with the default probabilities by ordinary least squares method and investigate whether there is a relationship between default probability of a bank estimated by using CDS data and size of it.

To extend our study we have done the regression and used Return on Assets (ROA) which is calculated as "Net Income/Total Assets" as dependent variable. In this way we will investigate whether profitability is related with banks' default probability.

4 Data and Results

We have used CDS data of 22 banks from different countries for the period 14.08.2008 – 12.09.2010. The list of banks is given below. And for risk free rate we have used two sets of data. For the banks that have USD denominated CDS, we have used US Treasury Bond rates as risk free rate and German Treasury Bonds for the banks that have EUR denominated CDS.

Banco Bilbao Vizcaya Argentaria SA (BBVA)
Banco Santander SA
Barclays Bank PLC
BNP Paribas
Commerzbank AG
Credit Agricole SA

Credit Suisse Group AG
Deutsche Bank AG
HSBC Bank PLC
ING Bank NV
Lloyds TSB Bank PLC
Royal Bank of Scotland PLC/The
SocieteGenerale
UBS AG
UniCreditSpA
American Express Co
Bank of America Corp
Citigroup Inc
Goldman Sachs Group Inc
JPMorgan Chase & Co
Morgan Stanley
Wells Fargo & Co

4. a. Default Probability Trends

In the first part of our study we have analyzed default rate trends especially to see whether they are realistic. Here we give the default rate trends for zero recovery rates. To keep graphs as clear as possible, we separate US and European banks. In the tables it is obviously seen that calculated default probabilities of banks move in a realistic manner. Default rates of American Banks increase suddenly after collapse of Lehman brothers in 15.09.2008. Default rates of US banks relatively converge in time. The periods when default probabilities of for instance Morgan Stanley and Citi Group reach a top, overlap with the periods that bad news and rumors about those banks were frequent. Similar observation can be done in European banks too. For example default rates of BBVA and Santander increases very much in 2010 when concerns about Spanish economy increase.

We can also see that default rates of US banks converge in time but European banks show less homogeneity and less convergent trends. This is because unlike US banks they belong to different countries and reflect economic conditions of their home countries.

