Risk-Based Capital (RBC) Premium Risk Charges – Improvements to Current Calibration Method

Report 6 of the CAS Risk-Based Capital (RBC) Research Working Parties

Issued by the RBC Dependencies and Calibration Working Party (DCWP)

Abstract: The purpose of this paper is to describe the results of research on methods to improve the Current Calibration Method (CCM) for premium risk charges for use in the NAIC RBC Formula. The paper shows how it is possible to construct risk charges that might be both more reflective of underlying risk and more stable over time than the CCM.

This paper shows the extent to which calibration of premium risk charges is affected by issues identified, but not measured, in prior research – premium size by line of business (**LOB-size), pooling, and movement over time**. The paper also identifies and measures the extent to which risk charges are affected by the following additional issues: (a) the **"minor line"** effect, which appears to distort risk charges for specialty lines of business (LOBs), (b) the effect of data **maturity,** and (c) the effect of **'survivorship',** companies that stop filing annual statements.

This is one of several papers being issued by the Risk-Based Capital (RBC) Dependencies and Calibration Working Party.

Keywords. Risk-Based Capital, Capital Requirements, underwriting risk, reserve risk, premium risk, Analyzing/Quantifying Risks, Assess/Prioritizing Risks, Integrating Risks.

1. Introduction

1.1 Background and Purpose

The NAIC RBC Formula ("Formula") has six main risk categories, R0 – R5. The underwriting risk is expressed in two of the categories, reserve risk and written premium risk, R4 and R5 respectively. This paper relates to R5, written premium risk.

For each Schedule P line of business (LOB), R5 is determined using an "Industry RBC Loss and Expense Ratio," used in PR017 line 4, a value applicable to all companies. We refer to this as the premium risk factor (PRF).

For each LOB the Premium Risk Charge (PRC) is produced using the PRF, LOB net written premium (NWP), and adjustments for investment income, differences between the company loss ratios and the industry loss ratios, the company proportion of loss

sensitive contracts, and the company all-lines expense ratio.[1] For purposes of this paper we refer to the PRC divided by the NWP as the PRC%.

This paper provides a framework for deriving the PRFs by LOB.

1.2 Terminology, Assumed Reader Background, and Disclaimer

This paper assumes the reader is generally familiar with the property/casualty RBC formula.[2]

In this paper, references to "we" and "our" refer to the principal authors of this paper. "The working party" and "DCWP" refer to the CAS RBC Dependencies and Calibration Working Party.

The analysis and opinions expressed in this report are solely those of the authors, the Working Party members, and in particular are not those of the members' employers, the Casualty Actuarial Society, or the American Academy of Actuaries.

DCWP makes no recommendations to the NAIC or any other body. DCWP material is for the information of CAS members, policy makers, actuaries, and others who might make recommendations regarding the future of the property/casualty RBC formula. In particular, we expect that the material will be used by the American Academy of Actuaries RBC Committee.

In Section 3 we define a "baseline filtering" approach to selecting data for use in our analysis. The purpose of the baseline is to simplify comparison among a number of analyses; it is not presented as a recommendation.

This paper is one of a series of articles prepared under the direction of the CAS RBC Dependency and Calibration Working Party.

Special terms and acronyms are described in the Glossary.

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[1] For expenses other than loss adjustment expenses. Net of reinsurance.

[2] For a more detailed description of the formula and its initial basis, see Feldblum, Sholom, NAIC Property/Casualty Insurance Company Risk-Based Capital Requirements, Proceedings of the Casualty Actuarial Society, 1996 and NAIC, Risk-Based Capital Forecasting & Instructions, Property Casualty, 2010.

1.3 Prior Research

The PRFs in the Formula were first set in 1993.[3]. Research reports on the PRFs and comparable reserve risk charges were most recently prepared by the American Academy of Actuaries (Academy) in 2007 [4] with updates in 2009 [5] and 2010, [6] and by the Underwriting Risk Working Party (URWP) of the Casualty Actuarial society (CAS) in 2012.[7] In this paper we refer to the method described in the 2007 Academy Report as the "Current Calibration Method" (CCM).

This paper describes new research addressing a number of the issues raised by those prior papers, particularly those identified by URWP, as follows:

1. The current data sources—confidential company RBC filings and the most recently available Schedule P—yield too few observations for stable estimates of RBC factors from one calibration cycle to the next. Additional data sources should be investigated.
2. Filtering eliminates a significant amount of company experience from the Current Calibration Method. For many lines of business the majority of the companies in the industry are eliminated; for two lines, all companies are eliminated. New ways to filter out questionable data should be investigated. Possible alternatives are discussed in the report. [8]

[URWP] … identified potential improvements to the Current Calibration Method that could be researched within the framework of the current RBC formula (including the following):

Data

1. Filtering strategies.
2. Additional or extended (number of years) data sources.
3. Treatment of data from pooled companies.

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[3] Academy (2007)
[4] Academy 2007
[5] Academy (2009)
[6] Academy (2010)
[7] CAS E-Forum, URWP report, Winter 2012
[8] CAS E-Forum, URWP report, Winter 2012– page 2

4. Analysis of the extent to which alternative filtering is affected by run-off and startup companies, and including procedures to mitigate that effect, if any. [9]

DCWP also reviewed Solvency II approaches to underwriting risk charge calibration and the results of that work will be described in a different paper.

