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**An Analysis of the Impact of Contingent Commission Use on Underwriting Performance in Property-Liability Insurance Industry**

By

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**Abstract**

Top brokers were banned from receiving contingent commissions following the inquiry into the industry about 12 years ago led by Eliot Spitzer, former New York attorney-general. But the ban raised concerns about whether it created a level playing field across the industry, as smaller brokers carried on taking them. In addition, despite the possible conflicts of interest, contingent commissions have also been recognized as a way to better align agent and insurer incentives. Regulators agreed to change the terms for the leading brokers in 2010, resulting in a less onerous compliance regime. It is important to study the effectiveness of contingent commission use on improving underwriting performance. The purpose of my research is to examine the relationship between contingent commission use and underwriting performance after controlling for self-selection bias using most recent data from 2007 to 2014. In my study, I find strong evidence supporting my hypothesis that contingent commissions’ usage improves insurers’ underwriting performance.

Keywords: contingent commissions, distribution system, underwriting performance

**1. Introduction**

New York Attorney General Eliot Spitzer announced a civil suit in the New York State Supreme Court against the world’s largest insurance broker Marsh & McLennan Cos. (MMC) and several other insurers for bid rigging and inappropriate use of contingent commissions in 2004. This suit raised a discussion about the use of contingent commissions, an arrangement in which an insurance intermediary receives a percentage of the premiums realized by the insurer, if it meets certain goals in terms of volume, persistency, and profitability in the business it with the insurer.

The suit against MMC caused a great loss for insurance industry. After the suit, leading brokers stopped receiving contingent commissions as payments and several insurers also eliminated the use of contingent commissions. Model laws were developed on regulating the use and disclosure of contingent commissions use by National Association of Insurance Commissioners (NAIC). The NAIC also developed a set of requirements for brokers’ compensation disclosure.

Whether or not should insurers include contingent commissions in their compensation scheme? Prior literature (e.g., Cummins and Doherty, 2006; Cummins et al., 2006; Cheng, Elyasiani, and Lin, 2010) provide evidence that the use of contingent commissions could improve the efficiency of insurance market. However, only a few prior papers focus on examining the impact of contingent commission use on underwriting performance. Regan and Kleffner (2010) contributes in this aspect by investigating whether contingent commissions are associated with improved insurer underwriting performance using data from 2001 to 2005, the period around the Spitzer suit against Marsh. However, one problem remains unsolved in their research. Contingent commission use may be possibly due to self-selection, which can result in potential bias of the estimated coefficients. The purpose of my research is to examine the relationship between contingent commission use and underwriting performance after controlling for self-selection bias using the most recent data.

A treatment effect model is used to control the self-selection bias. I utilize a caliper (caliper=0.005) matching with no replacement on a propensity score estimated with categorical variables in this study under the common support assumption. After matching, a pseudo “random” sample is created where any difference in underwriting performance between firms in treated and control groups is due to the use of contingent commissions. OLS regressions are employed on the matched sample with underwriting performance measurer as the dependent variable and contingent commission use/ratio of contingent commissions to total commissions paid as the variable of interest while controlling for other variables.

I find that contingent commissions’ usage improves insurers’ underwriting performance by lowering both the loss ratio and the combined ratio. This result indicates that although contingent commission users may have higher expense ratios, the increased underwriting costs can be offset by the savings from improved loss performance. However, for firms using contingent commissions, the loss ratio declines as the proportion of contingent commissions increases while the combined ratio increases though with no statistical significance.

The remainder of the article is organized as follows. In Section 2, I review and discuss the related literature and develop the hypotheses. The methodology and variable description is give in Section 3. Section 4 discusses the data utilized in the study. Section 5 reports the results and implications, and Section 6 concludes.

**2. Literature Review & Hypothesis Development**

**2.1. Literature Review**

Since New York Attorney General Eliot Spitzer filed a civil suit against Marsh & McLennan Cos. (MMC) and several other insurers in 2004, a heated debate on contingent commission use has been launched in both academia and industry. Cummins and Doherty (2006), Cummins et al. (2006), and Carson, Dumm, and Hoyt (2007) all offer a great overview on the mechanisms as well as the role of contingent commissions. Cummins and Doherty (2006) investigates the functions performed by brokers and agents, the competitiveness of the marketplace, compensation arrangements, and the process by which policies are placed with insurers. They find that contingent commissions are borne by policyholders rather than insurers. They also explain that contingent commissions can potentially enhance the efficiency of insurance markets.

Cummins et al. (2006) summarizes a panel discussion for the 2005 World Risk and Insurance Economics Congress (WRIEC) on changes of insurance brokerage industry caused by the 2004 Spitzer suit from perspectives of academic, brokers, and regulatory. They conclude that contingent commissions are not the top reasons really causing or may cause problems in insurance industry, although their use should be made public to policyholders. Rather, the high concentration of top brokerage industry, the operating roles of brokers as primary insurers or reinsurers, and antitrust surveillance need more attentions. Carson, Dumm, and Hoyt (2007) find that contingent commissions, serving as an effective and efficient way in insurance marketplace helping consumers to get appropriate products and services, is a natural result of the development of a competitive insurance market. They bring benefits to all parties including policyholders, insurers, and agents.

