Skin in the game: The performance of insured and uninsured municipal debt

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Abstract

We compare the performance of insured and uninsured municipal bonds by looking at changes in the bonds' underlying credit quality. We focus on transitions in the Standard and Poor's ratings of the underlying municipal issuers. We find that the insured bonds have had substantially better underlying rating transition performance than uninsured bonds. In other words, the pure security selection ability of the financial guarantors appears to have been positive. We estimate that the financial guarantors' outperformance on their portfolio of insured municipal issues has amounted industry-wide to a value of about $5 Billion since December 2007.

Keywords: Bond insurance, municipal bonds.

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Financial guarantors have played a central role in the ongoing credit crisis. At their peak, they insured approximately half of all municipal issues as well as billions of dollars of structured products based on residential mortgages. The collapse of the financial guarantee industry has had an impact throughout the financial system, and the financial guarantors have earned their place among the magnets of blame for the entire crisis. We ask a very simple question about the financial guarantors: given that their core business was insuring municipal debt, how good were they at selecting which municipal issues to insure? Our conclusions lead us to have some sympathy for the embattled guarantors. Although the guarantors were massively levered, and as an industry they made an unfortunate detour into insuring non-municipal products, their pure security selection ability with respect to municipal issues appears to have been positive.

This conclusion is based on an assessment of the underlying credit quality of the municipal portfolios that the guarantors have insured. We find that, controlling for the underlying rating, the bonds insured by financial guarantors have better ratings transition performance than uninsured bonds. We use the underlying ratings of the municipal bond issuers, rather than the enhanced ratings of the bonds. The underlying rating reflects that credit quality of the municipal issuer, while the enhanced bond rating reflects the joint credit quality of the financial guarantor and the issuer. The default performance between insured and uninsured debt is not distinguishable, a fact attributable to the miniscule default frequency (so far) among municipal issues. Using ratings transitions, however, we can place a dollar magnitude on the value of the guarantors' outperformance: we estimate that the financial guarantors' outperformance between December of 2007 and September of 2010 amounted to about $5 Billion across the industry, or about 43 basis points of the $1.3 Trillion insured portfolio. Scaled

differently, security selection has amounted a total equivalent to 30 percent of the S&P-estimated $18 Billion in guarantors' capital as of December 2007.

These numbers, based on transitions in the underlying credit quality of the insured and uninsured portfolios, don't necessarily tell us about the profitability of the bond insurers' municipal finance businesses. We do not know, bond by bond, how much the guarantors charged for the insurance they provided. But our results do allow us to reject some interesting hypotheses. For one thing, the period since the credit crisis has seen a particularly persistent phenomenon where the yields on insured debt, controlling for credit rating, have exceeded the yields on uninsured debt (see Bergstresser et al, 2010). One potential explanation for this phenomenon would be that the credit quality of insured debt, controlling for rating, has been lower than the credit quality of uninsured debt. By this argument, low-quality issuers would have been more likely to need to get insurance, or to have their investors demand it (see Butler et al, 2009, who find that issuers in more corrupt locations are more likely to get insurance) Our results suggest that, on net, controlling for rating, the opposite seems to have held. The ratings transition performance of the insured bonds has been better than the uninsured.

Because insurance status predicts subsequent ratings transitions, our results also allow us to reject the hypothesis that credit ratings conveyed all information available to market participants. Similar to analyses by Adelino (2010) and Ashcraft et al (2009) who analyze the market for MBS, we find that additional information, available at the point of bond issuance, has some predictive power for subsequent bond performance.

One persistent criticism of the credit rating industry has been that the ratings firms have no 'skin in the game'. The ratings agencies offer ratings but have only reputational capital at risk

based on the performance of the rated bonds. Financial guarantors are the polar opposite – they 'rate' a bond by taking exposure to the bond's credit risk. The performance of the insured bonds over the crisis period leads us to conclude that this 'skin in the game' seems to matter. The insured portfolios perform substantially better than would have been the outcome of a ratings-matched dartboard approach.

The financial guaranty industry has been criticized from many different sides recently. Critical accounts of the industry have highlighted accounting practices, investment policies, and practices with respect to off-balance sheet. We don't challenge any of this criticism. We ask and answer a very narrow question. The financial guarantors, when it came to insuring municipal securities, appear to have had some security selection ability.

This paper proceeds in four sections. Section 1 describes the credit rating and financial guarantee industries. Section 2 describes our hypothesis tests. Section 3 describes our data. Section 4 presents our results. A brief final section concludes.

1. The credit rating and financial guaranty industry

The financial guarantors go back to 1971, when the American Municipal Bond Insurance Corporation, a predecessor of Ambac, insured a local bond issue in Alaska. MBIA's predecessor began in 1975. The growth of the industry was boosted by the 1975 New York City default crisis and the 1983 default at the Washington State Public Power Supply System. The industry grew to insure roughly half of municipal debt by the mid 2000s, and was an oligopoly, with MBIA, Ambac, FGIC, CFIG, FSA, AGC, and ACA insuring the bulk of the debt. **Table 1** shows the total municipal universe, and the amounts insured by different issuers. Of the $3.4

Trillion in municipal debt outstanding in September 2010, approximately $1.3 Trillion was insured. Bond insurance has been a broad phenomenon – issuers at all levels and throughout the country have chosen to issue bonds with bond insurance attached.

With the rapid growth of structured finance, in particular securities tied to subprime mortgages in the 2000s, the bond insurers branched out into insuring structured products based on residential mortgages. **Table 2** shows the aggregate result of this shift. As of December 2006, on the eve of the crisis in structured finance, the bond insurers collectively had insured $823 Billion worth of structured finance instruments. Of this total, $200 Billion were directly tied to mortgages, whether in the US or abroad. This exposure has adversely impacted the financial guarantors, leading to ratings downgrades and even bankruptcies. This expansion into guaranteeing CDOs and RMBS was ill-timed, and may even have been ill-considered. The bond insurers have been criticized from all sides, and even blamed for the severity of the ongoing credit crisis. In this paper we neither challenge nor add to any of this criticism. We ask a very simple question: when it came to their selection ability with respect to their municipal portfolios, were they able to do better than a ratings-matched dartboard approach.