1.4 Working Party Approach

To address the opportunities for improvements identified by that prior research, DCWP proceeded as follows:

1. Using information provided by the NAIC we compiled Schedule P information from 14 Annual Statements (1997-2010) from all individual companies and DCWP-defined pools,[10] for each LOB. This provides data for up to 23 accident years (AYs), many of them developed to 10 years maturity. By comparison, CCM uses only one Annual Statement with a maximum of 10 AYs and only one AY at 10 years maturity.
2. We applied less restrictive approaches to filtering data, and thereby retained more data for analysis.

In this DCWP research we continued to apply the CCM framework of measuring the PRF as the 87.5th percentile of observed loss ratios across companies and AYs.

1.5 Findings

The main findings from this research are the following, organized by section in this paper:

1. Section 2 – PRFs calibrated based on the CCM (using 10 AYs from a single Annual Statement) vary, often widely, from to Annual Statement to Annual Statement. This variation seems to be driven by the underwriting cycle, catastrophes, and other industry-wide effects. Longer-term data appears necessary to achieve more stable indicated PRFs.

[9] CAS E-Forum, URWP report, Winter 2012, page 26.
[10] Details in Appendix G.

2. Section 3 – We identified certain data points as "minor lines" data points if the Net Earned Premium (NEP) for the LOB and AY represents less than 5% of the company's all-line total premium for that LOB and AY. For certain specialty LOBs the indicated PRFs excluding the "minor lines" data points are significantly lower, and more relevant, than the PRFs based on all data points. For those LOBs, failure to exclude the minor lines data points appears to result in PRFs that are not representative of risk for companies writing the bulk of the industry LOB premium.

3. Section 3 – Pooling can distort the PRFs. The distortion can be at least partially removed.

4. Section 3 – We define a baseline filtering approach to selecting data for use in our analysis. This baseline is not a recommendation. Rather, it is a practical way to evaluate a variety of alternatives. This baseline is the starting point for the analyses described in Sections 4-8.

5. Section 4 – Looking at all 23 available years and the 'even-year/odd-year' test suggests that the 23-year data set will produce PRFs that are more stable than the CCM across calibrations from year-to-year.

6. Section 5 – We demonstrate that indicated PRFs vary with LOB-size; i.e., NEP by LOB.[11] To the extent that the RBC formula is not intended to have PRFs that vary by LOB-size, we identify two approaches to treating that issue in the context of the RBC Formula: PRFs based on the median LOB-size and PRFs based on LOB-size above a threshold. There may be other suitable approaches.

7. Section 6 – PRFs are affected by the maturity of the data to an extent that varies by LOB.

8. Section 7 – For most LOBs, PRFs are lowest for data points from companies with the longest experience period, 20 or more AYs of NEP > 0.

[11] We use the term LOB-size to clearly distinguish between the premium size of the company and the premium size for the LOB.

9. Section 8 – PRFs are somewhat affected by "survivorship." Companies with 2010 Annual Statements have somewhat lower PRFs than companies whose last filed Annual Statements were prior to 2010.

10. While maturity and survivorship adjustments are not included in the baseline that we used for comparative purposes, it would be reasonable to include them in a final RBC calibration.

2. PRFs Based on CCM

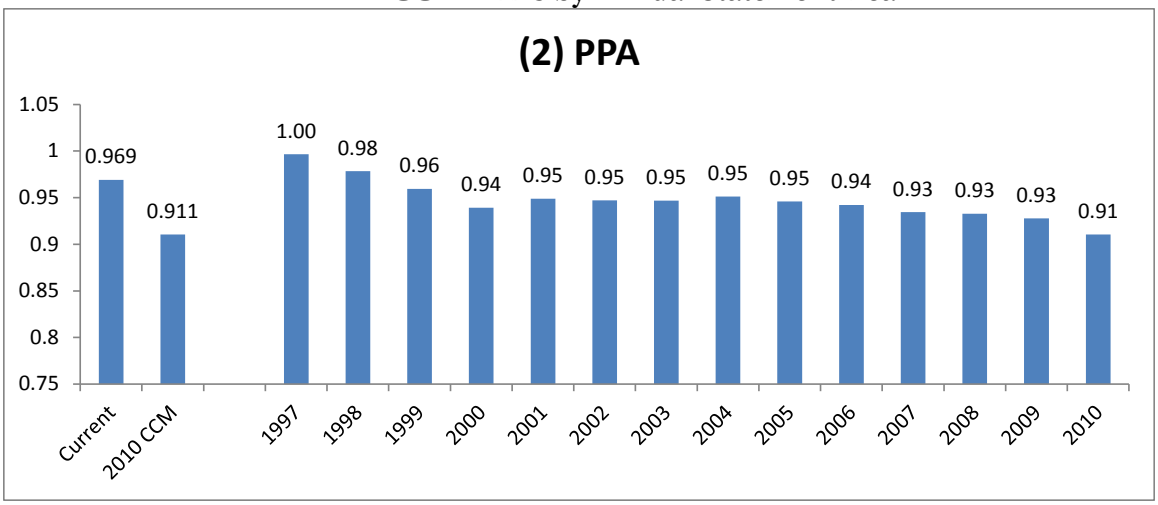
In 2011, the URWP observed that the CCM-indicated PRFs, based on data from a single Annual Statement, vary widely from Annual Statement to Annual Statement, and URWP recommended that more data be used in determining the PRFs. In this section we provide a more detailed illustration of the year-to-year variability exhibited by the PRFs indicated by the CCM.

The PRFs indicated by the CCM are based on the empirical 87.5th percentile of 10 years of loss ratio data from all companies at a single Annual Statement date, with filtering described below in section 3.2.1.

Table 2.1 shows these values, as would be determined from successive Annual Statements from 1997 to 2010, for the Private Passenger Auto (PPA) LOB.

