INSURING SEPTEMBER 11TH
MARKET RECOVERY AND TRANSPARENCY

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INTRODUCTION

The behavior of insurer stock prices after September 11th presents an interesting spectacle.[1] Prior to 9/11, insurer stock prices had fallen short of market indices. Despite suffering from what has turned out to be by far the biggest loss ever to befall the industry, insurer stock prices recovered quickly to exceed their pre 9/11 levels and, for some months, outperformed market indices. But this pattern is not without precedent. A similar pattern was seen following hurricane Andrew and the Northridge earthquake, the two previous costliest U.S. insured events.

The events of September 11th and their impact on the insurance industry offer an opportunity to test a number of related theories about how this industry responds to, and recovers from, a severe shock to its capital. These models allow us to predict the temporal and cross sectional variation in stock prices and the 9/11 events present a natural experiment to test these models. Our paper focuses on three issues. The first is the capacity constraint (and related models) that predict the behavior of insurance markets after shocks. The second issue is the implicit insurance model, which determines the design of efficient insurance contracts for events like 9/11. Third, we examine the implications of the widespread uncertainty that beset the insurance market after 9/11.

The first set of models we test are the capacity constraint models of Winter (1988) and Gron (1994). These models argue that insurers experience sharp price spikes and capacity swings following capital shocks because of the high cost of accessing external capital markets. These models, and the related models we describe below, allow us to predict the relative impact of 9/11 on different insurance companies as well as the market opportunities the different firms face going forward. For example, brokers, with little exposure and with revenue-based fees, perform extremely well. In contrast, commercial writers, which are the most hard hit by claims but also have attractive post-loss market opportunities, would be expected to perform less well. Personal lines underwriters are hardly affected by such events and would be expected to be little

1 The terrorist attacks on the World Trade Center towers will be the most costly man-made catastrophe in U.S. history, according to the Insurance Information Institute. The 1993 World Trade Center bombing caused $510 million in insured losses. The 1995 Oklahoma City bombing resulted in insured losses of $125 million. The Los Angeles riots of 1992 resulted in insured losses of $775 million, previously the most costly insured man-made disaster until today. As of January 11, 2002 Morgan Stanley estimate of the loss attributed to the World Trade Center towers to range between $50 billion to $55 billion (including both life and non-life). Estimates are rendered by numerous sources with the average loss estimate for non-life insurers being $45.3 billion.

impacted. The main constraint facing many insurers after such a capital shock would be shortage of capital.Those least affected will benefit most. Thus, for example, we should find that firms with smaller pre-loss leverage, smaller risk overhang, higher post-loss liquidity are the best performers.

The second model we examine is the implicit insurance model of Doherty and Posey, 1997. This model is designed to examine the efficient design of catastrophe insurance when losses cannot be easily verified. The model argues that insurers will be more willing to offer coverage for first-event catastrophic events if second-event coverage is both expensive and rationed. Thus, severe post-loss price hikes, and rationing of coverage at these high prices, are consistent with efficient insurance contracting rather than evidence of a market breakdown. The predictions of this model clearly contest the popular belief in market failure that has led to calls for federal provision of terrorism insurance and the passage of bills in both the House and Senate. Like the capacity constraint model, the implicit contract model predicts that prices will spike after catastrophes and will gradually moderate as capital is restored. It differs from the capacity constraint model in that it predicts post-loss rationing rather than short-run market clearing.

While the events of 9/11 created many of the conditions predicted in these models, the magnitude of these events, and their economic and political ramifications, created considerable uncertainty and information asymmetry. Unlike, previous natural catastrophes, 9/11 closed the stock market, induced the U.S. Federal Reserve Bank to reduce interest rates again, purportedly nudged the developing recession and sparked a massive military response. Moreover, the impact of 9/11 on insurers is less clear than that of the previous capital shocks which were mostly natural catastrophes. The prior events caused substantial property damage with modest loss of life. For such damage, insured losses could be estimated quite quickly with moderate error. In contrast, 9/11 caused massive property loss, business interruption, workers compensation and potential open ended liability losses, all of which are extremely difficult to estimate with any accuracy and which will probably take many years or even decades to be run off. Thus, loss estimates given by insurers tend to have wide boundaries and are subject to large margins of error. Under these conditions, one might expect both opportunistic behavior by insurance companies, but a corresponding demand by investors for (and a consequent reward for) transparency. Given this situation, we would expect, and find that the opening of trading was accompanied by a rush of share repurchases despite the fact that many firms were short of capital. On the other hand, we also find the market tended to reward those firms that were early in reporting their net loss estimates suggesting an investor demand for transparency.

In section 1, we discuss the empirical implications of the capacity constraint and related models for an event such as 9/11. Section 2 provides the empirical implications the implicit insurance contracting model while section 3 presents the informational issues (signaling and share repurchase) in the post-loss market. In section 4 we describe the data set we have assembled to test the models and section 5 presents the results.

1. CAPACITY CONSTRAINT AND RELATED MODELS OF CAPITAL SHOCKS

a. Principal agent issues

The behavior of the insurance market post 9/11 can be predicted by several interrelated models that are based on the principal-agent model, the capacity constraint models and the post-loss investment funding model. Rather than providing competing predictions, these models provide explanations for different aspects of insurance company behavior when the companies are faced with negative shocks to equity. The capacity constraint models, e.g., Winter (1988) and Gron (1994) explain how insurers respond to large shocks and how the insurance product market returns to the long-run equilibrium price and capacity. The post-loss funding model, on the other hand, focuses on the risk management choices of firms that anticipate such shocks; e.g., their hedging decisions. The overlap between these models is due in large part to their common origin; both are rooted in principal agent models. We briefly review each of these models and outline their empirical implications for the period after the 9/11 event. Before reviewing these models we discuss two underlying principal-agent problems.

Two principal-agent problems are directly applicable to the conditions of the insurance market after 9/11. The first, the under-investment problem, implies that insurers who are in financial distress may fail to exploit post-loss investment opportunities.[2] If a severe shock such as 9/11 renders the firm insolvent, the firm may fail to exploit subsequent positive NPV investment opportunities since much of the value created will not accrue to shareholders but simply prop up the debt which otherwise would be in default. Thus, very severely hit firms will find it difficult to recover from 9/11 because they cannot raise new capital. Even if the firm is not insolvent, the main impact of 9/11 will be a decrease in equity values, resulting in increased leverage. This effect enhances the prospect of future distress and thereby raises the *ex ante* cost from future under-investment. The empirical implication of this model is that the ability of firms to recover value after 9/11 will be negatively related to their post-loss leverage.

The second applicable principal-agent problem, the asset substitution problem, refers to the propensity of highly levered firms to favor more risky investment choices because these choices increase the value of the shareholders' default put option. Since 9/11 will tend to increase the insurers' leverage, the asset substitution problem should be aggravated. Thus, we should find the firms most severely hit by 9/11 to be more inclined to make risky post-loss investment choices. If these actions are anticipated by investors, the firms should find it more

[2]See Mayers and Smith, 1987

difficult to raise new capital. The resulting empirical prediction of the asset substitution theory is that firms suffering the biggest losses, and that have the greatest pre-loss leverage, (these two variables determine post-loss leverage) will have the weakest recovery in value.

b. The capacity constraint model and the post-loss investment funding model.

The capacity constraint models of Winter (1988) and Gron (1994) trace the impact of severe shocks to the insurance industry's market performance. Using Myers and Majluf's (1984) pecking order theory, Winter and Gron argue that insurers will respond to a sudden loss of surplus, by reducing capacity and slowly building capital internally rather then seeking to raise costly external capital immediately.[3] The reduction in capacity will result in severe price increases in the insurance product market.[4] The quantity of insurance traded will then fall substantially, reflecting the withdrawal of supply and its impact on prices. Moreover, price can be subject to even further upward pressure since the demand for insurance may rise. Severe events often cause a spike in demand, possibly because of revisions of subjective loss estimates or simply the salience effect. Such demand spikes are often seen after earthquakes, floods and storms. The combined effect of the reduction in supply and the increase in demand, can result in a very large price spike. Slowly, capital is replenished internally and the product market returns to a long run equilibrium. If the price spike is sufficiently severe, short-term profit opportunities, can overcome the additional costs of external capital and new capital will flow in. Given the cost differential between internal and external capital, one would expect the inflow of external capital to fall short of full replacement of lost surplus. But, the higher the price spike, the greater the expected inflow of external capital and the quicker the market will revert to long run equilibrium.