Prior literature also tests the market reaction to the Spitzer suit in 2004. Both using evidence from stock market, Cheng et al. (2010) and Ghosh and Hilliard (2012) deliver similar conclusions. They find both negative contagion and positive competitive effects present in the insurance industry with the former being dominant, implying that different sectors of the insurance industry are closely integrated. They also find that the information-based contagion hypothesis is supported against the pure contagion hypothesis. However, Cheng et al. (2010) examine the market reactions to the Spitzer suit on three portfolios, including P-L and Life insurers and brokers using GARCH (1,1) model while Ghosh and Hilliard (2012) test hypothesis by utilizing restriction tests on different subsamples of insurers for various event windows, showing changes of market reaction to the event along time.

Several papers focus on examining the determinants of whether or not an insurer chooses to pay contingent commissions and the extent of their use for those insurers that pay them. Colquitt, McCullough and Sommer (2011) contributes in this aspect by examining the determinants of whether or not an insurer chooses to pay contingent commissions at all, as well as the determinants of the extent of their use for those insurers that pay them using data from years prior to the Spitzer suit against Marsh. Their findings suggest that firm size, distribution system, organizational form, diversification and other characteristics play an important role in using contingent commissions. Regan and Tennyson (1996) examine the relation between contingent commissions and distribution system. They utilize a Tobit model and find a positive relation between the use of independent agencies and the use of contingent commissions.

In regarding to the argument that the use of contingent commissions could improve the firm value, existing studies report different results, which implies that the relationship between firm performance and contingent commissions’ usage is complex. Ma, Pope, and Xie (2009) find that the use of contingent commissions is not associated with better firm performance. Moreover, Ma, Pope, and Xie (2013) find a negative relationship between contingent commissions’ usage and levels of firm performance using an efficiency model. However, Ma, Pope, and Xie (2013) also find that higher levels of use of contingent commissions are associated with higher levels of firm performance. In addition, Ma, Pope, and Xie (2014) suggest that the decision to abandon the use of contingent commissions after 2004 is associated with decreases in insurer performance. Regan and Kleffner (2010) report similar findings, stating that contingent commissions are associated with improved insurer underwriting performance using data from 2001 to 2005, the period around the Spitzer suit against Marsh. However, one problem remains unsolved in their research. Contingent commission use may be possibly due to self-selection, which can result in potential bias of the estimated coefficients. The purpose of my research is to examine the relationship between contingent commission use and underwriting performance after controlling for self-selection bias using the most recent data.

**2.2. Hypothesis Development**

It is important to study the effectiveness of contingent commission use on improving underwriting performance. The largest brokers were banned from using contingent commissions as part of their incentive compensation scheme after the Spitzer suit against Marsh. However, smaller brokers kept receiving contingent commissions, which raised concerns on possible consequences in insurance market. Moreover, prior literature prove that contingent commission could better align the incentives of agents and insurers, resulting in a higher level of efficiency in insurance industry. In 2010, regulators changes the terms of contingent commissions’ usage for the top brokers. “Among the top brokers, Marsh refuses to take contingent commissions for clients in its core U.S. brokerage business but does accept them in its agency and consumer business. Aon, after the ban was lifted in 2010, said it would accept contingent commissions where ‘appropriate and legally permissible’. Willis does not accept contingent commissions on its retail property/casualty business but began accepting them on employee benefit business as of April 1. Gallagher automatically discloses any supplemental income paid by underwriters.”[[1]](#footnote-1)Thus, this is a good time point to examine the effectiveness of contingent commission use on improving underwriting performance.

According to the fact that contingent commissions offer a better risk selection and better matching of client risk type with insurer risk appetite, I develop the following hypotheses:

***Hypothesis 1:*** Insurers paying contingent commissions would experience better underwriting performance.

***Hypothesis 2:*** The underwriting performance would further improve as the percentage of contingent commissions paid increase.

Following Regan and Kleffner (2010), I measure underwriting performance using the loss ratio and the combined ratio. The loss ratio is defined as the sum of the total losses incurred and adjustment expenses divided by total premiums earned. The loss ratio indicates whether an insurer collects enough premiums to pay in claims. Thus, insurers that have high loss claims suggests possible financial troubles. The combined ratio is measured as the sum of the loss ratio and the expense ratio. A lower combined ratio indicates a better underwriting performance. If a better underwriting performance is associated with the contingent commissions’ usage, a lower loss ratio should be found for insurers using contingent commissions. However, if the saving from improved loss performance cannot be offset by the increased underwriting costs caused by contingent commission payments, a higher combined ratio would be found for contingent commission users. Therefore, a lower loss ratio as well as a lower combined ratio is expected for insurers using contingent commissions in their compensation scheme.

**3. Methodology & Variables**

**3.1. Methodology**

The primary objective of this study is to examine the relationship between contingent commissions use and insurers’ underwriting performance. I hypothesize that if agents exercise discretion in underwriting because of incentives provided by contingent commission payments, and therefore get better risk selection and better matching of client risk type with insurers’ risk appetite, then insurers using contingent commissions will experience better underwriting results on average. Thus, the expected result is that the use of contingent commissions improves underwriting performance, and underwriting performance increases as the ratio of contingent commissions to total commissions paid increases. An OLS regression is used with underwriting performance measure as the dependent variable and contingent commission use/ratio of contingent commissions to total commissions paid as the variable of interest while controlling for other variables.