Note that for this chart, as with most charts in this paper, the vertical scale starts at 0.75, so that the height of the displayed bar can be considered representative of the PRC%, based on an illustrative underwriting expense ratio of 0.25 and before considering the investment income offset and other factors that affect the final PRC%.

Table 2.1
PPA – CCM PRFs by Annual Statement Year



For this LOB, the PRF varies from 1.00 to 0.91 over the 14 years shown: a swing of nine percentage points in PRF, a large portion of the PRC% for this LOB.

For comparative purposes, the current PRF, 0.969, is shown at the left side of the table. This is the "industry loss and expense ratio" appearing in Line 04 of the 2010 RBC report PR017. The PRF indicated using the CCM and 2010 Annual Statement data, 0.911, is also shown on the left part of the chart. The actual RBC factors were updated over the 2008-2010 period, based on the CCM but subject to limitations ("caps") in year-over-year movements. The caps were ±15% in each of 2008 and 2009, and ±5% in 2010.[12]

Table 2.2 shows the indicated PRFs for workers compensation. Here we see a swing of 11 percentage points of PRF, from 0.94 related to experience in based on year 2010 Annual Statements to 1.05 based on year 2003 Annual Statements. The values also show a pattern over time typical of the underwriting cycle.

[12] URWP – page 5.

Table 2.2
WC – CCM PRFs by Annual Statement Year

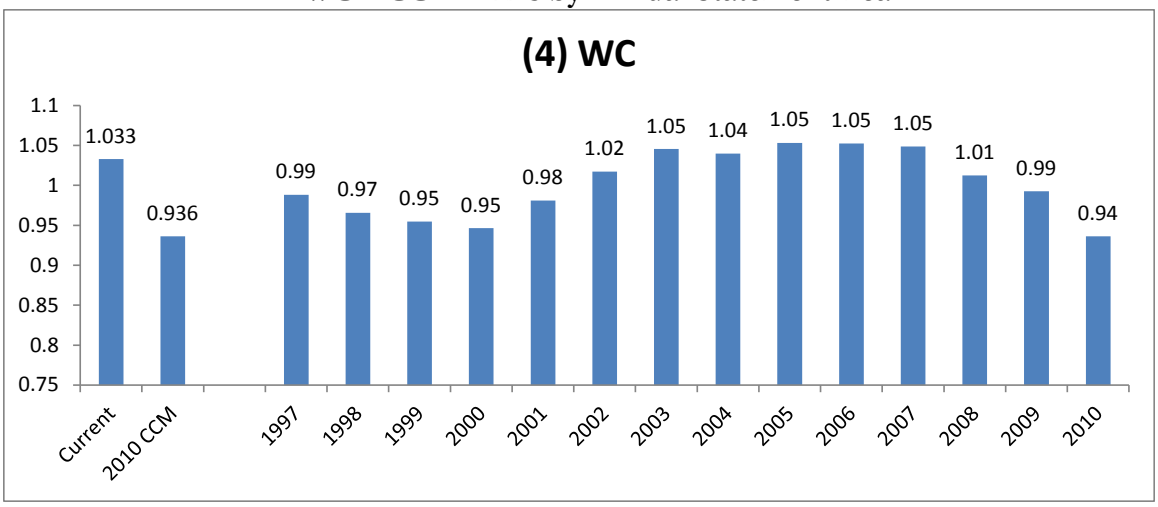
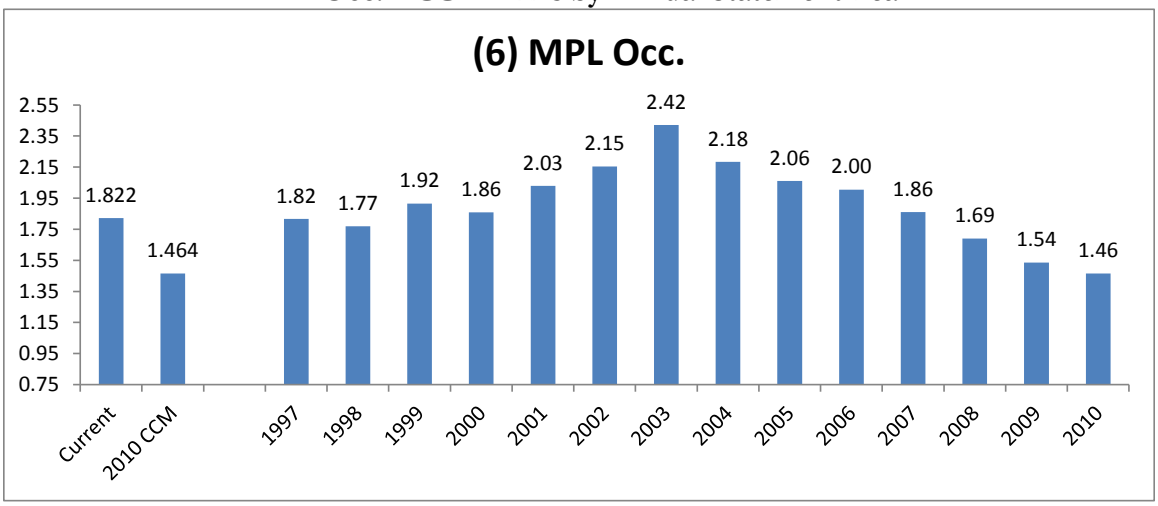


Table 2.3 shows the PRFs for the Medical Professional Liability (MPL) – Occurrence LOB. Here the PRF swing is from 1.46 to 2.42, 96 percentage points of PRF swing from Annual Statement year 2003 to Annual Statement year 2010.