Closely related to the capacity constraint model are two explanations of hedging and risk management by Doherty (1985), Tufano (1998) and Froot, Scharfstein and Stein, FSS, (1992). In these models, firms often hedge to secure funds for post-loss investment opportunities and the extent to which they do sodepends on the relative costs of different sources of capital. Using Myers and Majluf's (1984) pecking order theory, FSS argue that internal funds are less costly than external funds so firms will prefer the former to pay for new investments. This preference leads firms to hedge against losses so that post-loss investment can continue to be financed internally. Thus, the FSS model, and the capacity constraint model discussed above

[3]This cost differential is due largely to principal agent problems, similar to those discussed above, and to information asymmetries.

4 Swiss Re Sigma estimates that the average worldwide rate increases at January 2001 reinsurance renewals was 16% which places additional pressure on the rates of the underlying risks in the direct market. Benfield's Paragon U. S. catastrophe-pricing index indicated that rates were up 7.2% during 2002 – the first increase since 1984. According to a survey of commercial accounts prepared by the Council of Insurance Agent and Brokers, 31 percent of respondents for large accounts indicated a price increase in excess of 10% in 3rd quarter 2001 versus 97 percent in 4th quarter 2001. The increase in respondents indicating price increases in excess of 10% was similar for small and medium accounts.

might be seen as applications of the under-investment and asset substitution problems to a post-shock situation. In contrast, Doherty (1985) and Tufano (1998) argue that hedging also involves transaction costs both directly (e.g. moral hazard and adverse selection), and indirectly, (in contrast to external funding it enables managers to avoid the monitoring associated with external funding of post-loss investment choices). But all of these models argue that the firm's ability to recovery value after an unforeseen loss will depend upon the availability of insurance, and the extent to which the event disturbs its cost of capital i.e., by shifting the firm from its optimal capital structure.

The availability of funding after 9/11 is moot unless firms have post-loss investment opportunities. These models (particularly FSS) further predict that the loss of value from being unable to finance post-loss investment opportunities will be highest for firms that had the highest pre-loss growth potential, because pre-loss growth potential would have be impounded in the pre-loss stock price.

Gron and Winton (2001) extend the FSS model by considering how the structure of the insurer's existing book of business will affect its ability to recover from a given shock. Their "risk overhang" model argues that insurers with a risky (e.g. long tail) book of business will be particularly hard hit because this risk aggravates the post-loss principal agent problems and the difficulties in raising new capital. Thus, we should find cross sectional variation in the depth of the response of individual firms to 9/11 and in the duration of their recovery. Hardest hit will be insurers that are concentrated in high-risk lines such as commercial general liability and worker's compensation.[5]

Collectively these models carry a set of predictions about the impact of 9/11 across the insurance industry. Before collecting all these together it is useful to note how the estimated loss falls across different industry products, since this will help us distinguish between the likely effects on different types of insurance firms. Table 1 shows the breakdown of 9/11 losses by line of business. Of particular interest is that virtually none of the damage is to personal lines insurance; almost all of it falls in the commercial lines part of the business.6 The carriers that write both personal lines and commercial lines are exposed to loss through their commercial lines and, to this extent, they will suffer a capital shock. This shock creates an

[5]Additional difficulties face insurers with a concentration in workers' compensation. States have not permitted insurers to avoid coverage for terrorism risk.. Moreover, this line of business is subject to price regulation. On the other hand reinsurers, are not subject to such controls and have, by and large, cancelled or restricted terrorism coverage. And, at the time of writing, the Congress has failed to agree on a Federal reinsurance program to offer such reinsurance. This, many primary worker's compensation insurers are being forced to write a coverage which may be very high risk, which cannot be reinsured and, for which, they have little control over price. Such insurers would be very hard hit. However, they would benefit most, should congress come up with substantive program. This issue can affect some other lines but states have reacted differently in their willingness to permit exclusion of terrorism risk.

6 There is a modest amount of life insurance loss; though we have not included this part of the industry in our study (life insure is mostly written by separate firms)

indivisible increase in default risk across all lines (unless they are able to totally separate operating companies) and a consequent capacity squeeze in all lines. If all personal lines business were written by joint personal-commercial lines writers, one would expect a significant price hike in this line. However, a considerable share of the personal lines business is written by specialist personal lines writers who suffered negligible 9/11 claims and whose capital was not greatly impaired.[7] Because much of the personal lines market is written by these specialist insurers, we would not expect this line of business to be dramatically affected and for the personal lines writers as a group to show little reaction to 9/11 (other than theirstock prices responding to general market movements).

Commercial lines writers would be expected to take the brunt of the impact of 9/11 and to reap much of the benefit from the hardening market that affects precisely the lines they write. In contrast, insurance brokers focus largely on placing commercial lines insurance and do so on either a fee or commission basis. Thus, assuming business is not highly price elastic, brokers would benefit as hardening markets drove up premiums and commissions. And in their role as brokers, they are not risk bearers and do not pay any claims. As a group, brokers should reap a clear benefit from 9/11 and this should be reflected in their post 9/11 stock return. (However, the empirical implication is confounded to some extent because some of the brokers, e.g., AON, have insurance company subsidiaries that did have loss exposure.) The final type of insurance companies that we single out is Lloyds. While the same general issues arise for Lloyds as for other commercial writers, many of the Lloyds syndicates already carried massive prior liability exposures particularly from asbestos claims. Thus, as a group, these firms were not well positioned to cope with the magnitude of the 9/11 claims and may well be in weaker position to exploit the hardening market as other commercial writers.

These arguments suggest some patterns of post 9/11 stock price performance (after adjusting for the market return and other controls). Brokers as a group should benefit from 9/11, whereas personal lines writers should be largely unaffected. Commercial lines writers should be negatively affected relative to brokers, but should benefit from the hardening market opportunities. We also subdivide the commercial lines writers by capitalization because market power can affect the ability of the firms to exploit the disturbed, but hardening, post 9/11 insurance market. Lloyds underwriters raise some special issues; they not only pay 9/11 but, as a group, will find it difficult to raise new capital because of the overhang of prior liabilities. Thus we would expect Lloyds as a group to fare worse than other commercial lines writers.

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[7]It is true that the capacity of these companies is affected also by the impact on their asset portfolios. However, given the recovery of asset markets, these capacity effects are likely to be of a secondary importance. There are some interesting exceptions. For example, AXA which had significant claims from 9/11 also was a major investor in several U.S. airlines whose stock were severely hit. On September 26th the financial press reported that according to regulatory filings AXA Financial Inc. was the top institutional investor in three airline companies - United Airlines, Continental Airlines and Northwest Airlines Corp. as of June 30th. While AXA expected its insurance related costs from the WTC attacks to be $550 million, the estimated loss due to the decline in airline stock is $875 million. And Royal Sun Alliance, also with significant liability exposure, held a large portion of the U.S. insurer Chubb which also had a large exposure.