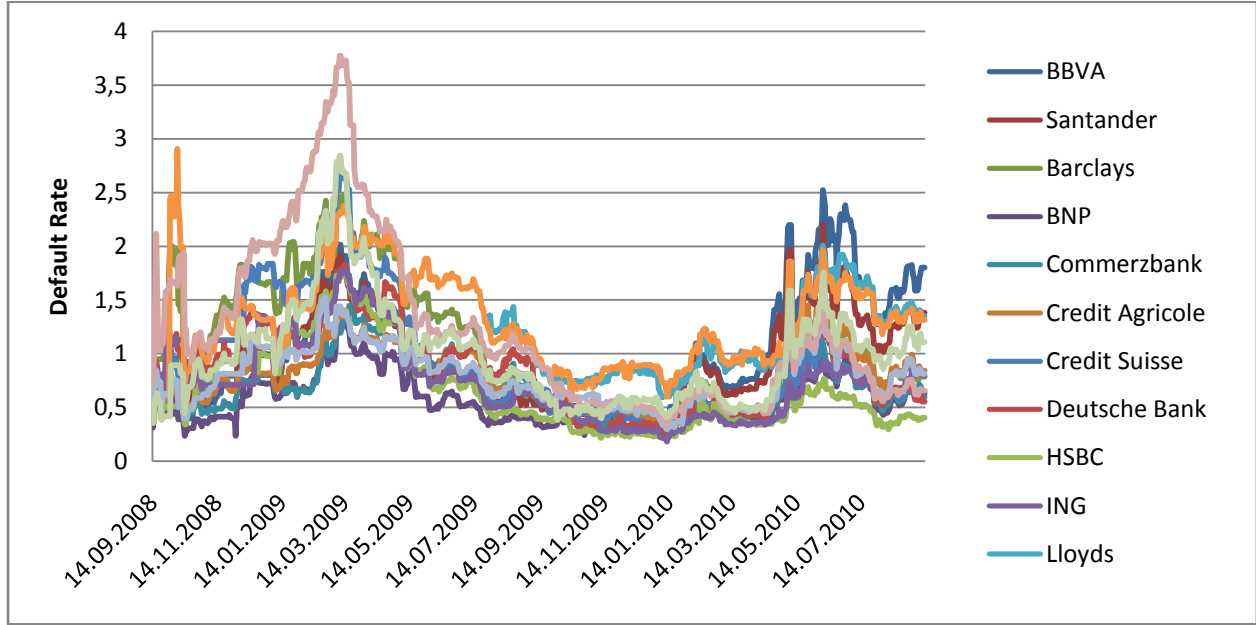


Figure 1 : 1 Year Default Probability Trends for European Banks

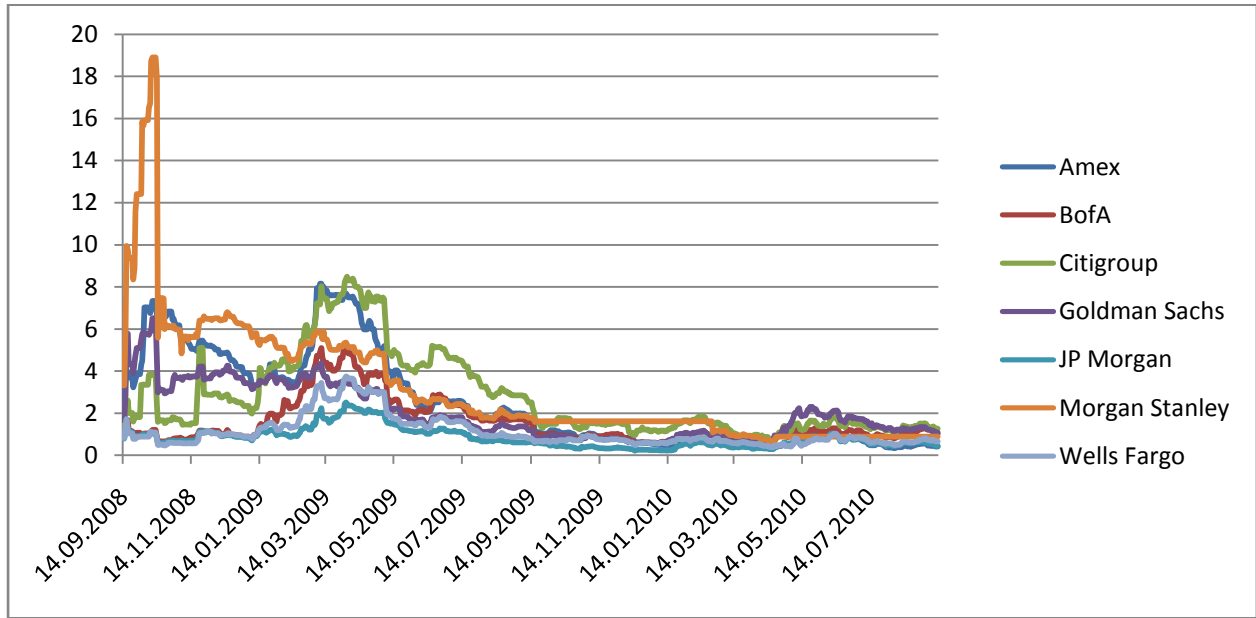


Figure 2 : 1 Year Default Probability Trends for US Banks

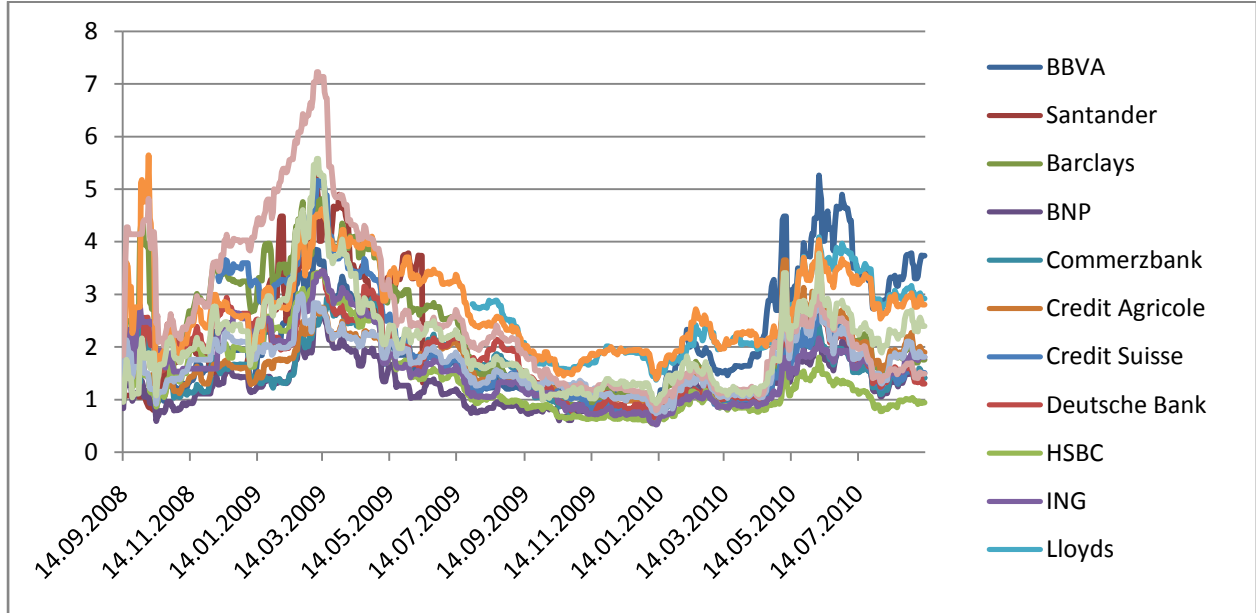


Figure 3 : 2 Year Default Probability Trends for European Banks

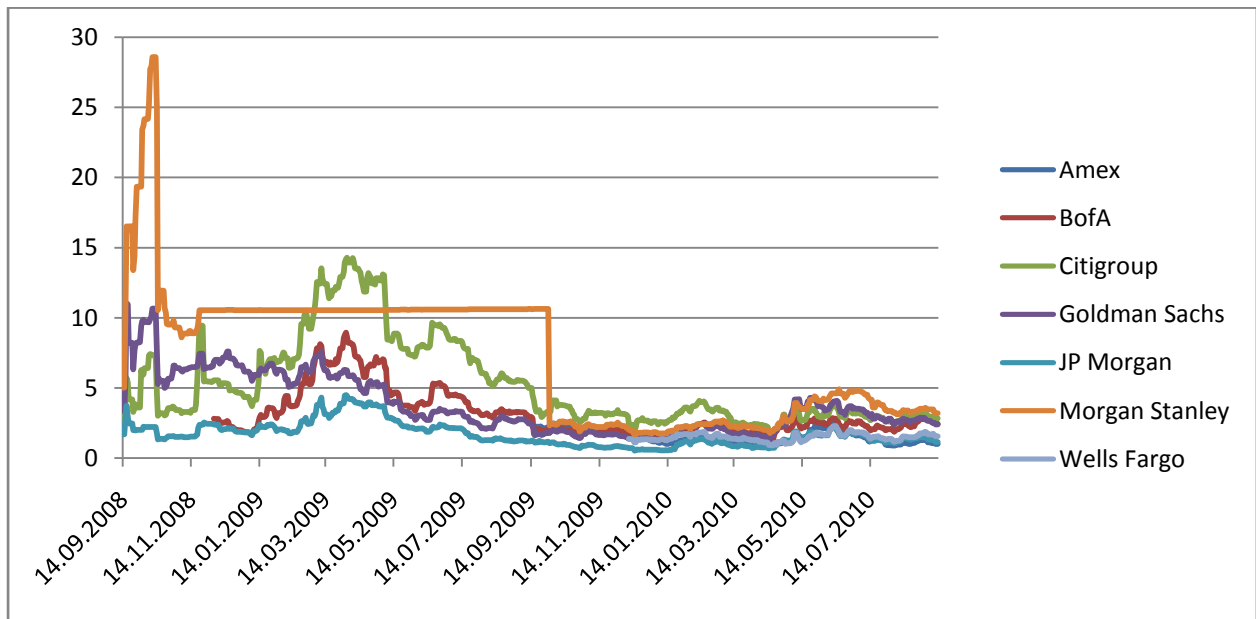


Figure 4 : 2 Year Default Probability Trends for US Banks

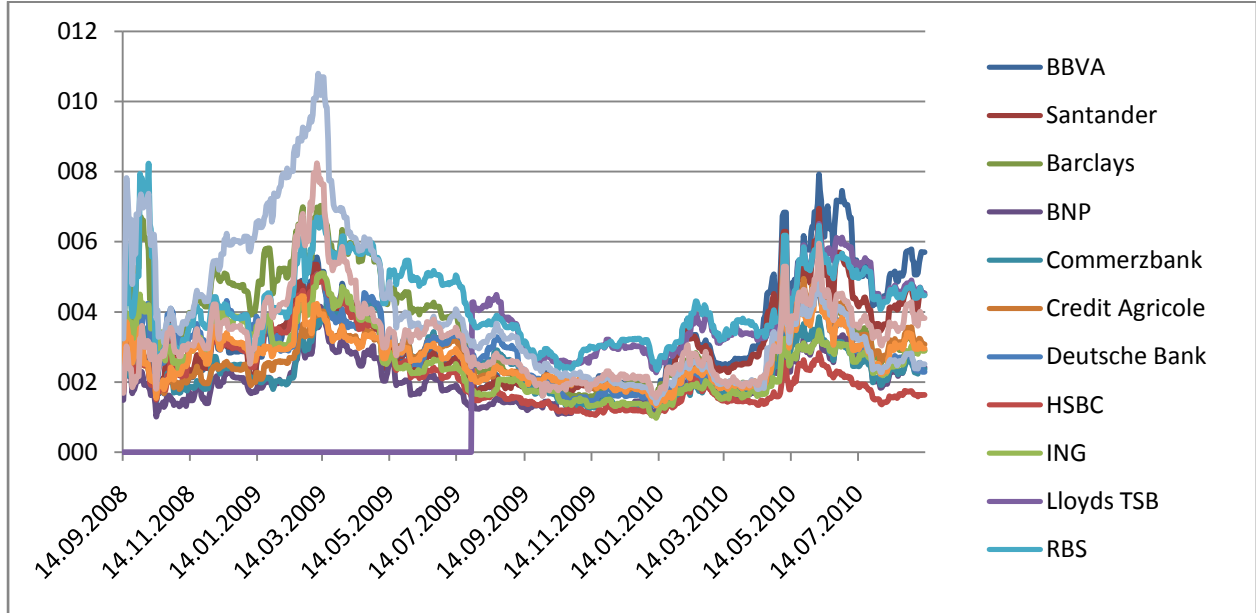


Figure 5 : 3 Year Default Probability Trends for European Banks

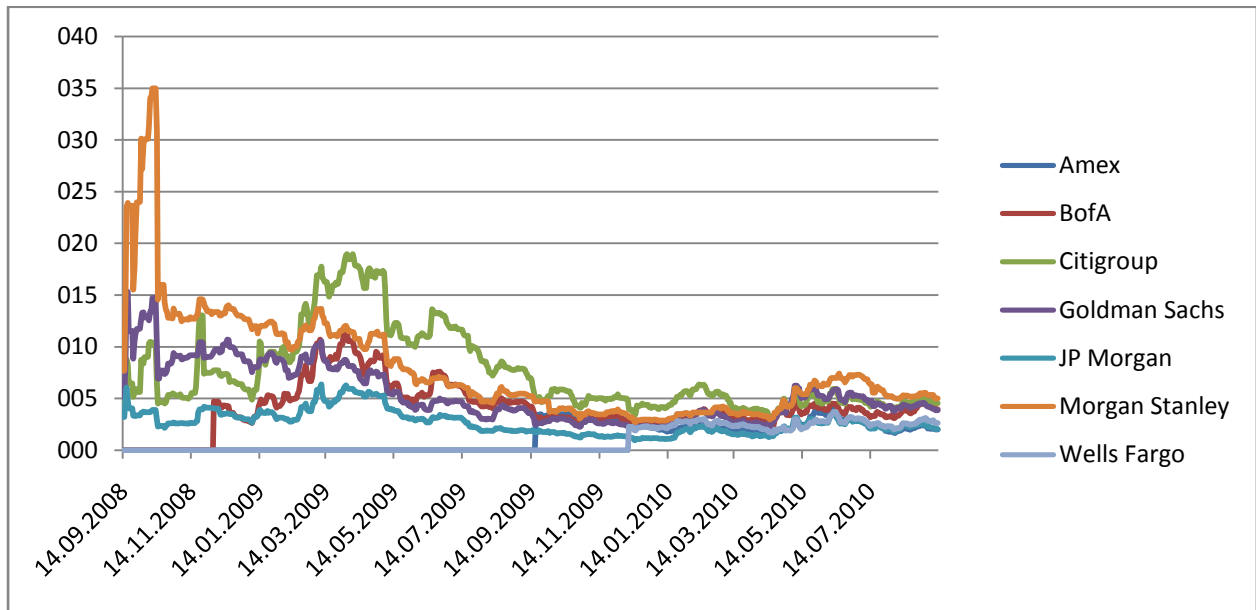


Figure 6 : 3 Year Default Probability Trends for US Banks

* The vertical and horizontal lines in figures 4, 5, and 6 are because of missing data.

4. b. Regression Results

In the second part of our analysis we will regress the default rates calculated in the previous section and regress them with financial data that reflects size. The financial data included is total assets, total shareholders' equity and net income. American Express is not included in this part as we could not reach financial data of that bank.