Table 2.3
MPL Occ. – CCM PRFs by Annual Statement Year



Similar year-by-year PRF graphs for all LOBs are shown in Appendix A.

It seems clear that the CCM approach of using the most recent Annual Statement will not produce stable PRF indications.

3. Data and Filtering

3.1 Data

Using information provided by the NAIC, we compiled Schedule P information from 14 Annual Statements (1997-2010) from all individual companies and DWCP-defined group pools (pools). That provides over 200,000 data points, covering 23 AYs, many of them developed to 10 years maturity. The CCM uses only one Annual Statement with a maximum of 10 AYs and only one AY at 10 years maturity.

Each data point is an AY-LOB, for a single company or pool, at the latest available maturity. For each data point we have the following information:

1. net earned premium (NEP)
2. the loss and all loss adjustment expense ratio to premium
3. maturity of the AY (1 year, 2 years,… 10 years)
4. the percentage of premium for the data point LOB compared to the premium for the all LOBs for the same company (pool) for the same year, to identify 'minor lines' described under section 3.2.2.

3.2 Filtering Methodologies

We use the term "filtering" to describe the manner in which we treat data features that might affect the indicated PRFs, such as data errors, LOB-size, maturity of loss experience, etc. In the sections below we discuss the CCM filtering and DCWP filtering approaches.

3.2.1 CCM Filtering

CCM uses data from only one Annual Statement for the calibration. In the CCM <u>all</u> data associated with a LOB for a company is removed if, for the 10 years of data included in the latest Annual Statement:

1. Average AY earned premium < $500,000
2. Any AY loss ratio < 0
3. Fewer than 10 years of earned premium
4. Fewer than 8 AYs with net earned premium greater than 20% of average earned premium for all AYs (company growing or shrinking too rapidly)

For remaining data points, loss ratios are capped at 300%.[13]

CCM filtering eliminates about half of the data points and about 10% of premium dollars from the data set.[14]

3.2.2 Alternative Filtering Methods

In this analysis, the DCWP used a less restrictive filtering process.

A data point (i.e., company/LOB/AY combination) is excluded if earned premium ≤ 0 or incurred loss ≤ 0. By excluding data points rather than excluding the entire company's data, more data is retained for analysis. This filter eliminates about 11% of data points but almost 0% of premium dollars.

In the rest of this section we test the sensitivity of indicated PRFs to three other data filtering methods: pooling, minor lines, and LOB-size:

Pooling – For companies with intergroup pooling arrangements the Schedule P loss ratio for each LOB-AY would be the same for each pool member; the common loss ratio would be the weighted average net loss ratio for that LOB-AY for the entire pool rather than the individual pool member loss ratio before pooling.

That feature of the data would distort the results of our analysis in that:

1. The same loss ratio value would appear multiple times, reducing the apparent variability in the loss ratios across companies; and
2. Companies that appear small based on their pooling percentages would show the lower year-to-year variability associated with the larger size of the overall pool rather than the higher year-to-year variability associated with a company of its apparent lower size.

To mitigate these effects, we would like to combine the separate pool participants into a single date point for each LOB-AY. If that were done, the data would reflect the correct variability between companies and the proper data point LOB-size.

[13] The 300% cap would affect PRF only if the indicated PRF were above 300%. That situation does not arise.
[14] URWP – page 8.

We use information in the Annual Statements to identify individual companies that appear to be part of a larger pooled entity. There are 3,730 NAIC legal entities in the initial data set. Of these, 2,695 are not part of any pool and 1,035 entities are mapped into 206 DCWP-constructed pooled entities. Thus, the total data set includes 3,730 – 1,035 + 206 = 2,901 entities in total.[15]. Our approach to identifying relevant pools is discussed in Appendix G.[16].

LOB-Size – Indicated PRFs vary by LOB-size, and in Section 5 we evaluate PRFs by LOB-size. In the subsection below, we test the effect of excluding a data point if the LOB NEP is below a threshold which varies by LOB. The selected thresholds are listed in Appendix B.

Minor Line Filtering – We defined "minor lines" data points as those where the company/LOB/year NEP was less than 5% of the all-lines NEP for that company/year. We compare the indicated PRFs using data including minor line data points and data excluding minor line data points.