Over these broad sub industry effects, we can superimpose the specific predictions of the capacity constraint and related models. To illustrate these effects we have grouped together stock price graphs for various insurer types in Figures 1a and1b. The first group shows large insurers (AIG, CHUB and Royal & SunAlliance) who were exposed to large direct losses. The first two show the impact of 9/11 but a subsequent recovery. Two personal lines insurers (Progressive and Allstate) show little effect from 9/11. The three reinsurers with large exposure (Berkshire Hathaway, Swiss Re and Munich Re show the impact of the exposure and the subsequent benefit from the hardening market. Two smaller reinsurers with very little exposure and all to gain from the hard market (Renaissance Re and Max Re show excellent stcok price performance). And finally two brokers, (Willis and Aon) also show robust price

c. The implicit contract model of insurance shocks and post-loss rationing

An alternate approach to examining the behavior of insurance markets after a severe shock is to ask what type of contingent contracts would be efficient given the prospect of such shocks. If shocks are severe and can be quickly verified, the classic mutualisation model developed by Karl Borch 1962, is appropriate. In this model, policyholders pool risk in a mutual like arrangement. This can be an actual mutual insurance firm, or a stock firm with dividends or assessments based on aggregate loss experience. If small, uncorrelated losses occur, they can be diversified. But if a severe (i.e., undiversifiable) loss occurs, the policyholders who have a claim are fully paid. However, instead of passing the cost of settlements to shareholders, it is spread retroactively over all policyholders by reducing their dividend, or making an *ex post* assessment. In this way, all diversifiable risk is insured and undiversifiable risk is retained by the policyholders.

There is a problem with this approach if policyholders cannot observe the insurer's aggregate losses. Because the aggregate loss cannot be observed, the insurer has an incentive to exaggerate the loss and thereby reduce the dividend. Thus, when the insurance market was plagued with a liability crisis in the mid 1980s, there was a similar verification problem (ultimate liability losses were not resolved for many years and some are still developing). Similarly after 9/11, losses may not be known for years (especially liability claims) and there is much uncertainty surrounding the loss estimates given by insurers. To cope with such verification problems, Doherty and Posey 1997, developed an implicit contract model based on similar labor market models. They derive the efficient insurance contract when losses are very large, undiverifiable, and not easily verified.

In the implicit contract model, undiversifiable risk is shared but the sharing mechanism must satisfy a truth-telling constraint. This means that the sharing mechanism must be costly to the insurer. After a loss, prices for new coverage are raised (reflecting the capital shortage as in the capital constraint model) but insurance coverage is rationed at this price. The combination of price increases and rationing accomplishes several goals. First, undiversifiable risk is passed back to policyholders. Second, insurers can cover their additional costs by raising prices but do not dissemble because this would involve greater rationing at the post-loss prices (thus satisfying the truth-telling constraint). Thirdly, and prospectively, insurers are more willing to offer coverage for such severe events because they know they can raise prices after loss and, by rationing, they need not stretch their depleted capital.

There are two essential predictions of the Doherty and Posey (1997) model. As in the capacity constraint model, this model predicts that prices will spike after a major loss and will gradually moderate as surplus builds up. However, in contrast to the capacity constraint model, there will not be a post-loss price that clears the market. Coverage will be rationed. Rationing is not evidence of market failure. On the contrary, rationing is part of the *ex ante* efficient contract design. Moreover, without the prospect of being able to ration after catastrophic losses, insurers would be less willing to offer coverage catastrophic coverage in the first place.

The rationing prediction is particularly interesting in the light of the post 9/11 market experience and the policy implications that have been drawn from it. Although our data set does not allow us to test the rationing prediction directly, there have been countless press reports that coverage is restricted at the offered price. This raises interesting policy questions. Rationing, together with price rises, is often seen as evidence of market failure and has given rise to demands for Federal provision of terrorism reinsurance to stimulate the private market. At the time of writing, both the U.S. House and Senate have responded with proposed legislation. The implicit contract model questions the market failure that appears to have stimulated this legislative response.

2. INFORMATIONAL EFFICIENCY AND TRANSPARENCY

(a). Signaling and the "lemons" problem

The period following 9/11 was one of major uncertainty over the economy in general, and the fortunes of the insurance industry, in particular. When the stock market re-opened on September 17, 2001, the DJIA had dropped 7% by the end of day from the previous close on September 10. The DJIA dropped an additional 1.8% in the following two days reaching its lowest level since December 1998. The equity market reaction spanned the world markets. In the week ending September 19th the percentage change in the DJIA was -8.8% versus -7.0% for the S&P 500, -3.3% for London FTSE 100, -5.5% for Paris CAS 40, and -6.8% for Frankfurt DAX. This seemed to reflect the hardening of fears of a recession already forecast before 9/11. The most immediate hits were to the airline and other travel-related industries, as well as the insurance industry upon which much of the direct cost of 9/11 was expected to fall.[8] This uncertainty permits a wide divergence in expectations of investors and other stakeholders about the value of insurance stocks and this uncertainty can be disaggregated into uncertainty about the cost to insurers of settling 9/11 claims and to uncertainty about the post-loss earnings stream.

Increased uncertainty can give rise to both insurer opportunistic behavior and investor demand for insurer transparency. On 9/17 insurer stock prices plunged at a greater rate than the market index as investors anticipated the severity of the claims that were likely to be lodged. However, some firms announced their estimated net losses between 9/11 and that date, thus

[8]Any ambiguity as to whether the terrorists strikes were a covered peril or an excluded "act of war" were mostly dispelled by timely statement by insurance industry, that they would not seek to claim the war exclusion. CITE

somewhat closing the information asymmetry between management and investors. Analysis of the reaction to these announcements is complex because the announcements not only provide information (losses can be higher or lower than previously expected thus causing a negative or positive stock price response), they also help resolve investor uncertainty. It is also possible for some firms to use the announcement as a signal to differentiate their prospects from other insurers. Initially, announcements were made by a few firms and the criterion for this self selection is important. A plausible story is that the announcing firms were those who thought that their net losses would be least unpleasant, i.e. there was a "lemons" market with the low risk firms selectively signaling to reveal their status. Both the demand for transparency (investors value the reduction in uncertainty)and the signaling (low risk firms choose to signal) suggest that stock prices respond favorably to the timely revelation of net losses (i.e., to the act of revealing losses rather than their size). We discriminate between these two potential explanations by including in our regressions a dummy variable for the announcement itself and a separate variable for the size of the net loss. Given that an announcement is made, the stock price response to the size of losses could be either positive or negative depending on whether those losses were higher or lower than previously expected.[9]

A second event arises during the post 9/11 period that allows for a further test of the transparency and lemons concepts. An insurer's *net* loss is the insurer's *gross* loss minus reinsurance receivables. The gross loss is the amount the insurer expects to pay its policyholders to settle their claims. However, many insurers have reinsured the gross losses with other insurers and the net loss will subtract the estimated receivables from the gross. In the days following 9/11, many insurers announced their net losses but none announced their gross until Trenwick Re and Renaissance Re both did so on 4th October. This was followed by a flurry of gross announcement by more insurers although many chose not to announce gross losses.

The importance of the gross announcement relates to the credit risk of the reinsurers. Since many reinsurers were hard hit by 9/11, this credit risk could be significant. Moreover the size of the receivables exposed to credit risk is enormous. For primary companies having announced their net and gross results, the average ratio of gross to net losses is 383% and for reinsurers, 220%.[10] Thus, an early announcement of credit risk provides information to the shareholders (and policyholders) of the primary insurer and one would expect this revelation to be valued. However, there is anecdotal information to suggest that a secondary lemons problem was unfolding. The firms making the first announcements all made a great play of giving the credit ratings of their reinsurers which were generally very good. For example, at General Electric's meeting with investors on September 21st, management discussed GE's / ERC's gross and net WTC loss. The pretax gross WTC loss for all of GE's insurance and reinsurance operations is $3.0 billion and the pretax net loss, which was previously disclosed, is $600

[9]Note that the lemons theory suggests that loss surprises would be less severe for those that announce than for those that do not. But is still plausible that announcing firms could announce net losses that were higher than previously expected.

[10]See "Insurance and Risk Briefing" Morgan Stanley, Equity Research North America, 1/04/02

million (thus, the gross / net ratio equals 500%). The reinsurance recoverables of $2.4 billion are reportedly from reinsurers and retrocessionaires that were rated "AAA" and "AA" prior to the WTC event.

Thus, we should find that the stock price should respond favorable to a first announcement of gross losses and we can test for this effect by use of an announcement dummy variable. However, we should still find that the stock price responds negatively to the announced size of the receivables, because, given that an announcement has been made, the larger the ratio of gross to net losses the larger the potential credit risk. Summarizing these effects, we should find that:

a. Firms that make an early announcement of net losses will tend to have a favorable share price response.

b. Conditional on announcing, those firms with higher net losses should have less favorable price response.

c. Firms that make an early announcement of gross losses will tend to have a favorable share price response.

d. Conditional on announcing, those firms with a higher ratio of gross to net losses should have a less favorable price response.