2. Hypotheses

We test the null hypothesis that the distribution of transitions in the underlying credit quality does not differ between insured and uninsured municipal debt. Our measure of underlying credit quality is based on the SPUR, or Standard and Poor's Underlying Rating. **Figure 1** shows the official statement from a recent municipal issue, where the first lines highlight both the rating of the instrument (AAA) and the S&P rating of the credit quality of the underlying credit (A). Bond insurance from Assured Guaranty leads the credit rating assigned to the issue to exceed the credit rating of the issuer. We take the S&P underlying rating as a

measure of issuer credit quality, and for issues that are not insured we impute a SPUR equal to the rating of the issuer. We also test the hypothesis that default probabilities are the same between insured and uninsured debt. This test has much less power: while ratings transitions are rather common among municipal issuers, at least to this point defaults have been exceedingly rare.

3. Data

Data for this study are compiled from several sources. The first source is Mergent, which has data on the bond characteristics, including the issuer, the issuance and maturity dates, whether the bond was insured, and the identity of the insurer. Mergent also identifies whether the bond was insured in the primary or secondary market; most municipal debt that is insured is sold with insurance at issuance, but there is also a smaller secondary market for insuring municipal debt. All of our results that follow include only bonds identified by Mergent as being insured in the primary market rather than the secondary market. Our rationale for this restriction is that purchasing bond insurance in the secondary market potentially reflects events that have happened to the issuer since issuance. Because excluding the bonds that Mergent lists as secondary market-insured is likely to exclude a large set of bonds that were issued without insurance but then subsequently insured after negative events, we view this exclusion as conservative with respect to our conclusion that the insurers collectively have good security selection at bond issuance.

We merge the Mergent data with ratings data from Standard and Poor's. Standard and Poor's ratings include both ratings for the instrument, and for many issuers of insured

instruments, ratings for the underlying issuer (SPURs, or Standard & Poor's Underlying Ratings.) For uninsured issues, we impute a SPUR equal to the rating of the instrument.

Table 3 describes the sample of bonds used in the analysis. The analysis starts with the Mergent sample of 2,694,906 bonds. The average size of the bonds in the sample is $2.769 million, and the average maturity is 9.92 years. The average yield at issuance was 4.288 percent. We calculate a spread measure by matching the month and maturity of issuance of the bond to the Bloomberg-reported AAA municipal yield curve; the average spread for all bonds in the sample was 38.4 basis points over that benchmark. 43.3 percent of the bonds were unlimited-tax General Obligation bonds, meaning that the bonds were backed by the taxing ability of the local or state authority that issued them. 20.3 percent of the bonds were revenue bonds, where the instruments were backed only by the revenue from a specific project. The residual bonds include limited-tax GO bonds, bonds backed by tobacco settlements, loan agreements, education loans, and other types of municipal borrowing. 63.7 percent of bonds were new bonds, the remainder were 'refunding' bonds issued to retire existing debt. 46.1 percent of the bonds were insured, and for 36.8 percent of the bonds we have or are able to impute a credit rating for the underlying issuer.

Comparing the insured and uninsured bonds, the insured bonds have an average spread of 24.8 basis points while the uninsured were issued at an average spread of 52 basis points. The insured bonds tended to be smaller in size than the uninsured bonds, and the average maturity of the two subsamples is the same. Our analysis, based on ratings transitions, is limited to the sample for which we have S&P rating data. For this subsample, we must be careful to be specific about the credit rating of the instrument versus the credit rating of the issuer. 149,415 bonds were issued by AAA-rated issuers. Of these, only 1,675 were sold with bond insurance.

The mean spread of insured bonds issued by AAA-underlying issuers was 16.7 basis points, significantly lower than the 29.5 basis point mean spread of uninsured bonds issued by AAA-underlying issuers. The sample of AAA-rated bonds is much larger – these 593,179 bonds include both the bonds who owed their AAA rating to the underlying credit quality of the issuer and the bonds that owed their AAA rating to the insurance wrap.

The remainder of the sample includes 412,890 bonds issued by AA-rated underlying issuers, 358,340 bonds issued by A-rated underlying issuers, and 71,452 bonds issued by BBB-rated underlying issuers. Not surprisingly, the wedge between the average spread of insured and uninsured issues goes up at the lower credit ratings – among the BBB-rated underlying issuers the average spread on uninsured issues is 97.3 basis points and the average spread on insured issues was 33.4 basis points. The A-rated and BBB-rated underlying issuers were much more likely to sell bonds with insurance than the AAA-rated and AA-rated underlying issuers.

4. Tests

Our first empirical analysis looks at monthly ratings transitions for the underlying credit ratings of the issuers, over the period between 1990 and September, 2010. We take our sample of S&P-rated bonds and issuers and construct an unbalanced panel of 63,014,771 monthly observations. We divide these observations into three buckets, upgrades, no-change observations, and downgrades. Our results are not sensitive to condensing the set of transitions to three; our estimation of the empirical magnitude of the insurer outperformance that follows in Table 11 is based on the entire transition matrix.

Among the entire sample, 98.31 percent of monthly observations were associated with no change in the credit quality of the underlying issuer. 1.062 percent of month-bond observations

saw a downgrade, and 0.628 percent of observations saw an upgrade. Months with upgrades were 37.2 percent of all of the months with changes. Among the uninsured bonds, 0.443 percent of observations saw an upgrade, and 1.023 percent of observations saw a downgrade. The upgrade ratio was 30.2 percent versus 37.2 percent in the entire sample.

To assess the statistical significance of the insurer outperformance we regress the monthly change categorical variable on a dummy variable for uninsured status, the bottom panel of **Table 4** shows the coefficients and t-statistics from models with different sets of additional controls. The first model has no covariates other than the dummy for uninsured bonds, and the coefficient estimate is 0.0033. Assuming that all changes are by one notch, this coefficient estimate implies that over a 5-year (60-month) period the issuer of an uninsured bond, in expectation, would have 6*0.0033 = 0.198 notches worth of downgrade relative to the underlying credit rating of an insured bond. Model 2 includes controls for month; downgrades are concentrated in time in certain months, particularly recent months. Controlling for the month raises the coefficient on the insurance dummy from 0.0033 to 0.0042. Controlling for the interaction of month and bond type (GO, revenue, etc) leads to a coefficient of 0.0035. All of our t-statistics are adjusted for clustering at the level of the issue. Municipal debt is typically issued in a series, with multiple bonds in an issue, and downgrades often happen at the issue level rather than for just one bond. The overall pattern of results is highly significant regardless of the clustering approach.