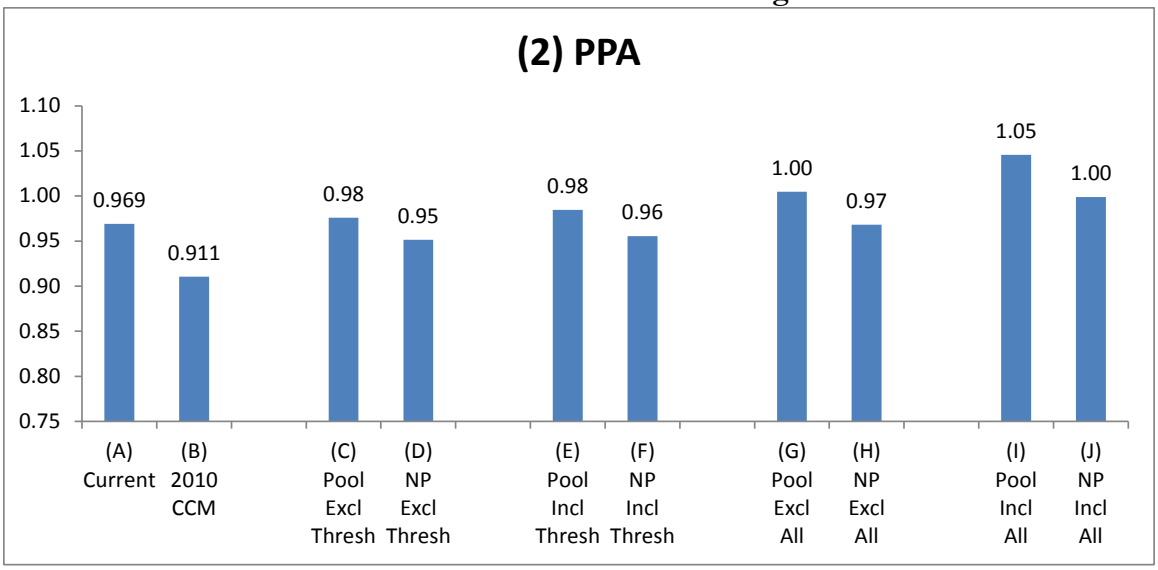
3.3 Sensitivity Testing

In this section we describe how we tested the extent to which pooling, minor lines, and LOB-size affect the indicated PRFs.

Table 3.1 shows the results of our filtering sensitivity analysis for the PPA LOB.

[15] For each LOB, the number of entities is smaller, as not all companies have written business in each LOB.
[16] As described in Appendix G, our approach is approximate, as it does not necessarily identify all pools and it may combine some LOB/companies that are not actually pooled.

Table 3.1
PPA – Effects of Alternative Filtering Methods



The "Current" and "2010 CCM" values shown in columns A and B at the left of the graph are unchanged from Section 2. We now focus on the pairs of values from right to left.

A comparison of the values in columns I and J at the far right shows the effect on indicated PRFs of pooling; the "Pool" and "NP" labels designate "Pooling" and "No Pooling" respectively, with no other filtering. Comparing columns I and J, we see an increase in the indicated PRF using pooled data, from 1.00 to 1.05.

The values in columns G and H show the indicated PRFs excluding minor lines filtering; the "Excl" label indicates that minor lines data points are excluded, and the "Incl" label indicates that minor lines data points are included. Comparing columns G to I and H to J, we observe a decrease in the indicated PRFs from 1.05 to 1.00 for pooled data and a decrease from 1.00 to 0.97 for unpooled data, when minor lines data points are excluded.

The values in columns E and F show the indicated PRFs with LOB-size filtering; the "Thresh" label indicates that the data points with LOB-size below the threshold size are excluded. The label "All" indicates that data points of all LOB-sizes are included. Comparing columns E to I and F to J, we see the effect on the calibration of removing the data points with LOB-sizes below the threshold. The size threshold for PPA is $1

million. The effect is a decrease in the indicated PRF, from 1.05 to 0.98 and from 1.00 to 0.96 for pooled and unpooled data respectively.

We note that the decrease in indicated PRF is larger based on LOB-size threshold than the decrease based on exclusion of minor lines data points. We characterize this as "LOB-size filter is more significant than minor lines filter" for PPA. This general pattern, "LOB-size filter is more significant than minor lines filter" appears to be the case for many LOBs.

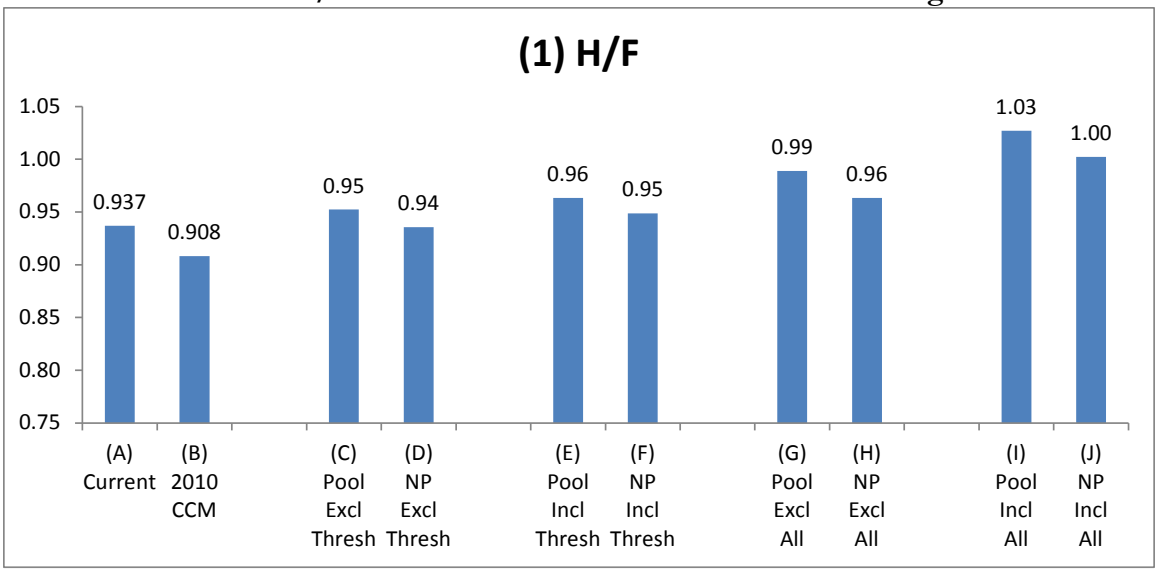
Finally, the values in columns C and D show the indicated PRFs with LOB-size and minor line filters combined. Comparing columns C and D against the other pooled/not-pooled pairs, there is a further decrease in indicated PRF by applying both the size threshold and the minor lines filters.