We separate these two effects through the use of two variables

a. dummy, D_a ; 1=announce, 0=not announce, expected sign positive
b. an interactive term D_a (G/N) where the expected sign is negative

b. Share repurchase

Share repurchases are usually motivated by

an information asymmetry in which insiders think shares are undervalued,
or by the desire of the firm to change its capital structure
or by the absence of profitable investment opportunities.

The shocks caused by 9/11 will generally increase the leverage of insurers as they lose surplus in the payment of claims. Thus, a share repurchase in this time frame is unlikely to be an adjustment of capital structure. While it is possible that some firms faced a dearth of investment opportunities after 9/11, many others sought new capital to exploit the new hard insurance market. On the other hand, we have argued that the severe trauma to the insurance market following 9/11 was followed by widespread uncertainty and wide variation in the values investors and insiders would place on firm values. Amongst the population of firms, we would expect to find a number of cases where insiders took the more optimistic view and sought to capitalize by share repurchase. And indeed there was a flurry of repurchase announcement on the re-opening of the stock market and in the days immediately following. Table 3 shows the repurchase announcements in the period following 9/11.

The second explanation for the management's belief that the stock is undervalued is that insiders take a more optimistic view of the post-loss earning potential - for example, they subscribe to the post-loss hard market view falling out of the capacity constraint model. This reason for share re-purchase is not based on quantitative information so much as a difference in the intellectual model of how the insurance market works and how it is affected by shocks. On this model, optimistic insiders believe that there are market opportunities and these are not reflected in the current stock price. But the rub is that, according to the capacity constraint model, to exploit the post-loss hard market will require more capital not less. Thus, if repurchases are made shortly after 9/11, then the same firms should subsequently raise new capital. Moreover, if management's belief's on value are correct, then new equity will be issued at higher stock price or the new issue will be debt.[11]

To illustrate the market uncertainty that appears to have given rise to the opportunities for repurchase we will briefly describe the experience of American International Group, AIG. Between 1991 and 2000, AIG's stock price performance increased an average 29 percent per year versus a 17 percent average annual rise in the Standard & Poor's 500. From January 1, 2001 up to the WTC event, AIG 's shares lost 25 percent of their value due to investor concerns over the effects of slowing economies in Asia and potential liabilities in the U.S. The stock price is plotted in Figure 1 for the second half of 2001. Note the dip in stock price when trade opens on 9/17 is followed by a recovery to pre 9/17 prices. The uncertainty about the underlying value of the stock following 9/11 is indicated by the implied volatility calculated using the option-pricing model. The implied volatilities for AIG are plotted in Figure 2 for the

[11]We need to be a little careful in looking at debt issues. In order to expand insurance capacity, new capital must be junior to policyholder liabilities. An example of such debt is "surplus notes".

second half of the year 2001 and the sudden increase occurs in the week following 9/11. The implied volatility stays high for a while and finally moderates in early November. Immediately after 9/11, AIG appears to have identified an opportunity for repurchase.

On September 14th, AIG's Board authorized a stock buyback on the open market of 40 million shares (approximately $3 billion) in excess of some 10 million shares authorized on September 5th. The share repurchase followed an announcement of a $500 million expected net loss which was released on September 13th. The estimate of the net loss was subsequently revised upward to $820 million with a gross loss estimate of $2.1 billion released on October 9th.

However, the opportunity for actual repurchase appears to have been overtaken by events, The combination of (a) the need for new capital to fund new business opportunities in the hardening market,12 (b) the recovery of the stock price reflecting these opportunities and (c) the decline in implied volatility, led AIG's Board to revoke its authorization to purchase in excess of 10 million shares before it was executed. However, this example does show how much uncertainty there was in the post 9/11 market and illustrates why investors might particularly value transparency.

3. TESTS OF THE EMPIRICAL IMPLICATIONS

a. Data

Daily stock price data was obtained from Bloomberg Professional for 86 property-casualty insurance companies from July 2, 2001 to November 16, 2001. Firms were classified into five groups - large market capitalization commercial lines insurers, personal lines insurers, insurance/reinsurance brokers, Lloyds syndicates and small cap insurers. GeneralCologne Reinsurance (GCRe) maintains the *NewsBrief Service,* which scans all major domestic and international wire services and printed publications covering the insurance markets and market participants. We tracked the GCRe *NewsBrief Service* daily from September 11th, 2001 to November 16th, 2001 for firm announcements of gross and net loss estimates relating to the WTC event. We identified the date and amount of each loss estimate by the sample firms as well as any updates in the loss estimates that occurred within our sample period. Morgan Stanley Equity Research Group provided extensive coverage throughout the time period following the WTC event and published market intelligence in their report titled *Insurance & Risk Briefing*. We verified our observations against the by-firm reported gross and net loss estimates as reported by Morgan Stanley.

We also employed the GCRe NewsBrief Service along with Morgan Stanley's *Insurance & Risk Briefing* to obtain announcements of share buybacks and new capital financings by sample firms. We gathered financial statement data from Bloomberg Professional, which

12 Two weeks following the WTC attack, AIG announced that it would write aviation war risk and hijacking liability coverage. On November 11th, AIG completed a $1 billion issuance of convertible debt. AIG, along with Chubb and Goldman Sachs sponsored the Bermuda start-up, Allied World Assurance Co. Ltd. AIG was quick to embrace new business – especially risky new business having high expected returns

reports GAAP financial statement histories as well as ratio summaries by firm. Specifically, we measure leverage as of year-end 2000 to proxy pre-event leverage.

Our empirical analysis is divided into three primary analyses. The first two analyses are focuses on explaining the returns following 9/11. The third analysis focuses on explaining the capital changes of insurance firms following 9/11. In the return analyses, we examine whether insurance stock prices impound the structural changes in the insurance industry resulting from 9/11. The signaling and capital shock models provide predictions concerning how the stock prices should have been expected to change. We first examine the effects on the first day the market re-opened following 9/11. However, as the effects predicted by the capital shock models would evolve over time, we use an extended sample period to measure the price changes for testing these models. Because of the confounding effects caused by another major insurance event in November (the collapse of ENRON), we have truncated our data to exclude this event. Thus, we examine the cumulative change in equity value from the opening of the stock markets on 9/17 though 11/16.

b. New Information, Signaling and Transparency

The signaling model implies that when the market re-opened on 9/17, insurance company stock prices should have incorporated the expected changes in value based on the information available to investors at that time. Our first regression analysis is:

ΔPrice from 9/10 to 9/17 = f(company type, net announcement dummy, net loss amount).

The insurance company type is captured by five dummy variables for large capitalization commercial companies, small capitalization commercial companies, Lloyds companies, insurance brokerage companies, and personal line companies.

To estimate investors' reactions to those firms that chose to reveal estimates of net losses, we include two additional variables. The first, NET17, is a dummy equal to 1 if a net loss announcement was made by 9/17; otherwise, the dummy is zero. A positive value indicates the market's reward for transparency at that point. According to Akerlof's ( ) lemons model, firms that want to distinguish themselves would provide early signals, which would be rewarded. Thus, we expect that the change in price on 9/17 to be positively related to the early signal and the coefficient on NET DUMMY should be positive. The second variable included in the regression, NETLOSS17, is the amount of the net loss announced by 9/11. Although the net loss to any insurer suffered on 9/11 was not known definitively, and may not be known for a number of years, many firms announced estimates of their net losses and updated these estimates at various times over the following period. On the first such announcement, the change is from zero to the net announced value. Subsequently we look for re-evaluations of the net and we measure the change in the estimated net. The sign on the NET LOSS coefficient could be positive or negative, depending on whether the changes were greater or less than anticipated by investors.