As a correlation value of 0,41 is calculated between the data of total assets and total shareholders' equity and correlation of 0,16 between total shareholders' equity and net income we did not place total shareholders' equity data with the other two in the same regression. Correlation between total assets and net income is 0,08.

Our regression results are given in the table below. The detailed results are given in the appendix. In the tables dependent variables are coded this way: Dt is cumulative default probability of an obligation at time t, the last two digits symbolize recovery rate. i.e. D100 means default probability in 1 year with zero recovery rates. And, independent variables are:

ASSET: Total Assets,

EQ: Total Shareholders' Equity,

NI: Net Income.

All three financial values are in billion USD.

Dependent Variable	Variable	Coefficient	Significance
D100	C	1,575413	0,0000
	ASSET	-0,000192	0,1954
D100	C	1,122335	0,0000
	EQ	0,001636	0,4178
D100	C	1,342073	0,0000
	NI	-0,021660	0,0812
D200	C	3,292400	0,0000
	ASSET	-0,000424	0,1019
D200	C	2,264415	0,0000
	EQ	0,002633	0,4576
D200	C	2,735958	0,0000
	NI	-0,039645	0,0656
D300	C	4,568599	0,0000
	ASSET	-0,000413	0,2321
D300	C	3,547881	0,0000

Dependent Variable	Variable	Coefficient	Significance
	EQ	0,004042	0,3923
D300	C	4,067905	0,0000
	NI	-0,048805	0,0894
D125	C	2,075871	0,0000
	ASSET	-0,000250	0,1962
D125	C	1,482581	0,0000
	EQ	0,002181	0,4068
D125	C	1,774194	0,0000
	NI	-0,028554	0,0775
D225	C	4,315060	0,0000
	ASSET	-0,000545	0,1032
D225	C	3,112228	0,0000
	EQ	0,003500	0,4445
D225	C	3,602756	0,0000
	NI	-0,051887	0,0620
D325	C	5,961653	0,0000
	ASSET	-0,000521	0,2363
D325	C	4,652558	0,0000
	EQ	0,005380	0,3707
D325	C	5,338843	0,0000
	NI	-0,063559	0,0820

In the table it is seen that there default probability does not have a significant relationship with either total assets or total shareholders' equity. But there is a negative relationship between default probability and net income with 10% significance level.

In the second part of our study we regress default probability with total assets and net income together.