There are 28,176,036 month-bond observations identified by Mergent as carrying bond insurance. Among these observations, the probability of upgrade is 0.857 percent and the probability of downgrade is 1.11 percent. There is much lower rating stability among the insured sample, in the sense that both upgrades and downgrades are more likely than in the uninsured

sample. The upgrade ratio is 43.6 percent, versus 30.2 percent among the uninsured sample. Because the insured and uninsured dummy variables are complements, the coefficients and t-statistics for the insured dummy variables are just the opposite of the uninsured variables in the earlier column.

We also focus on the 19,663,141 observations insured by the highly troubled insurers. The financial guarantors cleave neatly into two groups – those whose credit ratings have been cut below investment grade, including MBIA, Ambac, FGIC, CIFG, and XL, and those who are less financially troubled. The less troubled insurers include only Assured Guaranty and FSA, which have merged since the start of the financial crisis. The Berkshire Hathaway-sponsored guarantor, BHAC, entered the market after the credit crisis had hurt the incumbents. BHAC initially had a high credit rating. The pure security-selection performance of the troubled insurers has been particularly good: the upgrade ratio in the troubled insurer sample is 47.4 percent, versus 30.2 percent among the uninsured bonds. This result is highly significant as well.

Table 5 looks in detail at the performance of individual insurers. The pattern that emerges suggests that, on the whole, the troubled insurers each appear to have had some selection ability, at least controlling for timing and bond type. Focusing on the less-troubled guarantors, we find a pattern of evidence that could be consistent with two different hypotheses. Specifically, Berkshire Hathaway appears to have much worse security selection performance than the other insurers in the sample. No matter what set of controls we use, the Berkshire Hathaway dummy carries a large and significant coefficient in the downgrade regression. This pattern of results is consistent with Berkshire Hathaway entering the bond insurance market naively and doing a poor job of picking securities to insure. It could also be consistent, however, with a particular pattern of data errors in the Mergent data on bond insurance. While we

discarded observations listed by Mergent as having been insured in the secondary market, if bonds insured by BHAC in the secondary market were incorrectly listed by Mergent as having been insured in the primary market, then they would have remained in our sample. If bonds where the underlying issuers had experienced negative ratings transitions were disproportionately likely to get secondary insurance from Berkshire Hathaway (and get it after the negative events), and the Mergent data on these bonds were to incorrectly list BHAC as the insurer in the primary market, then Berkshire Hathaway's reported security selection performance would look, in our empirical analysis, worse than it really has been. Although Mergent is a well-regarded source of municipal bond data, used both by practitioners and academics, the scale of the apparent underperformance of the BHAC-insured portfolio leaves us at least open to the possibility of some mis-coding. On the other hand, given BHAC's status as a new entrant to the field of bond insurance, we are open to the possibility that their security selection performance has actually been truly dismal. Because of this uncertainty about the BHAC-insured bonds (which amount to only 11,804 monthly observations out of 63,000,000 total), we view our overall empirical results in Table 4 to potentially slightly underestimate the collective outperformance of the bond insurance industry.

Table 6 looks more closely at the underlying ratings transitions among the AA-rated subset of underlying municipal issuers. Here our results are the weakest: in the model with no covariates the dummy on insurance is slightly positive and statistically significant. With controls for month and controls for month-by-bond type, which we view as more reliability indicating security selection ability, the coefficient for the all-insurer dummy is negative and significant. For the troubled-insurer subset, the coefficient is negative and statistically significant regardless of the pattern of additional controls used. **Tables 7 and 8** look more closely at the bonds with

underlying ratings of A and BBB. In each of these subsamples, no matter what pattern of controls is used, and no matter whether the subset of insurers includes all of them or just the troubled insurers, the coefficients on the insurance dummies are negative and statistically significant. An interesting pattern emerges in the results across Tables 2, 4, 5, and 6. In the Model 3 specification in Table 2, the coefficient on the insurance dummy is -0.0035. This coefficient implies a net downgrade of 0.21 notches over a 5-year period for a bond. When the Model 3 specification is fit separately by underlying credit rating, the coefficients on the insurance dummy fall but remain statistically significant. In the A-rated subsample, the estimated coefficient is -0.0015, implying a (still economically significant) net downgrade of 0.09 excess notches for the uninsured sample over a 5-year horizon.

Table 9 takes a slightly different empirical approach. Rather than creating monthly observations for each bond, we use one observation for each bond and use a dependent variable which reflects the lifetime transition experience (through September 2010) of each underlying credit rating. Our t-statistics still reflect clustering at the issue level, and our observation cound falls to just under 1,000,000, of which about half are insured. Here the pattern of results is the same, and the economic magnitude of the results is similar to the earlier results as well. The lifetime outperformance of the underlying credit quality of insured bonds over uninsured bonds amounts to an average of 0.225 notches for the entire insured sample based on the model with no covariates. Model 2 in this case includes dummy variables for each year that the bond was outstanding, reflecting the fact that exposure to certain years has carried a much greater chance of downgrade than others. Model 3 includes dummies for exposure to each year as well as dummy variables capturing bond type. Each of these models implies outperformance among the insured bonds, suggesting security selection ability on the part of the insurers.

Table 10 focuses specifically at general obligation bonds, which are backed by the taxing authority of the state or local issuer. We find similar results within this subsample, and indeed within all of the major subtypes of municipal debt; the outperformance of insured debt appears to be a broad phenomenon. **Table 11** reflects our attempt to place a dollar value on the outperformance of the insured subsample. We start with the December 2007 distribution of credit ratings of uninsured bonds, listed in columns (1) and (2). We then estimate the entire transition matrix of underlying credit quality separately for the insured and uninsured bonds in our sample over the period between December 2007 and September 2010, the last date for which we have data. Columns (3) and (4) reflect (counterfactual) outcome credit rating distribution that would have applied had the transition matrix estimated on the uninsured sample was applied to the starting distribution of insured bonds. Columns (5) and (6) apply the transition matrix estimated on the insured sample. We then take these estimated distributions, and make a value impact estimate by using the September 2010 yields for 10-year maturity municipal bonds of different credit rating, taken from Bloomberg. We estimate a value loss versus the AAA benchmark by assuming an 8-year duration, meaning that we multiply the difference in spreads between each rating level and the AAA spread by -8 to get a hypothetical value impact. Using the AAA point as a benchmark is not terribly consequential since our goal is to compare the value impact using the insured and uninsured transition matrices to each other, rather than to any absolute benchmark. Columns (9) and (10) give a 'contribution to loss' for each transition matrix, leading us to conclude that applying the uninsured bond transition matrix to the insured bond starting point would have led to a loss 43 basis points larger than for the insured sample. With $1.3 Trillion in insured debt outstanding, 43 basis points of outperformance amounts to approximately $5 Billion. S&P in December 2007 estimated that the financial guarantors

collectively had $18 Billion in capital; our results would suggest that the outperformance based on their municipal security selection was large relative to their starting capital – a fact that reflects both the guarantors' security selection ability and the astonishing leverage at which they operated.