Table 4 presents the regression results from this analysis, in which the dependent variable is the stock price change on the day the stock markets re-opened, September 17th. Model 1 in

the table includes as independent variables the dummy variable for whether a firm had announced their net losses by September 17 and the amount of the announced net loss relative to the firm's assets. We find that stock prices responded strongly for those firms that had made net announcement before the close of trading on that day. The coefficient for the announcement dummy suggests that investors valued the announced as it is positive and significant at the 10% level. The coefficient for the amount of the announced net loss is negative, implying that the net announcements on average were worse than investors had feared. The second model in Table 4 includes as independent variables the categorization of the sample insurance companies into the five different types. The different responses to different firm types are significant and in roughly the expected ranking. Even at this early date, investors appear to have correctly estimated that personal lines insurers would be little impacted and that brokers would benefit. The third model in Table 4 combines the independent variables from the first two models. In this case, the coefficient on the net announcement dummy is no longer significant, suggesting that some types of insurers were more likely to have announced than others, resulting in some colinearity in the model. The stock price reactions to the amount of the announced net loss show that investors believed that the negative impact of paying claims would dominate any benefit from hardening markets for commercial lines insurers. Moreover, they believe that the Lloyds insurers would be significantly more severely affected than other firms. The high adjusted R-squareds for the models suggest that much of the movement in insurer stock prices on September 17 was related to investor expectations as to how the different types of insurers would be impacted and their announced impacts.

B. Testing the Capital Shock Models

According to the capital constraint and related models, the change in the stock prices of insurance companies following 9/11 should be a function of the net insurance loss, the change in firm growth and the change in the shareholders' default put:

ΔPrice from 9/10 to 11/16 = f(NET INSURANCE LOSS, Δ(GROWTH), Δ(DEFAULT PUT)).

Subsequent to 9/17, other firms announced their net losses and the original announcers updated their estimates of the losses. In these regressions, we include a dummy variable if the firm made an announcement of net loss anytime between September 11 and November 16. We include the amount of the announced net loss as well.

We are also concerned with the information revealed in the announcements of gross. The first cluster of announcements was made on October 4 and in the following few days. We include a dummy variable for whether a firm made a gross announcement during the sample period (the dummy is equal to 1 with such an announcement, otherwise it is zero). Because of the signaling and transparency arguments, we expect a positive sign. However, the lemons model suggests that firms making later announcements would not secure this positive stock price reaction so this effect should disappear from the returns of later announcements. We also looked at the size of the receivables revealed in the gross announcement and expect the sign to be positive.

Without default risk, estimated net losses should be reflected dollar for dollar in the value of equity. However, this is subject to two default adjustments. First, there may be default on receivables, which would suggest that net losses are underestimated. Second, since these losses can increase the credit risk of the insurer, part of these net losses will be passed back to policyholders and creditors in the form of default risk. Thus, the impact of net losses on equity will be reduced by any change in the default put option. As argued in the "capital shock" models above, the post-loss growth opportunities are diminished by the various agency effects which can distort capital budgeting choices and impede the inflow of new capital. These costs are related to the value of the default put option.

We will test the capital constraint and related models by estimating the impact of leverage and other default proxies on the change in stock prices in the period following 9/11. The post-loss leverage and the insurer risk, jointly proxy for the value of the default put and thereby provide a measure of the post-loss growth potential and the ability of the insurer to raise new capital. However, since post-loss leverage reflects the change in stock value after 9/11, there is a degree of spurious correlation. To allow for this we will use a measure of pre-loss leverage, noting that this variable, together with the change in value on 9/17, jointly determine post-loss leverage. The ability to exploit growth opportunities and raise capital will also be affected by the firm's post-loss liquidity, which is roughly the pre-loss liquidity minus the announced net losses.

The firm will have opportunities for growth in place before 9/11 and these would have been impounded in the pre 9/11 stock price. Thus, the change in stock price after 9/11 should reflect any changes in growth opportunities. We measure these growth opportunities through different proxies. The first is a measure of the pre 9/11 asset growth as a proxy for the growth opportunities the firm had in place before 9/11. This provides a measure of the potential growth in value that is at risk and could be lost as a result of 9/11. The sign is unclear. On the one hand, the greater the value at risk, the greater the potential for loss of that value. On the other hand, the fact that some firms had higher asset growth might reflect some economic capabilities that make them more robust to shocks. The second growth proxy we employ is the difference between analysts estimated earnings before and after 9/11, scaled by the pre 9/11 stock price. We expect the sign on this variable to be positive.

The capacity constraint model and its variants predict a post-loss hardening insurance product market, but insurers will be unable to reap the full benefit because their capital has been depleted. However, if this market becomes sufficiently hard then insurers might find it attractive to tap external capital despite its additional cost over internal money. Constant press reports after 9/11 have reported price rises for terrorism coverage, directors and officers, airline liability and many other lines, rising at enormous rates, often over 100%. With these rises, new the capital constraint might be relaxed with the entry of new capital. And in the months following 9/11, over $20 billion dollars has been raised. The treatment of such capital in our empirical work requires some care.

New capital flows into the industry in search of a high rate of return, which in turn will be a function of post-loss growth opportunities. However, as argued above, the change in stock value will be affected (a) directly by these growth opportunities, and (b) indirectly because the

new capital permits the firm to respond to post-loss market opportunity. This suggests a simple relationship of the following form (rather than a simultaneous equation system):

Change in Stock Value = f (Growth; New Capital (Growth)) = f (Growth) Rather

This presents differing empirical designs. We can omit capital and interpret the coefficient for growth as compounding direct and indirect effects. Alternatively, since we use rather crude proxies for growth, we can instead use new capital directly as a proxy for growth in its own right. We will use both forms.

Table 5 presents results for the regressions in which the dependent variable is the stock price change over the full sample period (from the close of trading on 9/10 through 11/16). We present six different regression models in the table. The six models include three different proxies for the company's growth opportunities. The first two models use the growth in the firm's assets over the previous three years. The second two models use the change in analysts' mean forecasts of current earnings between forecasts made at June 14 and the first forecasts after 9/11. The final two models use as a proxy for growth opportunities a dummy variable for whether the company issued new equity capital after 9/11. We have different numbers of observations for the models because not all of our firms have data on asset growth in Bloomberg (80 out of 86) or data on analysts forecasts from IBES (63 out of 86). For each pair of models, we present one with the net announcement dummy variable included and one without.

Over this period, more information is revealed, more signals are sent and investors have more time to digest the implications of 9/11. These results provide some support for the transparency/signaling conjecture and for the various shock models such as the capacity constraint, post-loss investment and implicit contract models. The support for the transparency and signaling model comes from the NET dummy, which is significantly positive in each of the regression models in which it is included. Investors reward firms that announce their net losses quite apart from the size of the announcement.

However, the coefficient for the gross announcement dummy is insignificantly different from zero in all cases. We can offer two explanations. The first is that the impact of signaling decays over time and as more signals are used. If the ranking of firm quality across unanticipated net losses were perfectly correlated with the ranking across credit risk on receivables, then the first signal sent (in this case the net announcement) will be sufficient to separate the low and high quality firms. A second signal on the gross would then be redundant. With less than perfect correlation, there will be diminishing impact from subsequent signals.

A second possible explanation for the insignificance of the gross announcement dummy is simply that the time series is too long and has too much noise to pick up any immediate responses to these announcements. This could also explain why the amount included in the announcement is insignificant as well. (To address this problem we plan to run a shorter series as indicated. This is still to be done).

Capacity Constraint, Post-loss Investment and the Implicit Contract Models

The main predictions of these models are that firms with highest post-loss leverage, highest risk and highest growth opportunities would be affected the worst by the 9/11 events. Post-loss leverage is determined jointly by the pre-loss leverage and the loss of equity value associated with 9/11. Because the change in equity is itself the dependent variable, we have used pre-loss leverage and this independent variable together with the insurer's estimated net loss largely determine post-loss leverage. Table 5 shows that both of these variables are significant and of the correct signs consistent with these models' predictions.