Dependent Variable	Variable	Coefficient	Significance
D100	C	1,632140	0,0000
	ASSET	-0,000174	0,2380
	NI	-0,020616	0,0973
D200	C	3,392234	0,0000
	ASSET	-0,000391	0,1290
	NI	-0,037265	0,0830
D300	C	4,693274	0,0000
	ASSET	-0,000373	0,2806
	NI	-0,046537	0,1059
D125	C	2,150711	0,0000

Dependent Variable	Variable	Coefficient	Significance
	ASSET	-0,000226	0,2395
	NI	-0,027198	0,0930
D225	C	4,445875	0,0000
	ASSET	-0,000502	0,1319
	NI	-0,048829	0,0786
D325	C	6,124300	0,0000
	ASSET	-0,000468	0,2865
	NI	-0,060710	0,0973

In this part we can again claim that there is a significant relationship between default probability and net income but we cannot say the same for total assets. Only in the case of D300 the significance is slightly bigger than 10% but that can be disregarded.

Next, we calculate ROA (Return on Assets) values which is equal to “Net Income/Total Assets”:

Dependent Variable	Variable	Coefficient	Significance
D100	C	1,345134	0,0000
	ROA	-0,350940	0,1188
D200	C	2,739632	0,0000
	ROA	-0,645542	0,1008
D300	C	4,066324	0,0000
	ROA	-0,0771425	0,1416
D125	C	1,778625	0,0000
	ROA	-0,464116	0,1132
D225	C	3,608244	0,0000
	ROA	-0,847473	0,0952
D325	C	5,338591	0,0000
	ROA	-1,011528	0,1297

Although in this part significance levels are slightly more than 10% except in the case of D225 we can still say that there is a strict negative relationship between profitability of a bank and its default probability.

5 Conclusion

In our study we have tried to find an answer to the question whether there is a relationship between banks' size and the risk, markets attribute to them. We have calculated default probabilities of banks with the help of CDS market data which are determined by markets. In this part we have concluded that default probabilities reflect market in a realistic manner.

Proceeding to the second part of our analysis, we have regressed default probabilities of banks in one, two, and three years with financial data that reflect size of the banks. We have considered both zero and 25% recovery rates to see whether there is a difference.

We have chosen three financial values which are total assets, total shareholders' equity and net income. In the first part we have regressed the financial values one by one. In the second part we have regressed total assets and net income together. We did not include total shareholders' equity as it had high correlation with the other variables.

As a result we could not reach a conclusion that tells us there is a significant relationship between the size of a bank and default probability of it. On the other hand we have reached an interesting and important result. Although it seems there is not a significant relationship between the default probability and size, there seems to be a significant relationship between default probability and profitability of a bank.

As a conclusion we can say that markets do not take into account how big a bank is but how profitable it is. So we propose the new concept of 'Too Profitable to Fail' instead of TBTF.

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APPENDIX

Results for Zero Recovery Rates:

Dependent Variable: D100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.575413	0.268587	5.865565	0.0000
ASSET	-0.000192	0.000148	-1.299614	0.1954
R-squared	0.009145	Mean dependent var		1.251428
Adjusted R-squared	0.003731	S.D. dependent var		1.362141
S.E. of regression	1.359597	Akaike info criterion		3.463006
Sum squared resid	338.2765	Schwarz criterion		3.497821
Log likelihood	-318.3281	Hannan-Quinn criter.		3.477116
F-statistic	1.688996	Durbin-Watson stat		0.648066
Prob(F-statistic)	0.195368			

Dependent Variable: D100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.122335	0.187940	5.971769	0.0000
EQ	0.001636	0.002015	0.812028	0.4178
R-squared	0.003590	Mean dependent var		1.251428
Adjusted R-squared	-0.001855	S.D. dependent var		1.362141
S.E. of regression	1.363403	Akaike info criterion		3.468597
Sum squared resid	340.1729	Schwarz criterion		3.503411
Log likelihood	-318.8452	Hannan-Quinn criter.		3.482706
F-statistic	0.659390	Durbin-Watson stat		0.641331
Prob(F-statistic)	0.417831			

Dependent Variable: D100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.342073	0.112206	11.96083	0.0000
NI	-0.021660	0.012353	-1.753377	0.0812
R-squared	0.016522	Mean dependent var		1.251428
Adjusted R-squared	0.011148	S.D. dependent var		1.362141
S.E. of regression	1.354527	Akaike info criterion		3.455533
Sum squared resid	335.7580	Schwarz criterion		3.490348
Log likelihood	-317.6368	Hannan-Quinn criter.		3.469643
F-statistic	3.074331	Durbin-Watson stat		0.678589

Prob(F-statistic) 0.081212

Dependent Variable: D200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.292400	0.472997	6.960723	0.0000
ASSET	-0.000424	0.000258	-1.644155	0.1019
R-squared	0.015127	Mean dependent var		2.570326
Adjusted R-squared	0.009531	S.D. dependent var		2.354608
S.E. of regression	2.343360	Akaike info criterion		4.552221
Sum squared resid	966.4748	Schwarz criterion		4.587971
Log likelihood	-403.1476	Hannan-Quinn criter.		4.566718
F-statistic	2.703245	Durbin-Watson stat		0.623769
Prob(F-statistic)	0.101929			

Dependent Variable: D200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.364415	0.328214	7.203885	0.0000
EQ	0.002633	0.003537	0.744479	0.4576
R-squared	0.003139	Mean dependent var		2.570326
Adjusted R-squared	-0.002525	S.D. dependent var		2.354608
S.E. of regression	2.357578	Akaike info criterion		4.564319
Sum squared resid	978.2387	Schwarz criterion		4.600069
Log likelihood	-404.2244	Hannan-Quinn criter.		4.578817
F-statistic	0.554250	Durbin-Watson stat		0.612194
Prob(F-statistic)	0.457579			