The study uses two measures of underwriting performance. The loss ratio is measured as the sum of incurred losses and loss adjustment expenses divided by net premiums earned. This ratio measures the company's underlying profitability on its total book of business. The combined ratio is measured as the sum of the loss ratio and expense ratio. This ratio measures a company's overall underwriting profitability. The natural logarithm values of these two ratios are used in the estimation because both of the ratios are highly skewed. I will test other performance measures in further study, including ROA and ROE, to examine the effect of contingent commission usage in improving firm performance in a wide way. To test my hypothesis, the following regressions are estimated:

(1)

(2)

(3)

(4)

where ;

;

I will also estimate overall regressions including both the proportion of contingent commission variable and contingent commission usage indicator. The regressions are as follows:

(5)

(6)

Contingent commissions use may be possibly due to self-selection, which can introduce endogeneity problem and result in potential bias of the estimated coefficients. The treatment effect model can be used to correct for the self-selection problem. Treatment evaluation is an econometric framework for analysis of cases with a binary independent variable. To assess the impact of treatment, it is necessary to have identical subjects some of whom are treated and others are not. Practically, this approach is infeasible and special econometric techniques should be used instead. The treatment evaluation framework provides such techniques and takes into account that each subject can be either treated or untreated and the counterfactual state is unobservable; the eﬀect of treatment can vary across subjects; the eﬀect of treatment and the choice of being treated can be determined by the same factors, that is, treatment can be endogenous. The characteristics of interest is average treatment effect on the treated (ATE1), which directly measures the impact of treatment. According to the definition, .

By definition, the propensity score is

(7)

So it is the conditional probability of being treated (contingent commissions use in this case), given observed baseline covariates Z (Rosenbaum and Rubin, 1983). The propensity score methods are based on the following fact (propensity score theorem): the ignorability of treatment assumption implies that conditional on, the treatment and are independent.[[2]](#footnote-2)

I utilize a caliper (caliper=0.005) matching with no replacement on a propensity score estimated with categorical variables in this study under the common support assumption.[[3]](#footnote-3) Each treated unit is selected to find its closest control unit according to the propensity score. If no control units had propensity scores that lie within the common support area of the treated unit, the treated subject would not be matched with any control subject and would then be excluded from the matched sample. In this way, a pseudo “random” sample is created where any difference in underwriting performance between firms in treated and control groups is due to the use of contingent commissions.

A Heckman two-step estimation will be examined in future study as supplementary and robustness check.[[4]](#footnote-4) In the ﬁrst stage, a probit regression will be estimated based on whether an insurer uses contingent commissions. The second stage regression, which includes the inverse Mills ratio calculated from the ﬁrst equation in order to control for selection bias, will be estimated to examine whether underwriting performance increases as the ratio of contingent commissions to total commissions paid increases.

**3.2 Variables**

Firm-specific factors included in the model that are hypothesized to affect underwriting performance as control variables generally follow previous literature. Such variables include firm size, financial leverage, business mix, business-line diversification, geographical diversification, reinsurance, advertising, underwriting surveys and audits, distribution system, organizational structure, group affiliation and publicly traded firm.

Firstly, firm size is measured as natural log of a firm’s total admitted assets. Larger firms tend to realize economies of scale, resulting in a lower labor cost in delivering insurance products. Moreover, larger firms are normally more diversified than small firms, which enables insurers to have a greater capacity to quickly respond to changes in market conditions. Regan and Kleffner (2010) find that underwriting performance is positively related to firm size. Therefore, a positive and significant relationship is expected between underwriting performance and firm size.

Secondly, I include financial leverage, which is measured as the ratio of total liabilities to total surplus. The degree of ﬁnancial leverage reﬂects insurers’ ability to manage their economic exposure to unexpected losses. Therefore, a low level of leverage reduces the need for managers to increase investment earnings. According to MM’s Proposition II, the more financial leverage, the higher expected return on equity with the increase in risk (Brealey & Myers, 2000). In addition, the free cash ﬂow hypothesis states that high ﬁnancial leverage can increase a company’s ﬁnancial performance because it forces managers to generate cash ﬂows in order to meet their obligations to ﬁxed claimants (Jensen, 1986). Regan and Kleffner (2010) also find a positive relationship between leverage and underwriting performance. Therefore, a positive and significant relationship is expected between underwriting performance and financial leverage.

In addition, I include the proportion of total premiums written in commercial lines to account for the impact of commercial lines of business.[[5]](#footnote-5) Insurers have more premiums written in commercial lines tend to be larger firms. Since underwriting performance is expected to be positively related to firm size, a positive relationship between underwriting performance and commercial lines of business is also expected.

Firms with a greater level of diversification enable insurers to better respond to a loss shock occurred in a single line of business or geographic location. To control for the effect of diversification on insurers’ underwriting performance, I will add two Herfindahl index variables: geographic Herfindahl-Hirschman Index (HHI) and line-of-business HHI.[[6]](#footnote-6) Both of the two Herfindahl indexes are based on net premiums written by lines of business and states, respectively. According to Regan and Kleffner (2010), a better underwriting performance is associated with a higher level of concentration of insurers’ business. Thus, a positive and significant relationship is expected.