Those able to secure post-loss growth by re-capitalizing would recover more effectively. The various regressions in Table 5 test for these effects. Because new capital responds to post-loss growth opportunities, we have avoided colinearity problems by either including growth proxies (asset growth or change in analysts forecasts) directly, or by including new equity capital. The coefficients on the growth proxies are not significantly different from zero. However, when we use the new equity capital variable to jointly pick up the impact of new growth opportunities and the ability to fund them, the results are somewhat improved. In Model 6, the coefficient has the predicted positive sign and is significantly different from zero.

Finally, the amount of the gross announcement is predicted to have a negative sign indicating an adverse stock price response to credit risk on reinsurance receivables. In all runs the coefficients are insignificantly different from zero. This result is not completely unexpected. Since the stock market reacts strongly to the announced net losses, which pick up the main impact of the 9/11 losses on firms, the potential credit risk picked up in the gross announcement would be a second order effect anyway. As mentioned earlier, such an effect may not be detectable in such a long time series. Nevertheless, we attempt to discern this second order effect in a secondary, short series regression that examines stock price behavior in the days in which these initial announcements of gross results were first made. These results will be presented in the additional table as mentioned above. This is still to be done)

CONCLUSION

The losses of September 11th were the heaviest ever suffered by the insurance industry caused much uncertainty amongst investors as the ongoing value of insurance firms. This uncertainty reflected concerns over the ultimate level of losses, over the new opportunities facing insurers in the post-loss hardening market place, and over the economy in general. This uncertainty created both an opportunity for opportunistic behavior (which we have documented anecdotally) and a demand for transparency (which we have tested more formally). In particular, despite the enormous size of insured losses, investors reward firms for coming clean and sharing this information. We were unable to find such rewards for transparency in declaring credit risk on receivables.

Despite the uncertainty, the post-loss market behavior was broadly predictable from existing economic models. Indeed some of these had been given trial runs in previous insurance crises such as hurricane Andrew, the Northridge earthquake and the 1980's liability

insurance explosion. These models include the capacity constraint, post-loss investment and implicit insurance contract models. The common predictions of these models are that firms suffering the lowest losses, with less leverage, and with the highest growth potential would be best able to exploit the post-loss hard market and this would be reflected in stock price performance. We found strong evidence connecting the net losses and leverage to stock price performance although the evidence on growth opportunities was mixed. Overall, these results provide reasonable support for these theories and show that the recovery of this market has been intelligible and some ordered.

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Table 1
September 11TH Losses by Line of Insurance

This table provides the estimated dollar losses from the events on September 11, 2001 by insurance line. The final column shows the percent of the total insurance losses in each line.

Line	Estimated Dollar Losses (in billions of dollars)	Percent of Total
Property.- WTC Towers 1&2	3.5	6.8
Property - other	5.0	9.8
Business Interruption	10.0	19.5
Workers compensation	3.5	6.7
Aviation Hull	0.5	1.0
Event cancellation., misc	2.0	3.9
Liability - airlines	3.5	6.8
Liability - other	20	39.0
Total Non Life	47.5	92.7
Life Insurance	3.5 - 4.5	7.3
TOTAL	50 - 55	100

Source: Morgan Stanley, "Update on WTC - Related Issues", 12/20/01

Table 2
New Capital Raised by Insurance Companies After September 11

This table shows the insurance firms that raised new capital between September 11 and year-end 2001. The table provides the name of the insurance company, the type of new capital raised, the dollar amount (in millions) and the date the new capital instruments were sold.

Firm	Type	Amount	Date Sold
Renaisance Re	Stock	$233	10/15/01
QBE	Stock	$337	10/17/01
Hartford	Stock	$450	10/17/01
Ace	Stock	$1,150	10/25/01
Axis Speciality	Stock	$1,600	11/01
Swiss RE	Various	$1,600	11/01
Amlin	Stock	$141	11/01
CGNU	Debt	$1,700	11/01
XL Capital	Stock	$819	11/01/01
W R Berkley	Stock	$205	11/01/01
AIG	Conv Debt	$1,000	11/07/01
St Paul	Trust Pfd	$575	11/13/01
Partner Re	Trust Pfd	$200	11/13/01
Renaisance Re	Pref Debt	$150	11/14/01
Chubb	Debt	$600	11/15/01
DaVinci Re	Stock	$350	11/15/01
Partner Re	Man. Conv.	$175	11/15/01
Markel	Stock	$220	11/16/01
Clark/Bardes	Stock	$69	11/19/01
Fairfax Financial	Stock	$158	11/20/01
Arch Capital	Stock	$763	11/20/01
Philadel. Cons.	Stock	$121	11/21/01
Allstate	Debt	$550	11/26/01
Allied World	Stock	$959	11/26/01
Montpelier	Pvt. Equity	$1,000	12/01
Brit	Various	$410	12/01
Wellington	Stock	$564	12/01
Progressive	Debt	$350	12/06/01
IPC Holdings	Stock	$455	12/06/01
Converium**	Stock	$985	12/11/01
Kingsway	Stock	$90	12/12/01
RGA	Various	$210	12/13/01
Endurance	Various	$800	12/14/01
PMA Capital	Stock	$169	12/17/01
Alea	Stock	$250	12/20/01
Goshawk Re	Stock	$142	12/20/01
Irish Re***	Various	$267	12/01
Hiscox	Stock	$77	12/01
PXRE	Pref. Stk.	$150	12/01
XL Capital	Debt	$600	01/07/02
Radian Group	Conv, Debt	$200	01/08/02
Total Completed		**$20,844**	

Source: Morgan Stanley, "Update on WTC - Related Issues", 12/20/01

Table 3
Share Repurchases by Insurance Companies

This table shows the insurance companies that announced repurchases of their common stock between 9/11/2001 and 11/16/2001. It also shows the announcement dates and the amount of the repurchases as announced, either in number of shares, total dollar amounts, or both.

Firm	Announcement Date	Amount
AIG	9/14/2001	up to 40M shares/$3 billion
HCC Holdings	9/14/2001	up to 3M shares
Allstate	9/17/2001	$500 M
Fairfax Financial	9/17/2001	up to 1M shares
Max Re Capital Ltd.	9/17/2001	up to $15M
Partner Re	9/18/2001	up to 4.3 M shares
Reinsurance Group of America	9/18/2001	up to $25 M
Abac	9/20/2001	up to 1M shares
Odyssey Re	9/20/2001	up to 2M shares
Max Re Capital Ltd.	9/27/2001	up to $25M
Vesta Insurance Group	11/8/2001	up to 1.3 M shares
Vesta Insurance Group	11/13/2001	up to 5M shares
Ace	11/16/2001	up to $250 M
Commerce Group	11/16/2001	up to 2M shares

Source: Morgan Stanley, "Update on WTC - Related Issues", 12/20/01

Table 4
Regression of Price Change on September 17

This table reports results from several OLS regressions in which the dependent variable is the change in price from the close of trading on September 10, 2001 to the close of trading on September 17, 2001, a one-day trading period as the stock market was closed between the two dates. The sample includes 86 publicly-traded insurance companies with adequate data on Bloomberg Professional for the time period. The independent variables include a dummy variable for whether a firm announced the estimated net losses from the 9/11 event by September 17 (equal to 1 if the firm announced and 0 otherwise); the dollar amount of the estimated net loss, and a series of dummy variables for insurance company type. Model 1 includes the announcement dummy and the estimated net loss. Model 2 includes only the five insurance company type dummy variables. Model 3 includes all variables. Models 2 and 3 are constrained from having intercepts in order to show all five type dummies. The t-statistics for each coefficient are reported in parentheses.