Dependent Variable: D200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.735958	0.196765	13.90470	0.0000
NI	-0.039645	0.021397	-1.852785	0.0656
R-squared	0.019131	Mean dependent var		2.570326
Adjusted R-squared	0.013558	S.D. dependent var		2.354608
S.E. of regression	2.338591	Akaike info criterion		4.548146
Sum squared resid	962.5452	Schwarz criterion		4.583897
Log likelihood	-402.7850	Hannan-Quinn criter.		4.562644
F-statistic	3.432812	Durbin-Watson stat		0.658116
Prob(F-statistic)	0.065588			

Dependent Variable: D300

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.568599	0.632917	7.218325	0.0000
ASSET	-0.000413	0.000345	-1.198983	0.2321
R-squared	0.008102	Mean dependent var		3.864003
Adjusted R-squared	0.002466	S.D. dependent var		3.139522
S.E. of regression	3.135648	Akaike info criterion		5.134721
Sum squared resid	1730.483	Schwarz criterion		5.170472
Log likelihood	-454.9902	Hannan-Quinn criter.		5.149219
F-statistic	1.437560	Durbin-Watson stat		0.670172
Prob(F-statistic)	0.232146			

Dependent Variable: D300

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.547881	0.437400	8.111292	0.0000
EQ	0.004042	0.004713	0.857641	0.3923
R-squared	0.004162	Mean dependent var		3.864003
Adjusted R-squared	-0.001496	S.D. dependent var		3.139522
S.E. of regression	3.141870	Akaike info criterion		5.138686
Sum squared resid	1737.357	Schwarz criterion		5.174436
Log likelihood	-455.3430	Hannan-Quinn criter.		5.153183
F-statistic	0.735547	Durbin-Watson stat		0.664447
Prob(F-statistic)	0.392257			

Dependent Variable: D300

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.067905	0.262734	15.48296	0.0000
NI	-0.048805	0.028571	-1.708175	0.0894
R-squared	0.016308	Mean dependent var		3.864003
Adjusted R-squared	0.010719	S.D. dependent var		3.139522
S.E. of regression	3.122650	Akaike info criterion		5.126413
Sum squared resid	1716.166	Schwarz criterion		5.162164
Log likelihood	-454.2508	Hannan-Quinn criter.		5.140911
F-statistic	2.917861	Durbin-Watson stat		0.707550
Prob(F-statistic)	0.089367			

Dependent Variable: D100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.632140	0.269451	6.057280	0.0000
ASSET	-0.000174	0.000147	-1.183787	0.2380
NI	-0.020616	0.012371	-1.666442	0.0973
R-squared	0.024037	Mean dependent var		1.251428
Adjusted R-squared	0.013312	S.D. dependent var		1.362141
S.E. of regression	1.353044	Akaike info criterion		3.458674
Sum squared resid	333.1925	Schwarz criterion		3.510896
Log likelihood	-316.9274	Hannan-Quinn criter.		3.479838
F-statistic	2.241213	Durbin-Watson stat		0.685523
Prob(F-statistic)	0.109256			

Dependent Variable: D200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.392234	0.473754	7.160331	0.0000
ASSET	-0.000391	0.000257	-1.521648	0.1299
NI	-0.037265	0.021375	-1.743363	0.0830
R-squared	0.031940	Mean dependent var		2.570326
Adjusted R-squared	0.020876	S.D. dependent var		2.354608
S.E. of regression	2.329900	Akaike info criterion		4.546238
Sum squared resid	949.9761	Schwarz criterion		4.599864
Log likelihood	-401.6152	Hannan-Quinn criter.		4.567985
F-statistic	2.886941	Durbin-Watson stat		0.667793
Prob(F-statistic)	0.058406			

Dependent Variable: D300

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.693274	0.634639	7.395181	0.0000
ASSET	-0.000373	0.000344	-1.082405	0.2806
NI	-0.046537	0.028634	-1.625220	0.1059
R-squared	0.022850	Mean dependent var		3.864003
Adjusted R-squared	0.011683	S.D. dependent var		3.139522
S.E. of regression	3.121129	Akaike info criterion		5.130977
Sum squared resid	1704.753	Schwarz criterion		5.184602
Log likelihood	-453.6569	Hannan-Quinn criter.		5.152723
F-statistic	2.046153	Durbin-Watson stat		0.713799
Prob(F-statistic)	0.132312			

Dependent Variable: D100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.345134	0.116300	11.56609	0.0000
ROA	-0.350940	0.223928	-1.567204	0.1188
R-squared	0.013244	Mean dependent var		1.251428
Adjusted R-squared	0.007852	S.D. dependent var		1.362141
S.E. of regression	1.356783	Akaike info criterion		3.458861
Sum squared resid	336.8772	Schwarz criterion		3.493676
Log likelihood	-317.9447	Hannan-Quinn criter.		3.472971
F-statistic	2.456129	Durbin-Watson stat		0.664977
Prob(F-statistic)	0.118794			