Reinsurance is defined as premiums ceded divided by direct premiums written plus reinsurance assumed. Adams and Bucle (2003) find that reinsurance companies are likely to have better firm performance because of a higher level of diversification in business and lower costs of regulatory compliance. However, Shiu (2004) report a negative relationship between reinsurance dependence and firm performance and they offer an explanation that the benefit of reinsurance may decrease beyond a threshold. Thus, the relationship between reinsurance and underwriting performance is unclear.

An indicator variable is included to account for use of distribution system based on information provided by Best’s Key Rating Guide. The dummy equals 1 for insurers using the independent agency system or broker, and 0 otherwise. According to D’Arcy and Doherty (1990), insurers are more easily convinced by independent agents of the validity of information they provide to them in regard to prospective policyholders because of the use of profit-based contingent commissions. Similarly, Regan and Tennyson (1996) argue that contingent commissions could provide incentives to independent agents and brokers, who are more involved in assisting insurers with risk assessment than exclusive agents, to do effective risk assessment. Thus, the independent agency system or broker indicator is included as a control variable. In addition, Regan and Kleffner (2010) find a positive relation between the use of independent agency system or broker and underwriting performance.

Firms that are group members could increase underwriting performance by pooling losses with their members. Therefore, I utilize an indicator variable equaling to 1 if the firm is a group member, and 0 otherwise. According to Regan and Kleffner (2010), firms that are group members would have better underwriting performance.

Risk difference is found to exist between stock and mutual insurers. Lamm-Tennant Starks (1993) provide empirical evidence that stock insurers have more risk than mutual insurers where the risk is inherent in future cash flows. Therefore, I include organizational form indicator to control for possible differences in underwriting strategy between firms with different organization forms. Organizational form is measured as a dummy variable which equals 1 if the insurer is a stock company, and 0 if it is a mutual company.

Cheng et al. (2007) find strong adverse stock market reactions to the announcement of the 2004 Spitzer suit against Marsh alleging bid rigging and other illegal activities, which indicate that market believes that contingent commissions improve insurer underwriting performance. Therefore, an indicator variable is included and equals 1 if the firm is publicly traded and 0 otherwise.

Advertising is measured as the ratio of advertising expenditure to net premium written. Underwriting surveys and audits is measured as the ratio of underwriting survey and auditing expenses to net premium written. Insurers may increase advertising to compensate the agent’s efforts in risk assessment so that qualified risks might be attracted that match the insurer’s objectives. Similarly, insurers may conduct underwriting surveys or audits to directly observe client risks as a substitute for compensating agents for risk assessment efforts. Since the main purpose of this study is to examine the relationship between contingent commissions use and underwriting performance, I also include these two variables as control variables.

**4. Data**

This project utilizes firm-level property–casualty data obtained from the National Association of Insurance Commissioners’ (NAIC) annual statements and Best’s Key Rating Guide from 2007 to 2014. Best’s Key Rating Guide is utilized to access data of distribution system, group member, organizational form and publicly traded firms. The commission and other financial data are obtained from NAIC database.

A number of screens are made before estimating the models. Insurers that reported non-positive numbers for total admitted assets, liabilities, and surplus are excluded. I will also screen for non-positive numbers for net premiums written in future study. Another step in the sample selection process is to exclude insurers reporting incomplete figures for any of the dependent or independent variables used in the models. The sample before matching is an unbalanced panel data set including 7,495 firm-year observations. Dependent and independent variables are winsorized at 1% and 99% in order to reduce the influence on estimations by big outliers in the sample**.**

The statistics summary for independent variables is provided in Table 1. I divide the whole sample into two parts according to whether or not an insurer pays contingent commissions. As can be seen, statistically significant differences exist in most of the variables mentioned before for firms using contingent commissions and those not according to t-test results. On average, firms that pay contingent commissions have significantly lower loss ratio and combined ratio than those do not at 1% level of significance, which indicates a better underwriting performance for firms using contingent commissions. The average loss ratio for firms using contingent commissions is 66.46 while one for firms not is 69.90. The combined ratio is 104.02 for firms that pay contingent commissions compared to 114.66 for those that do not use contingent commissions.

The summary statistics are also interesting for control variables. As can be seen, the average asset size of the users is 19.19**,** which is statistically larger than that of the nonusers, 18.16. However, the average value of the commercial lines variable for users is statistically smaller than that of the nonusers, which is inconsistent with the hypothesis. The users on average show significantly lower financial leverage than the nonusers. In addition, the contingent commission users are more diversified in both lines of business and geography. Moreover, the contingent commission users tend to use more reinsurance volume, with a value of 0.90 for users compared to a value of 0.51 for nonusers. The nonusers expend more on advertisings than users while the users tend to spend more on surveys and audits compared to nonusers. As can be seen, 77.0% of users are stock firms while 72.8% of nonusers are stock firms. 81.0% of users are group members while only 50.7% of nonusers are not. Similarly, 66.4% of users use independent agencies or brokers while only 32.1% of nonusers do. Also, 0.5% of users are publicly traded firms while 0.2% of nonusers are publicly traded firms.