Table 3.2 displays the filtering sensitivity results for the Homeowners/Farmowners LOB. As with PPA:

1. The PRF based on pooled data is lower than the PRF based on unpooled data (Columns I vs. J, G vs. H, E vs. F, and C vs. D).
2. The PRF excluding minor lines data points is lower than the PRF including minor lines data points (Columns G vs. I, and H vs. J).
3. The PRF excluding LOB-size below the premium threshold[17] is lower than the PRF across all LOB-sizes (Column E vs. I and F vs. J).
4. The LOB-size filter is more significant than minor lines filter (Columns E vs. G and F vs. H).

[17] The LOB-size filter for the Homeowners/Farmowners LOB is $1 million.

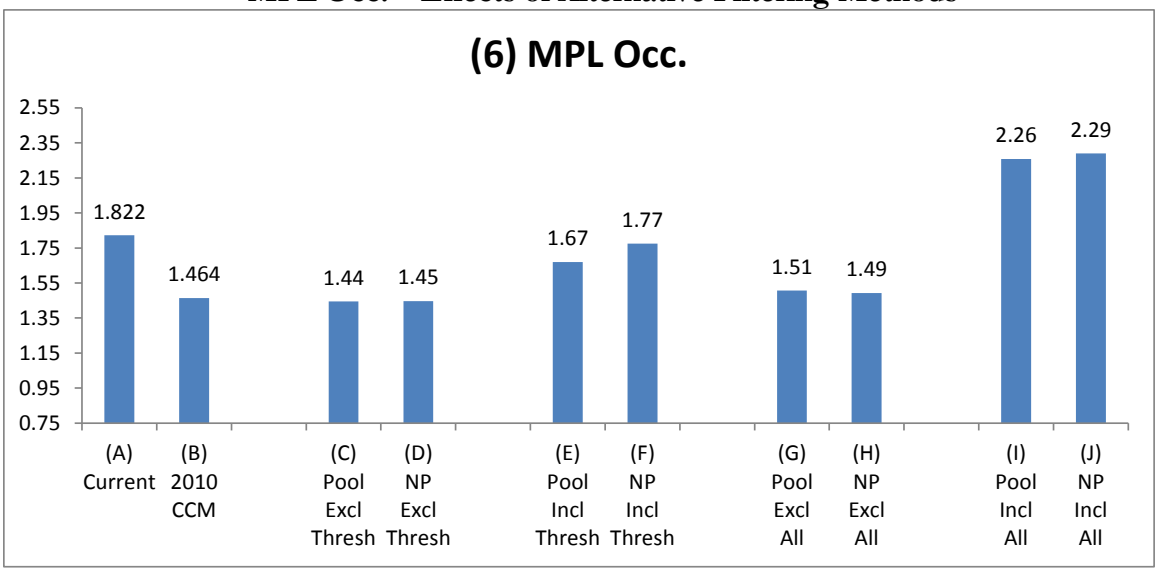
Table 3.2
Homeowners/Farmowners – Effects of Alternative Filtering Methods



For certain other LOBs, minor lines filtering is more significant than LOB-size filtering.

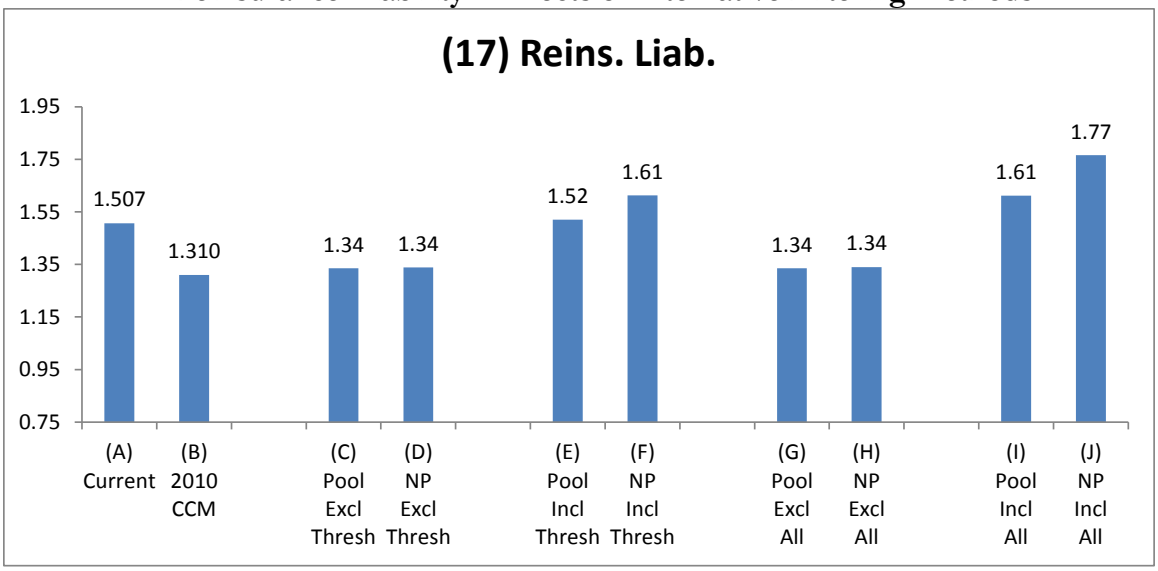
Table 3.3 shows indicated PRFs for the MPL – Occurrence LOB with the various filter combinations. In many respects the pattern is the same as for PPA and Homeowners/Farmowners.

Table 3.3
MPL Occ. – Effects of Alternative Filtering Methods



However, the pair of columns G and H is lower than the columns E and F, showing that the minor lines filter has a larger effect than the LOB-size filter.[18] This result demonstrates what might be called a "specialist effect," i.e., PRFs are larger for many insurers who write some MPL-Occurrence but for whom MPL-Occurrence is a small part of the overall business. We see a similar effect in the Reinsurance-Liability LOB in Table 3.4.