Dependent Variable: D200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.739632	0.203417	13.46803	0.0000
ROA	-0.645542	0.391292	-1.649770	0.1008
R-squared	0.015229	Mean dependent var		2.570326
Adjusted R-squared	0.009634	S.D. dependent var		2.354608
S.E. of regression	2.343238	Akaike info criterion		4.552117
Sum squared resid	966.3748	Schwarz criterion		4.587868
Log likelihood	-403.1384	Hannan-Quinn criter.		4.566615
F-statistic	2.721742	Durbin-Watson stat		0.642406
Prob(F-statistic)	0.100774			

Dependent Variable: D300

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.066324	0.271639	14.96957	0.0000
ROA	-0.771425	0.522523	-1.476346	0.1416
R-squared	0.012233	Mean dependent var		3.864003
Adjusted R-squared	0.006620	S.D. dependent var		3.139522
S.E. of regression	3.129112	Akaike info criterion		5.130548
Sum squared resid	1723.276	Schwarz criterion		5.166298
Log likelihood	-454.6188	Hannan-Quinn criter.		5.145046
F-statistic	2.179599	Durbin-Watson stat		0.691610
Prob(F-statistic)	0.141638			

Results for 25% Recovery Rates:

Dependent Variable: D125

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.075871	0.349795	5.934541	0.0000
ASSET	-0.000250	0.000192	-1.297239	0.1962
R-squared	0.009112	Mean dependent var		1.654700
Adjusted R-squared	0.003697	S.D. dependent var		1.773958
S.E. of regression	1.770676	Akaike info criterion		3.991351
Sum squared resid	573.7585	Schwarz criterion		4.026166
Log likelihood	-367.2000	Hannan-Quinn criter.		4.005461
F-statistic	1.682828	Durbin-Watson stat		0.646404
Prob(F-statistic)	0.196182			

Dependent Variable: D125

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.482581	0.244739	6.057802	0.0000
EQ	0.002181	0.002623	0.831406	0.4068
R-squared	0.003763	Mean dependent var		1.654700
Adjusted R-squared	-0.001681	S.D. dependent var		1.773958
S.E. of regression	1.775448	Akaike info criterion		3.996735
Sum squared resid	576.8557	Schwarz criterion		4.031550
Log likelihood	-367.6980	Hannan-Quinn criter.		4.010845
F-statistic	0.691236	Durbin-Watson stat		0.639891
Prob(F-statistic)	0.406828			

Dependent Variable: D125

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.774194	0.146099	12.14381	0.0000
NI	-0.028554	0.016085	-1.775214	0.0775
R-squared	0.016929	Mean dependent var		1.654700
Adjusted R-squared	0.011557	S.D. dependent var		1.773958
S.E. of regression	1.763677	Akaike info criterion		3.983431
Sum squared resid	569.2321	Schwarz criterion		4.018246
Log likelihood	-366.4674	Hannan-Quinn criter.		3.997541
F-statistic	3.151385	Durbin-Watson stat		0.677643
Prob(F-statistic)	0.077525			

Dependent Variable: D225

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.315060	0.610931	7.063092	0.0000
ASSET	-0.000545	0.000333	-1.637877	0.1032
R-squared	0.015013	Mean dependent var		3.385978
Adjusted R-squared	0.009417	S.D. dependent var		3.041075
S.E. of regression	3.026723	Akaike info criterion		5.064010
Sum squared resid	1612.345	Schwarz criterion		5.099761
Log likelihood	-448.6969	Hannan-Quinn criter.		5.078508
F-statistic	2.682642	Durbin-Watson stat		0.621951
Prob(F-statistic)	0.103234			

Dependent Variable: D225

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.112228	0.423862	7.342543	0.0000
EQ	0.003500	0.004567	0.766407	0.4445
R-squared	0.003326	Mean dependent var		3.385978
Adjusted R-squared	-0.002337	S.D. dependent var		3.041075
S.E. of regression	3.044626	Akaike info criterion		5.075806
Sum squared resid	1631.476	Schwarz criterion		5.111556
Log likelihood	-449.7467	Hannan-Quinn criter.		5.090303
F-statistic	0.587380	Durbin-Watson stat		0.610691
Prob(F-statistic)	0.444461			

Dependent Variable: D225

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.602756	0.254064	14.18052	0.0000
NI	-0.051887	0.027628	-1.878020	0.0620
R-squared	0.019646	Mean dependent var		3.385978
Adjusted R-squared	0.014076	S.D. dependent var		3.041075
S.E. of regression	3.019597	Akaike info criterion		5.059296
Sum squared resid	1604.762	Schwarz criterion		5.095047
Log likelihood	-448.2774	Hannan-Quinn criter.		5.073794
F-statistic	3.526960	Durbin-Watson stat		0.657277
Prob(F-statistic)	0.062032			

Dependent Variable: D325

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.961653	0.805208	7.403865	0.0000
ASSET	-0.000521	0.000439	-1.188222	0.2363
R-squared	0.007958	Mean dependent var		5.073298
Adjusted R-squared	0.002322	S.D. dependent var		3.993867
S.E. of regression	3.989228	Akaike info criterion		5.616245
Sum squared resid	2800.854	Schwarz criterion		5.651995
Log likelihood	-497.8458	Hannan-Quinn criter.		5.630743
F-statistic	1.411871	Durbin-Watson stat		0.664822
Prob(F-statistic)	0.236347			