Table 2 reports the T-test results for the differences in variable means between firm-years with contingent commissions payments (Usecont = 1) and those without contingent commissions payments (Usecont = 0) after matching. The original sample includes 4,545 observations of contingent commissions’ users and 2,948 observations of nonusers. After matching, the sample reduces to 4,025 firm-year observations of users and 2,797 firm-year observations of nonusers. As can be seen, the difference in means of both loss ratio and combined ratio is reduced a lot. The difference in means of loss ratio is reduced from -0.038 to 0.029. At the same times, the difference in means of combined ratio is reduced from 0.032 to 0.019. Although the matching is not perfect, the means of most of covariates are no longer significantly different. For covariates that the difference of means are still significantly different, the difference becomes much smaller, suggesting that the matched sample is well balanced between the two groups of firms compared to the original sample.

**5. Results**

A Probit model is employed to estimate the likelihood (propensity score) of contingent commissions usage based on firm characteristics, the result of which is shown in Table 3. We can see that insurers that are larger in size, writing fewer premiums in commercial lines, more diversified in both lines of business and locations are more likely to include contingent commissions in their compensation scheme. In addition, insurers that are group members, having an organizational form of mutual insurers, or using independent agencies or brokers tend to employ contingent commissions.

Equation (1) and equation (2) are examined on the matched sample to evaluate whether underwriting performance is associated with the use of contingent commissions with the loss ratio and the combined ratio as dependent variables separately. The results are reported in Table 4. The fixed effects will be tested in future study. I will employ a Hausman test where the null hypothesis is that the preferred model is random effects against the alternative the fixed effects. The estimated coefficients for the contingent commission indicator variable are negative and significant in both models, with a significance level of 5%. This results indicate that contingent commissions’ usage improves underwriting performance. Although contingent commission users may have higher expense ratios, the increased underwriting costs can be offset by the savings from improved loss performance.

For control variables, size is found to be positive and significantly related to the loss ratio and negative and significantly associated with the combined ratio, which indicates that larger insurers have a higher loss ratio as well as a much lower expense ratio. One explanation is that large firms could realize economies of scale. The estimated coefficients for commercial-line variable are negative and significant in both models with a significance level of 1%, indicating that insurers writing more premiums in commercial lines have better underwriting performance. Leverage is found to be positive and significantly related to the loss ratio and positive but not significantly related to the combined ratio, which indicates that a more leveraged insurer is not associated with a better underwriting performance. This finding is inconsistent with either MM’s Proposition II or the free cash ﬂow hypothesis. Insurers that are more diversified in both lines of business and locations are found to be associated with better underwriting performance. Stock firms show better underwriting performance compared to mutual insurers. In addition, insurers that are group members are positive and significantly associated with both the loss ratio and the combined ratio. Similarly, the coefficient of publicly traded insurers are positive and significant in the loss ratio regression. Moreover, insurers with more premiums written in reinsurance show worse underwriting performance.

To examine Hypothesis 2, equation (3) and equation (4) are examined on the matched sample containing only firms including contingent commissions in their incentive compensation scheme. The contingent commission indicator is replaced with the proportion of contingent commissions used to total commissions as the variable of interest. Table 5 presents the results of the regression models that examine the relationship between underwriting performance and the proportion of contingent commissions. As can be seen, the coefficient of the contingent commission variable is negative and significantly related to the loss ratio, indicating that the loss ratio declines as the proportion of contingent commissions in total commissions increase. However, inconsistent with the findings of Regan and Kleffner (2010), the coefficient of interest is positive but not significant in the model with the combined ratio as dependent variable. The results indicate that although firms using more contingent commissions experience a statistically significant lower loss ratio, they may also have a relatively higher expense ratios at the same time. I will conduct regressions with the expense ratio as the dependent variables to examine whether firms using more contingent commissions experience higher expense ratios. For now, an implication of the results is that the benefits of contingent commissions on insurers’ underwriting performance become smaller beyond a threshold. Further research can try to find the optimal threshold. In a word, insurers have to determine an appropriate proportion of contingent commissions used in total commissions, depending on their individual situations, meaning that they have to try to strike a balance between the increased expense ratio and reduced loss ratio.

For control variables, similar to the findings of previous two models with contingent commission indicator, size is positive and significantly related to the loss ratio but losses significance in the combined ratio model. Commercial line variable is found to be negative and significantly associated with both the loss ratio and the combined ratio, indicating that insurers with more premiums written in commercial lines have better underwriting performance. According to Cummins and Doherty (2006), the need for underwriting assistance by intermediaries is the greatest for “complex coverages such as the commercial PC lines”. Thus, this result may also suggest the positive effect of contingent commission use on insurers’ underwriting performance. Moreover, more leveraged insurers are associated with higher loss ratio. Stock firms again show better underwriting performance compared to mutual insurers. The coefficient of insurers using independent agencies or brokers are negative and significant in the combined ratio regression. Again, insurers with more premiums written in reinsurance show worse underwriting performance. What is new in these two models is that advertising is found to be positive and significant at 10% in the combined ratio model while survey and audit is negative and significantly related to the combined ratio. In addition, lines-of-business diversification is negative and significantly related to the loss ratio but positive and not significant in the combined ratio model. Geography-diversification also losses its significance in both models.

**6. Conclusion**

I employ OLS models to examine the relationship between contingent commission use and underwriting performance using firm-level PC insurers’ data for the period from 2007 to 2014. The underwriting performance as the dependent variable is measured using the loss ratio and the combined ratio and contingent commission use/ratio of contingent commissions to total commissions paid is the variable of interest. I also control for other firm characteristics including firm size, leverage, commercial line business, diversification, reinsurance, organizational form, group member, independent agency and broker, publicly traded firm, expenditure on advertising, surveys and audits. A treatment effect model is used to control the self-selection bias. I utilize a caliper (caliper=0.005) matching with no replacement on a propensity score estimated with categorical variables in this study under the common support assumption. A matched sample is where any difference in underwriting performance between firms in treated and control groups is due to the use of contingent commissions.