Table 12 is our final exercise; we look at differences in default experience over the period between the insured and uninsured bonds. We take default data from Mergent's record of defaults, a record that captures default regardless of whether a financial guarantor stepped in to cover bond payments. We fit 4 different models, each with a different set of control variables. Column 1 has no controls; column 2 controls for the initial underlying credit rating; column 3 controls for the initial rating interacted with bond type; column 4 uses the set of controls in column 3 as well as dummy variables for the periods that the bond was outstanding. All specifications report standard errors adjusted to account for issue-level clustering. Across the board, the pattern is reasonably clear. The background rate of default among municipal bonds is extremely low – the constant estimate is 0.000514. And there does not appear to be any statistically significant difference in the default performance experience between insured and uninsured issues.

5. Conclusion

This paper compares the performance of insured and uninsured municipal bonds by looking at changes in the bonds' underlying credit quality. We focus on transitions in the Standard and Poor's ratings of the underlying municipal issuers. The results suggest that insured bonds have had substantially better underlying rating transition performance than uninsured bonds. In other words, the pure security selection ability of the financial guarantors appears to

have been positive. We estimate that the financial guarantors' outperformance on their portfolio of insured municipal issues has amounted industry-wide to a value of about $5 Billion since December 2007.

The financial guarantors operated at high levels of leverage, poor levels of disclosure, and collectively made an astonishing and ill-starred departure into guaranteeing structured products based on residential mortgages – a departure that has now sunk or is sinking most of the industry. They appear to have rightly earned a leading place among the magnets for blame for the current credit crisis. In this paper, however, we find some evidence that in at least one activity they seem to have beat the dartboard test (and the rating agencies as well) – they appear to have had positive security selection ability in their choice of which municipal securities to insure.

The future of the financial guarantee industry is cloudy at best. But with all of the criticism of the rating agencies for their lack of 'skin in the game', it is interesting to find that the financial guarantors – who if anything had excessive levels of skin in the game – appear to have outperformed the rating agencies in evaluating municipal debt at issuance.

References

Adelino, Manuel, 2009, 'Do investors rely only on ratings? The case of mortgage-backed securities,' working paper, MIT Sloan School of Management.

Ashcraft, Adam, Paul Goldsmith-Pinkham, and James Vickery, 2010, 'MBS ratings and the mortgage credit boom,' working paper, Federal Reserve Bank of New York.

Becker, Bo, and Todd Milbourn, 2010, 'How did increased competition affect credit ratings?' working paper, Harvard Business School.

Bolton, Patrick, Xavier Freixas, and Joel Shapiro, 2010, 'The credit ratings game,' working paper, Columbia Business School.

Bongaerts, Dion, K.J. Martijn Cremers, and William N. Goetzmann, 2009, 'Multiple ratings and credit spreads,' working paper, University of Amsterdam.

Cantor, Richard, Owain ap Gwilym, and Stephen Thomas, 2007, 'The use of credit ratings in investment management in the U.S. and Europe,' Journal of Fixed Income, pp. 13-26.

Cantor, Richard, and Christopher Mann, 2007, 'Analyzing the tradeoff between ratings accuracy and stability,' Journal of Fixed Income, pp 60-68.

Cantor, Richard, and Frank Packer, 1995, 'The credit rating industry,' Journal of Fixed Income, pp. 10-34.

Cantor, Richard, and Frank Packer, 1997, 'Differences of opinion and selection bias in the credit rating industry,' Journal of Banking and Finance 21, pp. 1395- 1417.

Covitz, Daniel M. and Paul Harrison, 2003, 'Testing conflicts of interest at bond ratings agencies with market anticipation: Evidence that reputation incentives dominate,' working paper, Federal Reserve Board.

Dranove, David and Ginger Zhe Jin, 2010, 'Quality disclosure and certification: Theory and practice,' Journal of Economic Literature, forthcoming.

Griffin, John M. and Dragon Yongjun Tang, 2009, 'Did subjectivity play a role in CDO credit ratings?' working paper, University of Texas at Austin.

Jafry, Yusuf, and Til Schuermann, 2004, 'Measurement, estimation, and comparison of credit migration matrices,' Journal of Banking and Finance.

Mariano, Beatriz, 2008, 'Do reputational concerns lead to reliable ratings?' working paper, University Carlos III of Madrid.

Moon, C. G. and J. G. Stotsky, 1993, 'Testing the differences between the determinants of Moody's and Standard & Poor's ratings,' Journal of Applied Econometrics 8, pp. 51-69.

Nanda, Vikram and Rajdeep Singh, 2004, 'Bond insurance: What is special about munis?' Journal of Finance 59:5, pp. 2253-2279.

Neale, Faith R. and Pamela Peterson Drake, 2009, 'Financial guarantee insurance: Arrogance or ignorance in an era of exuberance,' working paper, University of North Carolina at Charlotte.

Pottier, Steven W. and David W. Sommer, 1999, 'Property-liability insurer financial strength ratings: Differences across rating agencies,' Journal of Risk and Insurance 66:4, pp. 621-642.

Richard, Christine, 2010, Confidence game: How a hedge fund manager called Wall Street's bluff, John Wiley and Sons, Hoboken.

Sylla, Richard, 2001, 'A historical primer on the business of credit ratings,' chapter in Reinhart et al.

White, Lawrence J., 2001, 'The credit rating industry – an industrial organization analysis,' chapter in Reinhart et al.

Table 1. Total and Insured Municipal Debt ($Billions), by State and Insurer.