Table 3.4
Reinsurance-Liability – Effects of Alternative Filtering Methods



For Reinsurance-Liability the minor line effect is so significant that the minor lines filter alone produces the same effect as minor lines and LOB-size filters[19] combined; compare columns G and H to columns C and D.

Corresponding graphs for all LOBs are shown in Appendix B. The premium thresholds by LOB are shown at the end of Appendix B in Appendix B Table 1.

In the following sections, unless otherwise indicated we use data

- on a pooled basis,
- excluding minor lines data points, and
- excluding data points with LOB-size below the threshold.

[18] The LOB-size filter for the MPL – Occurrence LOB is $ 800,000.
[19] The LOB-size filter for the Reinsurance – Liability LOB is $200,000.

In addition, to avoid the use of data points from immature LOBs, we exclude data points from companies with less than five years of positive NEP by LOB. We refer to the combination of these filters as the "baseline filtering."

Table 3.5shows the all-lines number of data remaining after the effects of pooling, the size threshold, minor lines filtering, and too few years of positive NEP.

Table 3.5

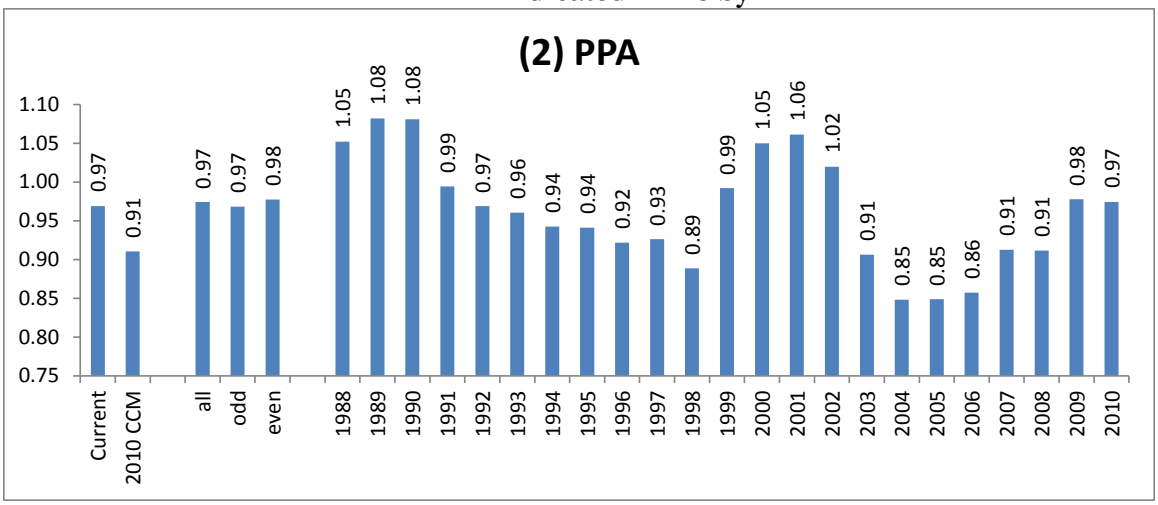
Number of data points and amount of premium after each step of the baseline filtering (all LOBs /all Years Combined)		
Filtering	**Premium (millions)**	**Data Points**
Un-Pooled	7,047	216,513
Pooled	7,061	121,622
Excluding Minor LOBs	6,508	79,025
Remove data points from companies with less than 5 years of positive NEP by LOB	6,471	75,515
Size above threshold (after applying minor lines and 5 Year NEP filters)	6,469	68,264

4. Indicated PRF by AY

In this section we review indicated PRFs by AY using the baseline filtering. The indicated PRF for an AY is the 87.5th percentile loss ratio for data points after baseline filtering within the LOB and AY.

Table 4.1shows the indicated year-by-year PRFs for the PPA LOB.

Table 4.1
PPA – Indicated PRFs by AY



In Table 4.1 the "Current" and "2010 CCM" values on the left side of the chart are the same as in the corresponding graph in Sections 2 and 3. The column "All" on the left shows the indicated PRF using all 23 AYs of available data, again with baseline filtering.[20] The "Odd" and "Even" values represent the results using odd and even AYs,[21] and give one perspective on whether the results will change significantly if additional years were added to the data set.

Not surprisingly, the individual year-to-year results exhibit more variability than the 10-year-rolling average CCM values shown in Section 2. The comparison of the "Odd" and "Even" results, 0.97 and 0.98, to the "All" result, 0.97, suggests that the random variation from year-to-year is significantly smoothed if spread over twelve years reflecting sufficient underwriting cycles and other systemic effects.[22]

We also tested variability across every fourth data point (sets of 4 or 5 data points). This is a smaller set, and we expect that the correlation across four years is much less than the correlation between adjacent years. The results of that test, presented at the end of

[20] The "all year" indicated PRF is not the average of the year-by-year PRFs. The all-year PRF is the 87.5th percentile loss ratio among all loss ratios, after baseline filtering, regardless of AY.
[21] The even-year PRF is the 87.5th -percentile loss ratio among all loss ratios from even numbered AYs. The odd-year PRF is the 87.5th -percentile loss ratio among all loss ratios from odd numbered AYs.
[22] It is beyond the scope of this paper to assess the extent to which the 23 AYs of experience in this data set does or does not sufficiently reflect the extent of systemic and cyclical variability in all lines of business.