I find that contingent commissions’ usage improves insurers’ underwriting performance. This result indicates that although contingent commission users may have higher expense ratios, the increased underwriting costs can be offset by the savings from improved loss performance. For firms using contingent commissions, the loss ratio declines as the proportion of contingent commission increases. However, the coefficient of the contingent commission proportion variable is positive but not significantly related to the combined ratio. An implication is that the benefits of contingent commissions on insurers’ underwriting performance become smaller beyond a threshold. Insurers have to determine an appropriate proportion of contingent commissions used in total commissions, trying to strike a balance between the increased expense ratio and reduced loss ratio. Thus, one possible area of further research is to find the optimal level of contingent commissions in total commissions. This study also provides evidence supporting the relaxed regulation on the ban of using contingent commissions after 2004.

One drawback of this study is that the matched sample is not well balanced. Significant difference still exists in the mean test of some key variables between firms using contingent commissions and those not although the difference is reduced a lot. Better matching methods could be tried to achieve a more balanced matched sample.

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| **Table 1** | | | | | | |
| **Summary Statistics** | | | | | | |
|  | **UseCont=0 ( N= 2948 )** | | **UseCont=1 ( N=4545 )** | |  |  |
|  | **mean** | **Std. Dev.** | **mean** | **Std. Dev.** | **diff.** |  |
| LossRatio | 4.1103 | 0.6773 | 4.1479 | 0.4003 | -0.0376 | \*\*\* |
| CombinedRatio | 4.6387 | 0.4693 | 4.6055 | 0.2618 | 0.0332 | \*\*\* |
| Size | 18.1598 | 1.9165 | 19.1929 | 1.8117 | -1.0331 | \*\*\* |
| Commercial | 0.6773 | 0.4226 | 0.5976 | 0.3640 | 0.0797 | \*\*\* |
| Leverage | 1.1542 | 2.6876 | 0.9592 | 2.6782 | 0.1949 | \*\*\* |
| HHI\_lines | 0.5812 | 0.3107 | 0.3912 | 0.2709 | 0.1900 | \*\*\* |
| HHI\_states | 0.6629 | 0.3749 | 0.4854 | 0.3689 | 0.1775 | \*\*\* |
| Group | 0.5068 | 0.5000 | 0.8097 | 0.3926 | -0.3029 | \*\*\* |
| Stock | 0.7283 | 0.4449 | 0.7701 | 0.4208 | -0.0418 | \*\*\* |
| IndependentAgency | 0.3209 | 0.4669 | 0.6636 | 0.4725 | -0.3427 | \*\*\* |
| Public | 0.0020 | 0.0451 | 0.0048 | 0.0694 | -0.0028 | \*\* |
| Reinsurance | 0.5125 | 1.0345 | 0.8990 | 1.4557 | -0.3865 | \*\*\* |
| Advertising | 0.0075 | 0.0201 | 0.0067 | 0.0159 | 0.0007 | \* |
| Surveys&Audits | 0.0083 | 0.0204 | 0.0091 | 0.0218 | -0.0009 | \* |

\*Note: Statistical significance at the 1, 5, and 10 percent levels are denoted by \*\*\*, \*\*, and \* respectively.

\*UseCont equals 1 if an insurer pays any contingent commissions, and 0 otherwise; Firm size is measured as natural logarithm of total admitted assets; Commercial lines of business is measured by proportion of net premiums written in commercial lines of business; Leverage is measured as ratio of liabilities to surplus; HHI\_lines is Herfindahl index of premiums written by business lines; HHI\_states is Herfindahl index of premiums written by states; Group member indicator is equal to one if the insurer is identified as a group by AM Best; Stock insurer dummy equals to one if the insurer is a stock company and zero otherwise; Independent agency indicator is equal to one if the insurer is identified as independent agency or broker by AM Best; Publicly traded indicator is equal to one if the insurer is identified as being publicly traded by AM Best; Advertising is measured as the ratio of advertising expenditures to net premiums written; Surveys & Audits is measured as the ratio of expenditure on surveys and audits to net premiums written; Reinsurance is measured as premiums ceded divided by direct premiums written plus reinsurance assumed.

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| **Table 2** | | | | |
| **Mean Test for Key Variables after Propensity Score Matching** | | | | |
|  | **UseCont=0 ( N=2797 )** | **UseCont=1**  **( N=4025 )** |  |  |
|  | **mean** | **mean** | **diff.** |  |
| LossRatio | 4.1674 | 4.1386 | 0.0288 | \*\* |
| CombinedRatio | 4.6258 | 4.6072 | 0.0186 | \* |
| Size | 19.0770 | 18.9000 | 0.1770 | \*\*\* |
| Commercial | 0.6161 | 0.5934 | 0.0227 | \*\* |
| leverage | 0.9493 | 1.0161 | -0.0668 |  |
| HHI\_lines | 0.4423 | 0.4212 | 0.0211 | \*\*\* |
| HHI\_states | 0.4811 | 0.5278 | -0.0467 | \*\*\* |
| Group | 0.7922 | 0.7851 | 0.0071 |  |
| Stock | 0.7776 | 0.7657 | 0.0119 |  |
| IndependentAgency | 0.6043 | 0.6204 | -0.0161 |  |
| Public | 0.0046 | 0.0047 | -0.0001 |  |
| Reinsurance | 0.6581 | 0.8342 | -0.1761 | \*\*\* |
| Advertising | 0.0075 | 0.0069 | 0.0006 |  |
| Surveys&Audits | 0.0082 | 0.0093 | -0.0010 |  |

\*Note: Statistical significance at the 1, 5, and 10 percent levels are denoted by \*\*\*, \*\*, and \* respectively.