State	Total	Insured	Ambac	MBIA	FGIC	FSA	Radian	Assured	Other	XL	BHAC*	Other
California	541.60	239.23	42.83	90.68	35.84	51.65	1.28	10.09	6.89	5.20	0.23	1.46
New York	339.63	110.50	19.11	38.78	16.84	26.16	0.74	3.87	5.01	2.98	0.37	1.66
Texas	293.39	91.71	17.87	28.94	10.64	19.90	2.25	8.56	3.56	2.11	0.46	0.99
Florida	173.89	92.99	18.71	34.62	12.16	17.93	0.58	5.76	3.23	2.07	0.41	0.75
Illinois	157.38	88.76	13.49	31.45	13.71	23.18	0.42	3.44	3.08	2.10	0.17	0.81
Pennsylvar	139.43	66.79	9.48	16.40	9.29	21.85	1.11	5.15	3.50	2.06	0.25	1.19
New Jersey	124.05	66.45	11.72	24.71	7.50	17.73	0.31	2.71	1.78	1.25	0.00	0.53
Ohio	102.23	33.06	5.81	10.75	4.97	8.16	0.35	1.96	1.07	0.72	0.00	0.35
Massachus	94.64	33.83	7.53	10.21	3.68	9.54	0.36	1.12	1.40	0.94	0.00	0.46
Puerto Ric	85.95	25.93	5.66	9.04	4.37	4.60	0.00	0.97	1.29	0.48	0.00	0.81
Other	1376.72	512.47	90.32	175.20	66.15	125.14	4.90	26.18	24.56	15.87	2.47	6.22
Total	3428.91	1361.72	242.53	470.78	185.15	325.84	12.30	69.81	55.37	35.78	4.36	15.23

Source: Bloomberg, accessed September 2010. Totals for states include issuance at state level and by jurisdictions within each state.

* Berkshire Hathaway Assurance Corp.

Table 2. Obligations insured by financial guaranty industry, December 2006.

(amounts in millions)		
Public Finance (principal insured)		
	General Obligation	463,564
	Tax-backed revenue	200,426
	Utility revenue	202,481
	Health care revenue	95,337
	Transportation revenue	109,862
	University revenue	67,871
	Housing revenue	38,337
	Student loan	27,697
	International	84,643
	Other	57,564
	Total Public Finance	$1,347,783
Structured Finance (principal insured)		
	Mortgage-backed - US	$154,889
	Other asset-backed - US	379,828
	Mortgage-backed - International	46,646
	Other asset-backed - International	154,673
	Investor-owned utility obligations	49,609
	Other - US	27,584
	Other - International	10,505
	Total Structured Finance	823,735
Total Par		$2,171,518
Net Financial Guarantees in Force (Principal and Interest)		$3,259,189

Source: AFGI 2006 Annual Report.

Source: AFGI 2006 Annual Report. See www.afgi.org/fin-annualrept06.html

Table 3. Characteristics of municipal bond sample.

Sample starts with Mergent municipal bond database, which provides data on bond size, maturity, yield, security (general obligation, revenue, etc), insurance status and insurer. Rating data for the bond and underlying issuer come from S&P. For uninsured bonds for which S&P reports only the instrument credit ratings, we impute an underlying rating equal to the instrument rating.

Group	Count	Average size ($M)	Average maturity	Average yield	Average spread*	GO bond	Revenue bond	New bond	Insured bond	Bond has SPUR**
All bonds	2694906	2.769	9.920	4.288	0.384	0.433	0.203	0.637	0.461	0.368
Insured	1242291	2.155	9.900	4.215	0.248	0.465	0.219	0.614	1.000	0.361
Uninsured	1452615	3.294	9.940	4.359	0.520	0.406	0.189	0.657	0.000	0.375
Have S&P underlying rating	992814	3.662	10.100	4.139	0.349	0.425	0.210	0.644	0.452	1.000
Have S&P bond rating	993628	3.663	10.100	4.139	0.348	0.425	0.210	0.644	0.452	0.999
AAA underlying	149415	4.024	11.050	4.202	0.293	0.538	0.149	0.645	0.011	1.000
AAA underlying + insured	1675	5.737	11.810	4.069	0.167	0.587	0.176	0.639	1.000	1.000
AAA underlying, uninsured	147740	4.005	11.040	4.204	0.295	0.537	0.148	0.645	0.000	1.000
AAA bonds	593179	3.189	10.370	4.052	0.267	0.450	0.209	0.633	0.733	0.999
AA underlying	412890	4.093	9.780	4.044	0.321	0.447	0.201	0.649	0.355	1.000
AA underlying, insured	146767	3.679	10.240	3.970	0.225	0.435	0.203	0.627	1.000	1.000
AA underlying, uninsured	266123	4.321	9.530	4.090	0.381	0.454	0.199	0.661	0.000	1.000
AA bonds	270865	4.267	9.560	4.097	0.383	0.451	0.198	0.661	0.028	1.000
A underlying	358340	3.161	9.990	4.153	0.360	0.365	0.246	0.635	0.713	1.000
A underlying, insured	255358	2.482	10.120	4.017	0.273	0.401	0.251	0.628	1.000	1.000
A underlying, uninsured	102982	4.846	9.690	4.546	0.626	0.275	0.235	0.654	0.000	1.000
A bonds	101246	4.654	9.780	4.580	0.635	0.264	0.240	0.660	0.041	0.996
BBB underlying	71452	2.884	10.460	4.467	0.555	0.362	0.210	0.659	0.621	1.000
BBB underlying, insured	44364	1.971	10.470	4.171	0.334	0.465	0.189	0.671	1.000	1.000
BBB underlying, uninsured	27088	4.379	10.430	5.010	0.973	0.193	0.245	0.639	0.000	1.000
BBB bonds	27761	4.141	10.700	5.002	0.955	0.213	0.238	0.651	0.075	0.998

* spread calculated against Bloomberg-reported fair-value AAA curve for matching maturity in month of bond issuance

** includes imputed SPURs; for observations with no bond insurance and with a S&P rating for the instrument, we assume that the SPUR is equal to the S&P rating for the instrument.

Table 4. Monthly probability of upgrade and downgrade of underlying credit rating by insured status, 1990-2010.