	Model 1	**Model 2**	**Model 3**
Intercept	-0.044*** (-4.03)		
Net Announcement By Sept. 17 Dummy	0.039* (1.70)		.009 (0.42)
Announced Net Loss On Sept. 17	-1.182*** (-7.34)		-0.783*** (-5.60)
Small Capitalization		-0.042*** (-2.81)	-0.033*** (-2.66)
Large Capitalization		-0.061*** (-4.57)	-0.036** (-2.38)
Lloyds		-0.228*** (-10.45)	-.167*** (8.66)
Broker		0.070* (1.79)	0.070** (2.23)
Personal Lines		0.026 (0.18)	0.005 (0.22)
Adjusted R^2	43.03%	61.04%	75.49%
F-statistic	33.48	28.26	39.27

*** indicates statistical significance at the 1% level; ** at the 5% level; * at the 10% level.

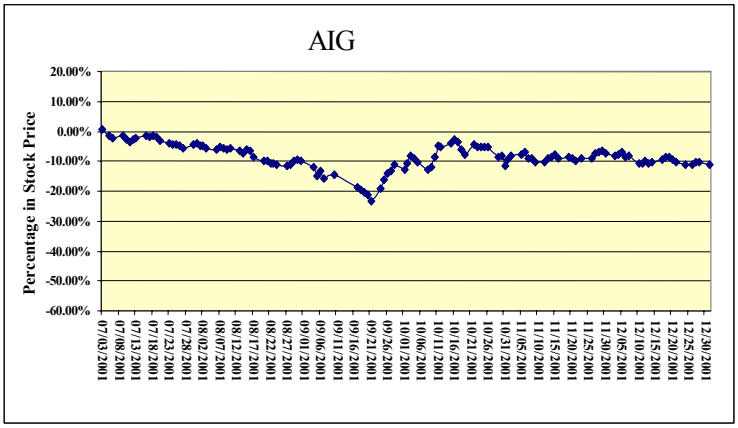
Table 5
Regression of Price Change from 9/10/2001 through 11/16/2001

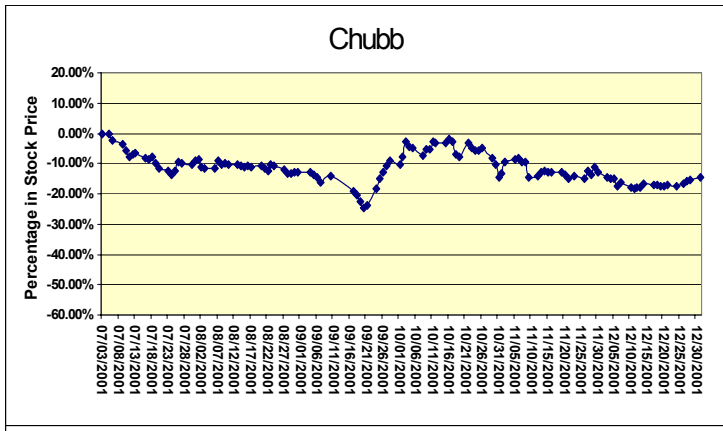
This table reports results from several OLS regressions in which the dependent variable is the change in price from the close of trading on September 10, 2001 to the close of trading on November 16, 2001. Due to lack of data on The independent variables include a dummy variable for whether a firm announced the estimated net losses from the 9/11 event over the sample period (equal to 1 if the firm announced and 0 otherwise); the dollar amount of the estimated net loss, a dummy variable for whether a firm announced the estimated gross losses from the 9/11 event over the sample period (equal to 1 if the firm announced and 0 otherwise); the dollar amount of the estimated gross losses, the company's leverage as of year-end 2000. The six regression models have three different proxies for the company's growth opportunities. Models 1 and 2 use the growth in the firm's assets over the previous three years; Models 3 and 4 use the change in analysts' mean forecasts of earnings where the change is measured between forecasts at June 14 and the first forecast after 9/11; Models 5 and 6 use a dummy variable for whether the company issued new equity capital after 9/11. For Models 1, 2, 5 and 6, the sample includes 80 publicly-traded insurance companies with adequate data on Bloomberg Professional over and for Models 3 and 4, 63 companies with adequate data on Bloomberg Professional and IBES. The t-statistics for each coefficient are reported in parentheses.

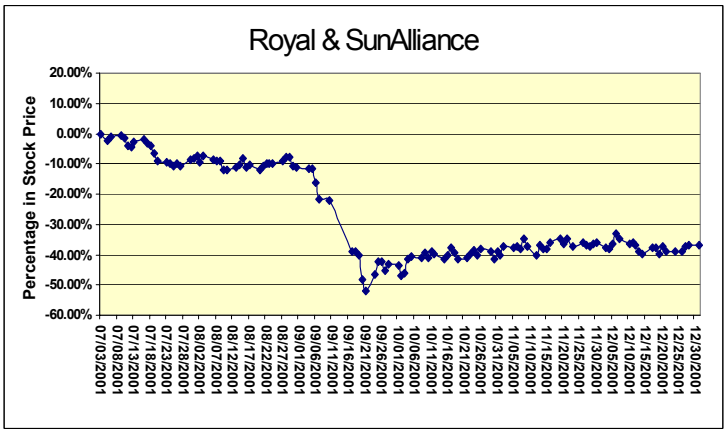
	Model 1	***Model 2***	***Model 3***	***Model 4***	**Model 5**	**Model 6**
Intercept	0.064** (2.39)	0.101*** (4.14)	0.075** (2.54)	0.114*** (4.22)	0.060** (2.25)	0.090*** (3.68)
Net Announcement Dummy	0.100*** (2.87)		0.105*** (2.72)		0.088** (2.49)	
Announced Net Loss	-0.652*** (-4.83)	-0.555*** (-4.06)	-0.663*** (-4.70)	-0.556*** (-3.89)	-0.729*** (-5.21)	-0.671*** (-4.70)
Gross Announcement Dummy	-0.027 (-0.46)	0.026 (0.45)	-0.036 (-0.63)	0.005 (0.09)	-0.028 (-0.48)	0.003 (0.35)
Announced Gross	0.019 (0.15)	0.024 (0.18)	-0.012 (-0.08)	0.031 (0.21)	-0.005 (-0.05)	0.003 (0.03)
Preleverage	-0.007** (-2.48)	-0.008*** (-2.65)	-0.006* (-1.73)	-0.006* (-1.85)	-0.008** (-2.55)	-0.008*** (-2.71)
Asset Growth	-0.0003 (-1.12)	-0.0004 (-1.18)				
Change in Analyst Forecasts			0.199 (0.94)	0.155 (0.70)		
New Equity Capital					0.075 (1.62)	0.101** (2.17)
Adjusted R^2	28.08%	21.16%	28.43%	20.51%	29.38%	24.46%
Number of Observations	80	80	63	63	80	80

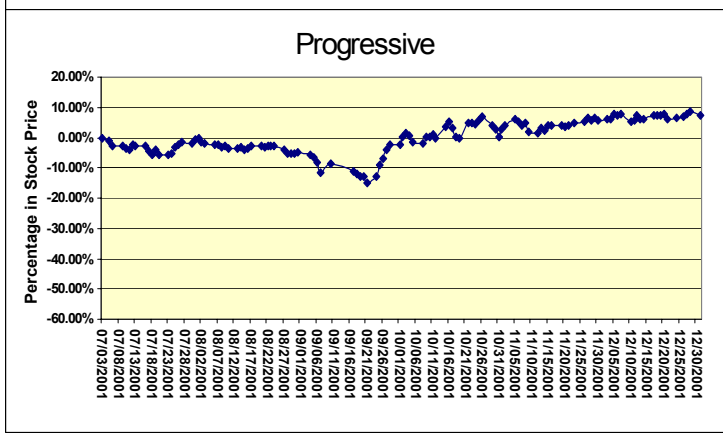
* **indicates statistical significance at the 1% level; ** at the 5% level; * at the 10% level.