\* UseCont equals 1 if an insurer pays any contingent commissions, and 0 otherwise; Firm size is measured as natural logarithm of total admitted assets; Commercial lines of business is measured by proportion of net premiums written in commercial lines of business; Leverage is measured as ratio of liabilities to surplus; HHI\_lines is Herfindahl index of premiums written by business lines; HHI\_states is Herfindahl index of premiums written by states; Group member indicator is equal to one if the insurer is identified as a group by AM Best; Stock insurer dummy equals to one if the insurer is a stock company and zero otherwise; Independent agency indicator is equal to one if the insurer is identified as independent agency or broker by AM Best; Publicly traded indicator is equal to one if the insurer is identified as being publicly traded by AM Best; Advertising is measured as the ratio of advertising expenditures to net premiums written; Surveys & Audits is measured as the ratio of expenditure on surveys and audits to net premiums written; Reinsurance is measured as premiums ceded divided by direct premiums written plus reinsurance assumed.

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| **Table 3** | |
| **PSM Results using Contingent Commission Usage Indicator** | |
| **Independent Variables** | **UseCont** |
| Size | 0.0830\*\*\* |
|  | (0.010) |
| Commercial | -0.277\*\*\* |
|  | (0.043) |
| Leverage | -0.001 |
|  | (0.006) |
| HHI\_lines | -0.902\*\*\* |
|  | (0.057) |
| HHI\_states | -0.467\*\*\* |
|  | (0.049) |
| Group | 0.417\*\*\* |
|  | (0.040) |
| Stock | -0.072\* |
|  | (0.040) |
| IndependentAgency | 0.827\*\*\* |
|  | (0.033) |
| PubliclyTraded | -0.010 |
|  | (0.302) |
| \_cons | -1.041\*\*\* |
|  | (0.211) |
| N | 7493 |

\*Note: Statistical significance at the 1, 5, and 10 percent levels are denoted by \*\*\*, \*\*, and \* respectively.

\* UseCont equals 1 if an insurer pays any contingent commissions, and 0 otherwise; Firm size is measured as natural logarithm of total admitted assets; Commercial lines of business is measured by proportion of net premiums written in commercial lines of business; Leverage is measured as ratio of liabilities to surplus; HHI\_lines is Herfindahl index of premiums written by business lines; HHI\_states is Herfindahl index of premiums written by states; Group member indicator is equal to one if the insurer is identified as a group by AM Best; Stock insurer dummy equals to one if the insurer is a stock company and zero otherwise; Independent agency indicator is equal to one if the insurer is identified as independent agency or broker by AM Best; Publicly traded indicator is equal to one if the insurer is identified as being publicly traded by AM Best; Advertising is measured as the ratio of advertising expenditures to net premiums written; Surveys & Audits is measured as the ratio of expenditure on surveys and audits to net premiums written; Reinsurance is measured as premiums ceded divided by direct premiums written plus reinsurance assumed.

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| **Table 4** | | |
| **Regression Results with Contingent Commission Usage Indicator** | | |
| **Independent Variables** | **LossRatio** | **CombinedRatio** |
| UseCont | -0.034\*\* | -0.023\*\* |
|  | (0.015) | (0.010) |
| Size | 0.035\*\*\* | -0.010\*\*\* |
|  | (0.005) | (0.004) |
| Commercial | -0.219\*\*\* | -0.052\*\*\* |
|  | (0.016) | (0.012) |
| Leverage | 0.006\*\*\* | 0.002 |
|  | (0.002) | (0.002) |
| HHI\_lines | -0.046 | 0.095\*\*\* |
|  | (0.036) | (0.026) |
| HHI\_states | 0.050\*\* | 0.010 |
|  | (0.022) | (0.016) |
| Group | 0.035\* | 0.037\*\*\* |
|  | (0.018) | (0.013) |
| Stock | -0.029\*\* | -0.034\*\*\* |
|  | (0.013) | (0.010) |
| IndependentAgency | 0.008 | -0.006 |
|  | (0.013) | (0.010) |
| PubliclyTraded | 0.098\*\*\* | 0.020 |
|  | (0.034) | (0.016) |
| Reinsurance | 0.012\*\*\* | 0.010\*\*\* |
|  | (0.004) | (0.003) |
| Advertising | 0.281 | 0.192 |
|  | (0.355) | (0.258) |
| Surveys & Audits | 0.152 | 0.227 |
|  | (0.261) | (0.208) |
| \_cons | 3.543\*\*\* | 4.749\*\*\* |
|  | (0.096) | (0.078) |
| N | 6715 | 6759 |

\*Note: Statistical significance at the 1, 5, and 10 percent levels are denoted by \*\*\*, \*\*, and \* respectively.