Sample includes monthly observations of all bonds that have S&P underlying ratings, including imputed underlying ratings for uninsured bonds. Table shows the count of monthly observations, as well as the monthly probability of upgrade and downgrade and the ratio of upgrades to downgrades. The bottom half of the table shows coefficients from regressions of an upgrade (-1)/no change(0)/downgrade (+1) categorical variable on dummy variables for insurance status. Model 1 includes no covariates; model 2 includes dummy variables by month; model 3 includes dummy variables by month interacted with a full set of controls for bond type (revenue, general obligation, limited general obligation, etc.) Reported t-statistics adjusted for issue-level clustering. Insured bonds include all bonds insured by financial guarantors; the troubled insurers include all insurers except for Assured Guaranty, FSA, and BHAC. Sample excludes bonds identified by Mergent as having been insured in the secondary insurance market.

Sample: All bonds		All bonds	Uninsured	Insured	Insured - troubled insurers*
Count		63014771	34838735	28176036	19663141
Upgrade %		0.628	0.443	0.857	0.866
No change %		98.310	98.534	98.033	98.174
Downgrade %		1.062	1.023	1.110	0.960
Upgrades/Changes		0.372	0.302	0.436	0.474
Coefficients and t-statistics from regression of upgrade (-1) no change (0) downgrade (+1) indicator variable on insurance status					
Model 1: no covariates	coef:		0.0033	-0.0033	-0.0050
	t-stat:		29.4504	-29.4504	-42.7711
Model 2: Month dummy variables	coef:		0.0042	-0.0042	-0.0035
	t-stat:		49.6596	-49.6596	-36.8953
Model 3: Month X bond type (GO, etc) dummy variables	coef:		0.0035	-0.0035	-0.0029
	t-stat:		42.2074	-42.2074	-31.0775

* Troubled financial guarantors all guarantors except BHAC, Assured Guaranty, and FSA.

Table 5. Monthly probability of upgrade and downgrade of underlying credit rating by insured status and insurer, 1990-2010.

Sample includes monthly observations of all bonds that have S&P underlying ratings, including imputed underlying ratings for uninsured bonds. Table shows the count of monthly observations, as well as the monthly probability of upgrade and downgrade and the ratio of upgrades to downgrades. The bottom half of the table shows coefficients from regressions of an upgrade (-1)/no change(0)/downgrade (+1) categorical variable on dummy variables for insurance status. Model 1 includes no covariates; model 2 includes dummy variables by month; model 3 includes dummy variables by month interacted with a full set of controls for bond type (revenue, general obligation, limited general obligation, etc.) Reported t-statistics adjusted for issue-level clustering. Sample excludes bonds identified by Mergent as having been insured in the secondary market.

					Troubled guarantors					Less troubled guarantors		
Sample: All bonds		MBIA	Ambac	ACA	CIFG	FGIC	Radian	XL	Other	AGC	FSA	BHAC
Count		7451871	5533996	56412	217081	6043845	297252	58455	3803	3071157	5429934	11804
Upgrade %		0.842	0.899	0.819	1.409	0.840	1.049	0.677	0.815	0.836	0.836	0.017
No change %		98.164	98.098	98.252	96.648	98.349	97.200	99.121	98.633	96.668	98.301	96.222
Downgrade %		0.994	1.003	0.929	1.943	0.811	1.751	0.202	0.552	2.496	0.863	3.761
Upgrades/Changes		0.459	0.473	0.469	0.420	0.509	0.375	0.770	0.596	0.251	0.492	0.004
Coefficients and t-statistics from regression of upgrade (-1) no change (0) downgrade (+1) indicator variable on insurance status												
Model 1:	coef:	-0.0032	-0.0036	-0.0032	0.0010	-0.0051	0.0027	-0.0091	-0.0070	0.0129	-0.0045	0.0331
	t-stat:	-19.6168	-19.7322	-2.2915	1.1907	-29.2266	2.7776	-14.1548	-2.7455	48.2401	-28.8373	20.0093
Model 2:	coef:	-0.0023	-0.0031	-0.0024	-0.0068	-0.0026	-0.0035	-0.0014	-0.0020	-0.0021	-0.0024	0.0049
	t-stat:	-16.1515	-19.4893	-1.8070	-8.1964	-16.3455	-4.3705	-2.4508	-0.7424	-14.2647	-17.7312	19.4517
Model 3:	coef:	-0.0019	-0.0023	-0.0039	-0.0054	-0.0024	-0.0039	-0.0010	-0.0020	-0.0017	-0.0021	0.0046
	t-stat:	-13.2283	-14.3669	-2.8129	-6.7652	-15.7308	-5.1804	-1.6229	-0.7738	-11.6315	-16.2007	14.0950

Table 6. Monthly probability of upgrade and downgrade of underlying credit rating by insured status, AA-rated underlying issuers, 1990-2010.

Sample includes monthly observations of all bonds that have AA+, AA, or AA- S&P underlying ratings, including those with imputed underlying ratings for uninsured bonds. Table shows the count of monthly observations, as well as the monthly probability of upgrade and downgrade and the ratio of upgrades to downgrades. The bottom half of the table shows coefficients from regressions of an upgrade (-1)/no change(0)/downgrade (+1) categorical variable on dummy variables for insurance status. Model 1 includes no covariates; model 2 includes dummy variables by month; model 3 includes dummy variables by month interacted with a full set of controls for bond type (revenue, general obligation, limited general obligation, etc.) Reported t-statistics adjusted for issue-level clustering. Sample excludes bonds identified by Mergent as having been insured in the secondary market.

Sample: AA-rated bonds		All bonds	Uninsured	Insured	Insured - troubled insurers*
Count		26697502	16040217	10657285	7377908
Upgrade %		0.657	0.580	0.773	0.784
No change %		98.158	98.345	97.876	97.985
Downgrade %		1.184	1.074	1.350	1.231
Upgrades/Changes		0.357	0.351	0.364	0.389
Coefficients and t-statistics from regression of upgrade (-1) no change (0) downgrade (+1) indicator variable on insurance status					
Model 1: no covariates	coef:		-0.0008	0.0008	-0.0011
	t-stat:		-4.4194	4.4194	-5.5278
Model 2: Month dummy variables	coef:		0.0017	-0.0017	-0.0018
	t-stat:		12.6026	-12.6026	-11.9830
Model 3: Month X bond type (GO, etc) dummy variables	coef:		0.0011	-0.0011	-0.0012
	t-stat:		8.4347	-8.4347	-8.1578

Table 7. Monthly probability of upgrade and downgrade of underlying credit rating by insured status, A-rated underlying issuers, 1990-2010.