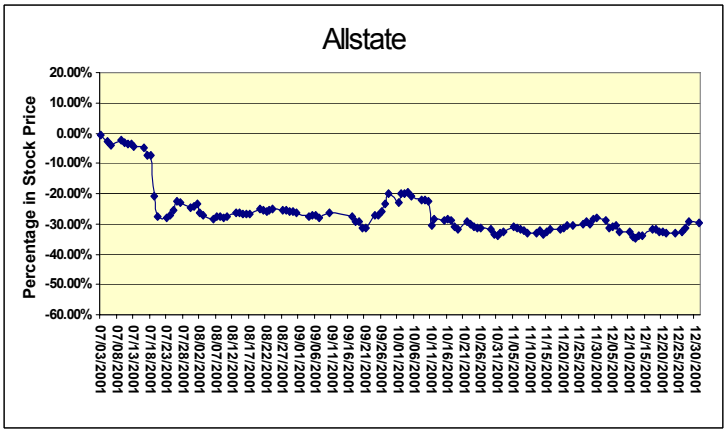
FIGURE 1A. STOCK PRICES FOR SELECTED INSURERS











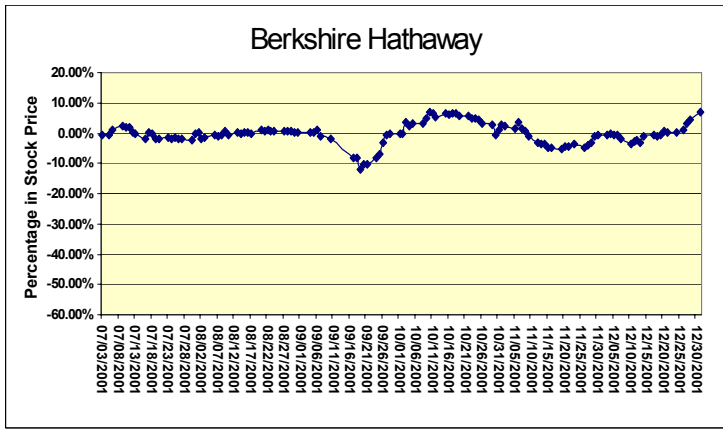
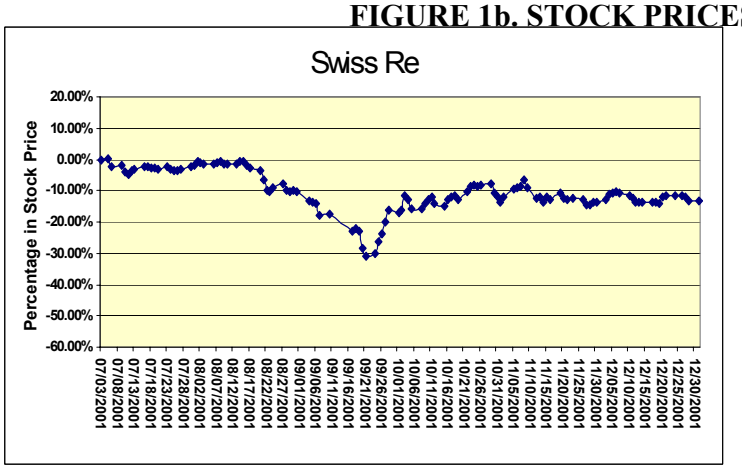
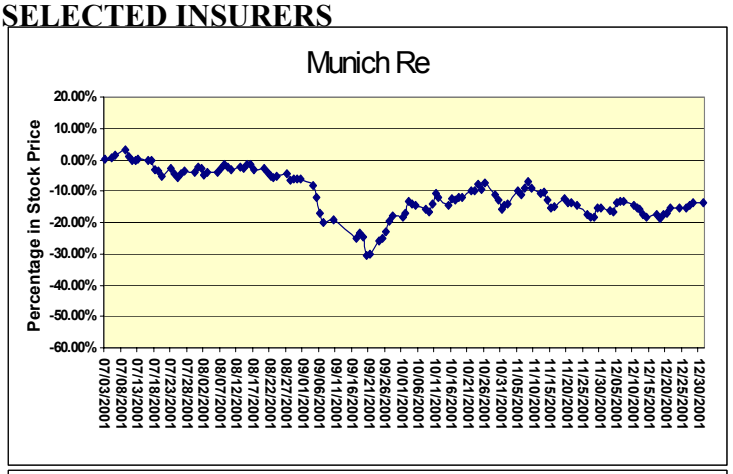
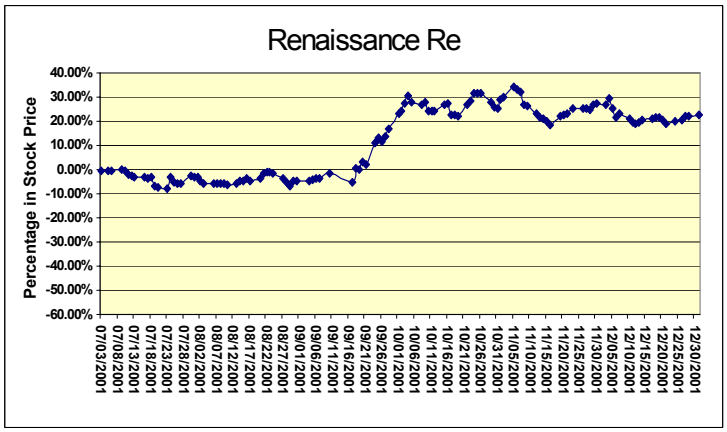
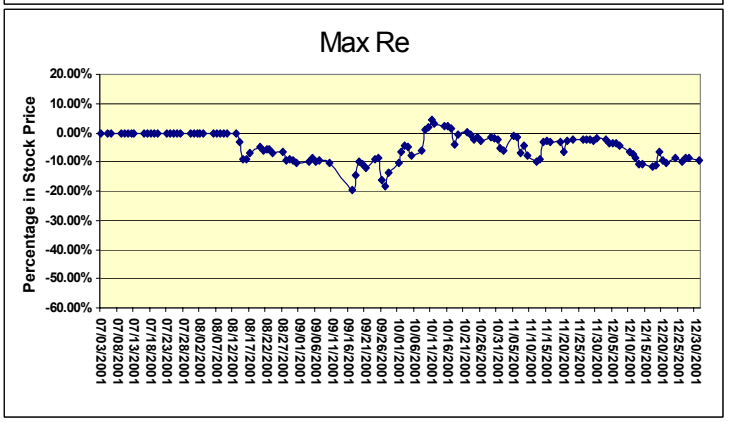


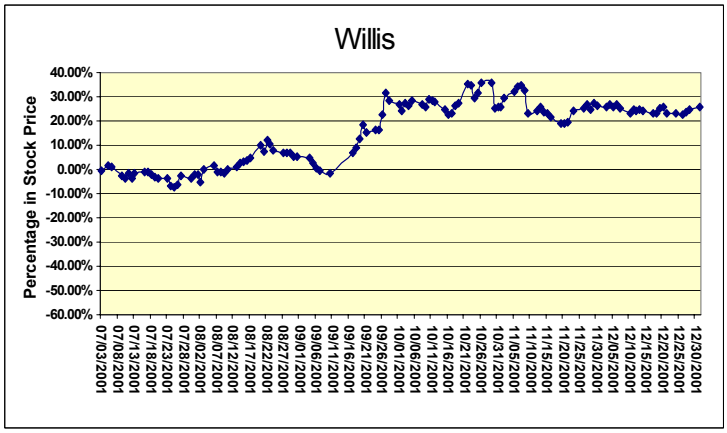
FIGURE 1b. STOCK PRICES FOR SELECTED INSURERS











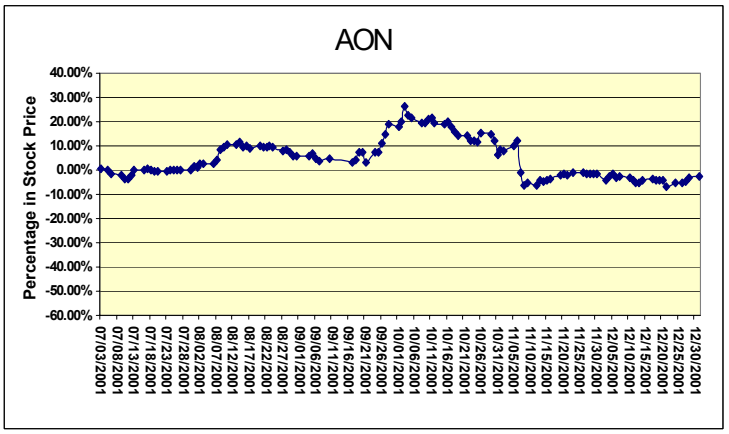


Figure 2.
Implied Volatility (10 day) - American International Group - June to December 2001