\* UseCont equals 1 if an insurer pays any contingent commissions, and 0 otherwise; Firm size is measured as natural logarithm of total admitted assets; Commercial lines of business is measured by proportion of net premiums written in commercial lines of business; Leverage is measured as ratio of liabilities to surplus; HHI\_lines is Herfindahl index of premiums written by business lines; HHI\_states is Herfindahl index of premiums written by states; Group member indicator is equal to one if the insurer is identified as a group by AM Best; Stock insurer dummy equals to one if the insurer is a stock company and zero otherwise; Independent agency indicator is equal to one if the insurer is identified as independent agency or broker by AM Best; Publicly traded indicator is equal to one if the insurer is identified as being publicly traded by AM Best; Advertising is measured as the ratio of advertising expenditures to net premiums written; Surveys & Audits is measured as the ratio of expenditure on surveys and audits to net premiums written; Reinsurance is measured as premiums ceded divided by direct premiums written plus reinsurance assumed.

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| **Table 5** | | | |
| **Regression Results with Contingent Commission Proportion** | | | |
| **Independent Variables** | **LossRatio** | **CombinedRatio** | **ExpenseRatio** |
| Cont | -0.088\*\*\* | 0.012 | 0.116\*\*\* |
|  | (0.026) | (0.024) | (0.037) |
| Size | 0.035\*\*\* | -0.009\*\*\* | -0.083\*\*\* |
|  | (0.005) | (0.004) | (0.006) |
| Commercial | -0.218\*\*\* | -0.052\*\*\* | 0.148\*\*\* |
|  | (0.016) | (0.012) | (0.020) |
| Leverage | 0.006\*\* | 0.002 | -0.003 |
|  | (0.002) | (0.002) | (0.003) |
| HHI\_lines | -0.043 | 0.097\*\*\* | 0.168\*\*\* |
|  | (0.036) | (0.026) | (0.035) |
| HHI\_states | 0.047\*\* | 0.008 | -0.069\*\*\* |
|  | (0.022) | (0.016) | (0.025) |
| Group | 0.032\* | 0.038\*\*\* | 0.055\*\*\* |
|  | (0.018) | (0.013) | (0.021) |
| Stock | -0.030\*\* | -0.034\*\*\* | -0.081\*\*\* |
|  | (0.013) | (0.010) | (0.018) |
| IndependentAgency | 0.006 | -0.006 | 0.041\*\*\* |
|  | (0.013) | (0.010) | (0.015) |
| PubliclyTraded | 0.097\*\*\* | 0.019 | -0.021 |
|  | (0.035) | (0.016) | (0.041) |
| Reinsurance | 0.011\*\*\* | 0.009\*\*\* | 0.014\* |
|  | (0.004) | (0.003) | (0.008) |
| Advertising | 0.306 | 0.208 | 0.606 |
|  | (0.356) | (0.258) | (0.385) |
| Surveys & Audits | 0.147 | 0.210 | 0.258 |
|  | (0.263) | (0.211) | (0.367) |
| \_cons | 3.535\*\*\* | 4.730\*\*\* | 4.916\*\*\* |
|  | (0.095) | (0.079) | (0.128) |
| N | 6715 | 6759 | 6690 |

\*Note: Statistical significance at the 1, 5, and 10 percent levels are denoted by \*\*\*, \*\*, and \* respectively.

\*Cont is measured by the percentage of net contingent commissions to net total commissions; Firm size is measured as natural logarithm of total admitted assets; Commercial lines of business is measured by proportion of net premiums written in commercial lines of business; Leverage is measured as ratio of liabilities to surplus; HHI\_lines is Herfindahl index of premiums written by business lines; HHI\_states is Herfindahl index of premiums written by states; Group member indicator is equal to one if the insurer is identified as a group by AM Best; Stock insurer dummy equals to one if the insurer is a stock company and zero otherwise; Independent agency indicator is equal to one if the insurer is identified as independent agency or broker by AM Best; Publicly traded indicator is equal to one if the insurer is identified as being publicly traded by AM Best; Advertising is measured as the ratio of advertising expenditures to net premiums written; Surveys & Audits is measured as the ratio of expenditure on surveys and audits to net premiums written; Reinsurance is measured as premiums ceded divided by direct premiums written plus reinsurance assumed.

1. Hofmann, Mark A., 2012, Spitzer Inquiry Brought Transparency, but Contingent Commissions Persist, from:http://www.businessinsurance.com/article/20120715/NEWS04/307159996/spitzer-inquiry-brought-transparency-but-contingent-commissions-persist [↑](#footnote-ref-1)
2. 2 Propensity scores can be estimated using binomial regression models or statistical learning algorithms. [↑](#footnote-ref-2)
3. 3 Lunt (2014). [↑](#footnote-ref-3)
4. Wooldridge (2010). [↑](#footnote-ref-4)
5. All lines of business are considered commercial lines except for homeowners multi-peril, auto physical, farmowners multi-peril, and private passenger auto liability. [↑](#footnote-ref-5)
6. They are calculated as: and, where = the proportion of net premium written in line i divided by total premium; and = the proportion of net premium written in state j divided by total premium. [↑](#footnote-ref-6)