Sample includes monthly observations of all bonds that have A+, A, or A- S&P underlying ratings, including those with imputed underlying ratings for uninsured bonds. Table shows the count of monthly observations, as well as the monthly probability of upgrade and downgrade and the ratio of upgrades to downgrades. The bottom half of the table shows coefficients from regressions of an upgrade (-1)/no change(0)/downgrade (+1) categorical variable on dummy variables for insurance status. Model 1 includes no covariates; model 2 includes dummy variables by month; model 3 includes dummy variables by month interacted with a full set of controls for bond type (revenue, general obligation, limited general obligation, etc.) Reported t-statistics adjusted for issue-level clustering. Sample excludes bonds identified by Mergent has having been insured in the secondary market.

Sample: A-rated bonds		All bonds	Uninsured	Insured	Insured - troubled insurers*
Count		20674386	6104245	14570141	10183394
Upgrade %		0.830	0.767	0.857	0.871
No change %		98.186	98.148	98.202	98.375
Downgrade %		0.984	1.084	0.942	0.754
Upgrades/Changes		0.458	0.414	0.476	0.536
Coefficients and t-statistics from regression of upgrade (-1) no change (0) downgrade (+1) indicator variable on insurance status					
Model 1: no covariates	coef:		0.0023	-0.0023	-0.0053
	t-stat:		10.0019	-10.0019	-24.8824
Model 2: Month dummy variables	coef:		0.0020	-0.0020	-0.0012
	t-stat:		11.4549	-11.4549	-7.7742
Model 3: Month X bond type (GO, etc) dummy variables	coef:		0.0015	-0.0015	-0.0011
	t-stat:		8.5011	-8.5011	-7.3218

Table 8. Monthly probability of upgrade and downgrade of underlying credit rating by insured status, BBB-rated underlying issuers, 1990-2010.

Sample includes monthly observations of all bonds that have BBB+, BBB, or BBB- S&P underlying ratings, including those with imputed underlying ratings for uninsured bonds. Table shows the count of monthly observations, as well as the monthly probability of upgrade and downgrade and the ratio of upgrades to downgrades. The bottom half of the table shows coefficients from regressions of an upgrade (-1)/no change(0)/downgrade (+1) categorical variable on dummy variables for insurance status. Model 1 includes no covariates; model 2 includes dummy variables by month; model 3 includes dummy variables by month interacted with a full set of controls for bond type (revenue, general obligation, limited general obligation, etc.) Reported t-statistics adjusted for issue-level clustering. Sample excludes bonds identified by Mergent as having been insured in the secondary market.

Sample: BBB-rated bonds		All bonds	Uninsured	Insured	Insured - troubled insurers*
Count		4050031	1677244	2372787	1725686
Upgrade %		1.133	0.781	1.381	1.306
No change %		98.004	98.297	97.796	97.934
Downgrade %		0.864	0.922	0.822	0.761
Upgrades/Changes		0.567	0.459	0.627	0.632
Coefficients and t-statistics from regression of upgrade (-1) no change (0) downgrade (+1) indicator variable on insurance status					
Model 1: no covariates	coef:		0.0070	-0.0070	-0.0048
	t-stat:		14.2121	-14.2121	-9.3416
Model 2: Month dummy variables	coef:		0.0047	-0.0047	-0.0025
	t-stat:		11.3888	-11.3888	-5.7436
Model 3: Month X bond type (GO, etc) dummy variables	coef:		0.0020	-0.0020	-0.0012
	t-stat:		5.2214	-5.2214	-2.9236

Table 9. Bond lifetime probability of upgrade and downgrade by insured status and credit rating, 1990-2010.

Sample includes one observation per bond, for all bonds that have S&P underlying ratings, including imputed underlying ratings for uninsured bonds. Table shows the count, as well as the lifetime probability of upgrade and downgrade and the ratio of upgrades to downgrades. The bottom half of the table shows coefficients from regressions of an upgrade (-1)/no change(0)/downgrade (+1) categorical variable on dummy variables for insurance status. Model 1 includes no covariates; model 2 includes dummy variables for each year the bond was outstanding; model 3 includes dummy variables for each period the bond was outstanding as well as a full set of controls for bond type (revenue, general obligation, limited general obligation, etc.) Reported t-statistics adjusted for issue-level clustering. Insured bonds include all bonds insured by financial guarantors; the troubled insurers include all insurers except for Assured Guaranty, FSA, and BHAC. Sample excludes bonds identified by Mergent as having been insured in the secondary market.

Sample: All bonds		All bonds	Uninsured	Insured	Insured - troubled insurers *
Count		990492	538344	452148	287266
Upgrade %		28.036	18.346	39.574	43.360
No change %		65.953	75.054	55.117	50.719
Downgrade %		6.010	6.600	5.309	5.922
Upgrades/Changes		0.823	0.735	0.882	0.880
Coefficients and t-statistics from regression of upgrade (-1) no change (0) downgrade (+1) indicator variable on insurance status					
Model 1: no covariates	coef:		0.225	-0.225	-0.217
	t-stat:		58.050	-58.050	-47.110
Model 2: Dummy variables for each year outstanding	coef:		0.168	-0.168	-0.141
	t-stat:		43.810	-43.810	-30.670
Model 3: Dummy variables for each year outstanding + dummy variables for bond type	coef:		0.147	-0.147	-0.123
	t-stat:		38.580	-38.580	-27.140

* Troubled financial guarantors all guarantors except BHAC, Assured Guaranty, and FSA.

Table 10. Monthly probability of upgrade and downgrade of underlying credit rating by insured status, 1990-2010. General Obligation bonds only.

Sample includes monthly observations of all bonds that have S&P underlying ratings, including imputed underlying ratings for uninsured bonds. Table shows the count of monthly observations, as well as the monthly probability of upgrade and downgrade and the ratio of upgrades to downgrades. The bottom half of the table shows coefficients from regressions of an upgrade (-1)/no change(0)/downgrade (+1) categorical variable on dummy variables for insurance status. Model 1 includes no covariates; model 2 includes dummy variables by month; model 3 includes dummy variables by month interacted with a full set of controls for bond type (revenue, general obligation, limited general obligation, etc.) Reported t-statistics adjusted for issue-level clustering. Insured bonds include all bonds insured by financial guarantors; the troubled insurers include all insurers except for Assured Guaranty, FSA, and BHAC. Sample excludes bonds identified by Mergent as having been insured in the secondary market.