Dependent Variable: D325

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.652558	0.556318	8.363124	0.0000
EQ	0.005380	0.005995	0.897472	0.3707
R-squared	0.004556	Mean dependent var		5.073298
Adjusted R-squared	-0.001100	S.D. dependent var		3.993867
S.E. of regression	3.996064	Akaike info criterion		5.619669
Sum squared resid	2810.460	Schwarz criterion		5.655419
Log likelihood	-498.1505	Hannan-Quinn criter.		5.634167
F-statistic	0.805456	Durbin-Watson stat		0.659651
Prob(F-statistic)	0.370693			

Dependent Variable: D325

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.338843	0.334098	15.97986	0.0000
NI	-0.063559	0.036332	-1.749408	0.0820
R-squared	0.017092	Mean dependent var		5.073298
Adjusted R-squared	0.011507	S.D. dependent var		3.993867
S.E. of regression	3.970822	Akaike info criterion		5.606996
Sum squared resid	2775.067	Schwarz criterion		5.642746
Log likelihood	-497.0226	Hannan-Quinn criter.		5.621493
F-statistic	3.060427	Durbin-Watson stat		0.704020
Prob(F-statistic)	0.081964			

Dependent Variable: D125

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.150711	0.350850	6.130000	0.0000
ASSET	-0.000226	0.000192	-1.180096	0.2395
NI	-0.027198	0.016108	-1.688468	0.0930
R-squared	0.024394	Mean dependent var		1.654700
Adjusted R-squared	0.013673	S.D. dependent var		1.773958
S.E. of regression	1.761788	Akaike info criterion		3.986619
Sum squared resid	564.9095	Schwarz criterion		4.038841
Log likelihood	-365.7623	Hannan-Quinn criter.		4.007784
F-statistic	2.275386	Durbin-Watson stat		0.684461
Prob(F-statistic)	0.105673			

Dependent Variable: D225

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.445875	0.611753	7.267431	0.0000
ASSET	-0.000502	0.000332	-1.513887	0.1319
NI	-0.048829	0.027601	-1.769067	0.0786
R-squared	0.032319	Mean dependent var		3.385978
Adjusted R-squared	0.021260	S.D. dependent var		3.041075
S.E. of regression	3.008576	Akaike info criterion		5.057521
Sum squared resid	1584.017	Schwarz criterion		5.111146
Log likelihood	-447.1194	Hannan-Quinn criter.		5.079267
F-statistic	2.922351	Durbin-Watson stat		0.666743
Prob(F-statistic)	0.056438			

Dependent Variable: D325

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.124300	0.807086	7.588164	0.0000
ASSET	-0.000468	0.000438	-1.069014	0.2865
NI	-0.060710	0.036415	-1.667199	0.0973
R-squared	0.023469	Mean dependent var		5.073298
Adjusted R-squared	0.012308	S.D. dependent var		3.993867
S.E. of regression	3.969212	Akaike info criterion		5.611723
Sum squared resid	2757.063	Schwarz criterion		5.665348
Log likelihood	-496.4433	Hannan-Quinn criter.		5.633469
F-statistic	2.102850	Durbin-Watson stat		0.709964
Prob(F-statistic)	0.125183			

Dependent Variable: D125

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.778625	0.151429	11.74559	0.0000
ROA	-0.464116	0.291567	-1.591800	0.1132
R-squared	0.013657	Mean dependent var		1.654700
Adjusted R-squared	0.008267	S.D. dependent var		1.773958
S.E. of regression	1.766610	Akaike info criterion		3.986754
Sum squared resid	571.1268	Schwarz criterion		4.021569
Log likelihood	-366.7748	Hannan-Quinn criter.		4.000864
F-statistic	2.533827	Durbin-Watson stat		0.663889
Prob(F-statistic)	0.113156			

Dependent Variable: D225

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.608244	0.262655	13.73760	0.0000
ROA	-0.847473	0.505240	-1.677366	0.0952
R-squared	0.015735	Mean dependent var		3.385978
Adjusted R-squared	0.010142	S.D. dependent var		3.041075
S.E. of regression	3.025615	Akaike info criterion		5.063278
Sum squared resid	1611.164	Schwarz criterion		5.099028
Log likelihood	-448.6317	Hannan-Quinn criter.		5.077776
F-statistic	2.813557	Durbin-Watson stat		0.641395
Prob(F-statistic)	0.095246			

Dependent Variable: D325

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.338591	0.345426	15.45510	0.0000
ROA	-1.011528	0.664458	-1.522336	0.1297
R-squared	0.012997	Mean dependent var		5.073298
Adjusted R-squared	0.007389	S.D. dependent var		3.993867
S.E. of regression	3.979085	Akaike info criterion		5.611153
Sum squared resid	2786.629	Schwarz criterion		5.646904
Log likelihood	-497.3926	Hannan-Quinn criter.		5.625651
F-statistic	2.317506	Durbin-Watson stat		0.687784
Prob(F-statistic)	0.129720			