Sample: General Obligation bonds		All bonds	Uninsured	Insured	Insured - troubled insurers*
Count		15130481	15130481	11671310	7580847
Upgrade %		0.601	0.421	0.835	0.858
No change %		98.311	98.535	98.020	98.180
Downgrade %		1.088	1.044	1.145	0.962
Upgrades/Changes		0.356	0.287	0.422	0.471
Coefficients and t-statistics from regression of upgrade (-1) no change (0) downgrade (+1) indicator variable on insurance status					
Model 1: no covariates	coef:		0.0031	-0.0031	-0.0053
	t-stat:		18.4572	-18.4572	-30.0766
Model 2: Month dummy variables	coef:		0.0044	-0.0044	-0.0040
	t-stat:		33.9460	-33.9460	-26.7705

* Troubled financial guarantors all guarantors except BHAC, Assured Guaranty, and FSA.

Table 11. Economic magnitude of insured portfolio outperformance, December 2007 through September 2010.

Table presents calculations behind estimated economic magnitude of the insured portfolio outperformance between December 2007 and September 2010. Starting point (columns (1) and (2) is the December 2007 underlying rating distribtion for the uninsured bonds in our sample. Sample excludes bonds identified by Mergent as having been insured in the secondary market. Columns (3) and (4) apply the underlying rating transition matrix estimated on uninsured bonds to column (1); Columns (5) and (6) apply the underlying transition matrix estimated on insured bonds. Estimated yields by credit rating column (7) are from Bloomberg (at AAA, AA+, AA-, and BBB) and imputed. Value loss versus hypothetical AAA yield is estimated for 8-year duration bond, roughly sample median.

			Apply estimated transition matrix							Contribution to loss	
	Dec. 2007 underlying distribution (insured)		Estimated on uninsured bonds		Estimated on insured bonds		September 2010 estimated yield	Spread over AAA yield	Percent loss versus AAA	Uninsured transition matrix	Insured transition matrix
	PDF	CDF	PDF	CDF	PDF	CDF					
Rating	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	=8*(8); (9)	(3)*(9); (10)	(4)*(9); (11)
AAA	1.63%	1.63%	7.06%	7.06%	3.74%	3.74%	2.51%	0.00%	0.0%	0.00%	0.00%
AA+	4.20%	5.83%	8.87%	15.94%	10.82%	14.56%	2.96%	0.45%	3.6%	0.32%	0.39%
AA	16.80%	22.63%	17.78%	33.71%	19.19%	33.75%	2.99%	0.48%	3.8%	0.68%	0.73%
AA-	17.66%	40.29%	18.44%	52.15%	19.43%	53.18%	3.01%	0.50%	4.0%	0.74%	0.78%
A+	16.67%	56.96%	13.27%	65.42%	18.49%	71.67%	3.26%	0.75%	6.0%	0.79%	1.10%
A	19.37%	76.33%	13.41%	78.82%	15.43%	87.10%	3.50%	0.99%	7.9%	1.06%	1.22%
A-	9.10%	85.42%	10.83%	89.66%	8.14%	95.24%	3.75%	1.24%	9.9%	1.07%	0.81%
BBB+	3.87%	89.29%	5.46%	95.11%	2.47%	97.71%	3.99%	1.48%	11.9%	0.65%	0.29%
BBB	2.96%	92.25%	2.47%	97.58%	1.26%	98.97%	4.24%	1.73%	13.8%	0.34%	0.17%
BBB-	1.56%	93.81%	1.64%	99.22%	0.55%	99.52%	4.76%	2.25%	18.0%	0.30%	0.10%
BB+	0.02%	93.83%	0.23%	99.46%	0.16%	99.68%	5.29%	2.78%	22.2%	0.05%	0.04%
BB	0.11%	93.94%	0.27%	99.73%	0.17%	99.85%	5.81%	3.30%	26.4%	0.07%	0.04%
BB-	0.02%	93.96%	0.09%	99.82%	0.01%	99.86%	6.33%	3.82%	30.6%	0.03%	0.00%
B+	0.00%	93.96%	0.02%	99.84%	0.00%	99.86%	6.86%	4.35%	34.8%	0.01%	0.00%
B	0.09%	94.06%	0.06%	99.90%	0.06%	99.93%	7.38%	4.87%	39.0%	0.02%	0.02%
B-	0.02%	94.08%	0.01%	99.91%	0.02%	99.95%	7.91%	5.40%	43.2%	0.00%	0.01%
CCC	0.00%	94.08%	0.06%	99.97%	0.00%	99.95%	8.43%	5.92%	47.4%	0.03%	0.00%
CC	0.00%	94.08%	0.01%	99.98%	0.00%	99.95%	8.95%	6.44%	51.5%	0.00%	0.00%
C	0.01%	94.09%	0.01%	99.98%	0.04%	99.99%	9.48%	6.97%	55.7%	0.00%	0.02%
D	0.00%	94.09%	0.02%	100.00%	0.01%	100.00%	10.00%	7.49%	59.9%	0.01%	0.00%
NR	5.91%	100.00%	0.00%	100.00%	0.00%	100.00%					
Sum						Estimated difference =		0.43%		6.18%	5.74%

Table 12. Regressions of default on bond insurance dummy

Table shows coefficient estimates from linear probability model regression of bond default dummies on insurance status. Default data from Mergent and reflect default of underlying issuer, regardless of whether guarantor stepped in to make payments to bondholers. Ratings data from S&P, Standard & Poor's underlying rating at time of bond issuance. SPURs direct from S&P; for uninsured bonds with bond rating data but no direct SPUR data we impute SPUR, setting it equal to the instrument's rating. Bond type dummy variables include GO, limited GO, revenue, etc. Standard errors adjusted for clustering at the issue level.

Sample: bonds with SPURs	(1)	(2)	(3)	(4)
Insured dummy	0.000049	-0.000335	-0.000075	-0.000110
	(0.000195)	(0.000243)	(0.000211)	(0.000226)
Constant	0.000514***	0.000686***	0.000569***	0.000181
	(0.000122)	(0.000153)	(0.000130)	(0.000143)
N	1018696	1018696	1018696	1018696
r2	0	0.0073	0.0160	0.0167
Controls	None	Initial SPUR	Initial SPUR X bond type	Initial SPUR X bond type, dummy variables for period bond was outstanding
Standard errors clustered by	Issue	Issue	Issue	Issue