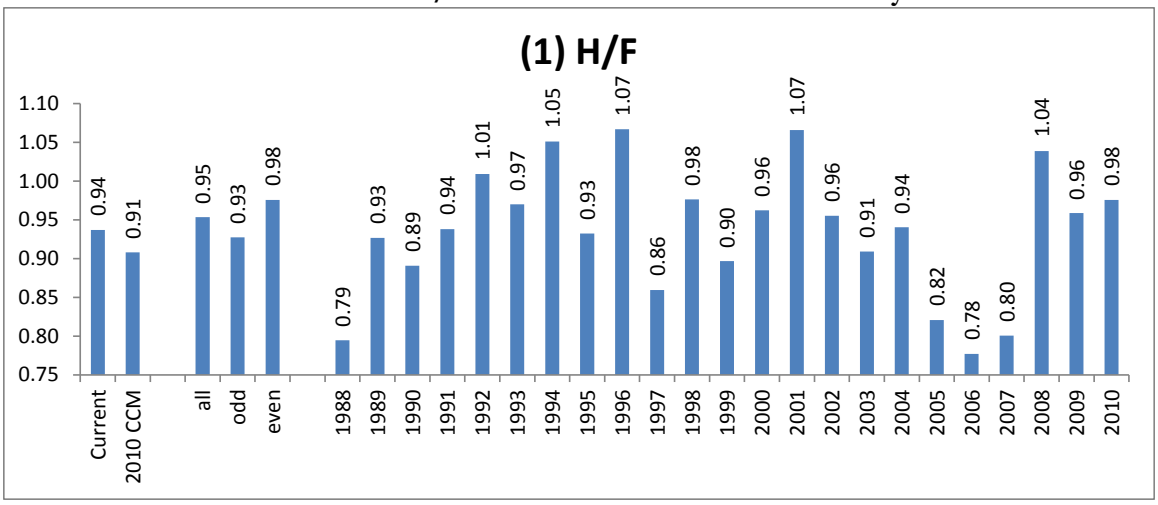
Appendix C, show more variability than the even/odd test, but still much less than the year-to-year variation in the CCM.

In examining year-by-year data, note that the oldest AYs shown are 10 years mature, and the more recent years are between one and nine years mature. In Section 6 we observe that for AYs 1997-2000, PRFs increased with increasing maturity. To the extent that recent year PRFs change with increasing maturity, then the more recent accident PRFs should be used with caution.[23]

Also note that as PRFs are the 87.5th percentile of loss ratios in each year, they will vary (a) as average loss ratio varies and (b) to the extent that variability (e.g., as measured by standard deviation) changes from year to year. We have not studied the components separately.

Table 4.2 shows the indicated PRFs for the Homeowners/Farmowners LOB.

Table 4.2
Homeowners/Farmowners – Indicated PRFs by AY



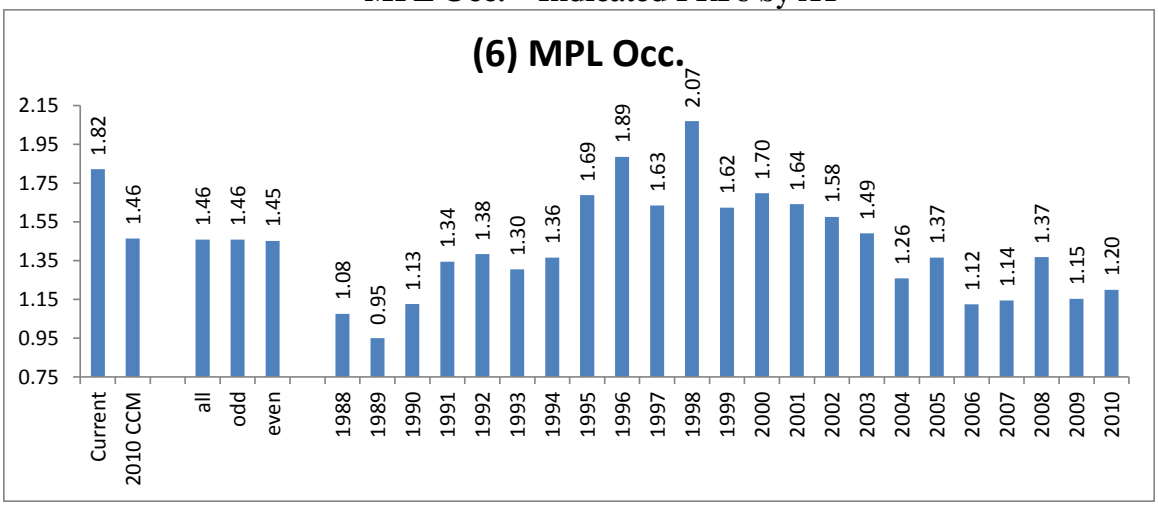
In this case the "Odd" and "Even" values are not as stable for as for PPA, a difference of 0.05 from 0.93 to 0.98. We also note that the highest years may indicate 'headline"

[23] This maturity pattern may not apply for all AYs. For example 1997-2000 might have been affected by the adverse side of the underwriting cycle for a LOB like reinsurance. AYs on the favorable side cycle might (possibly) develop less unfavorably or even develop favorably. The working party did not test these hypotheses.

catastrophe events, e.g., 1992 (Andrew) and 1994 (Northridge). For other years, the high values may be combinations of smaller natural events and adverse underwriting cycles. The slightly higher number of even-year 'high points' contributes to the difference between even-year and odd-year PRFs. If, as currently intended by the NAIC, catastrophe risk were reflected separately in the RBC formula, then the residual non-catastrophe PRF would be lower overall and more similar from year-to-year.

Table 4.3 shows the indicated PRFs for the MPL – Occurrence LOB.

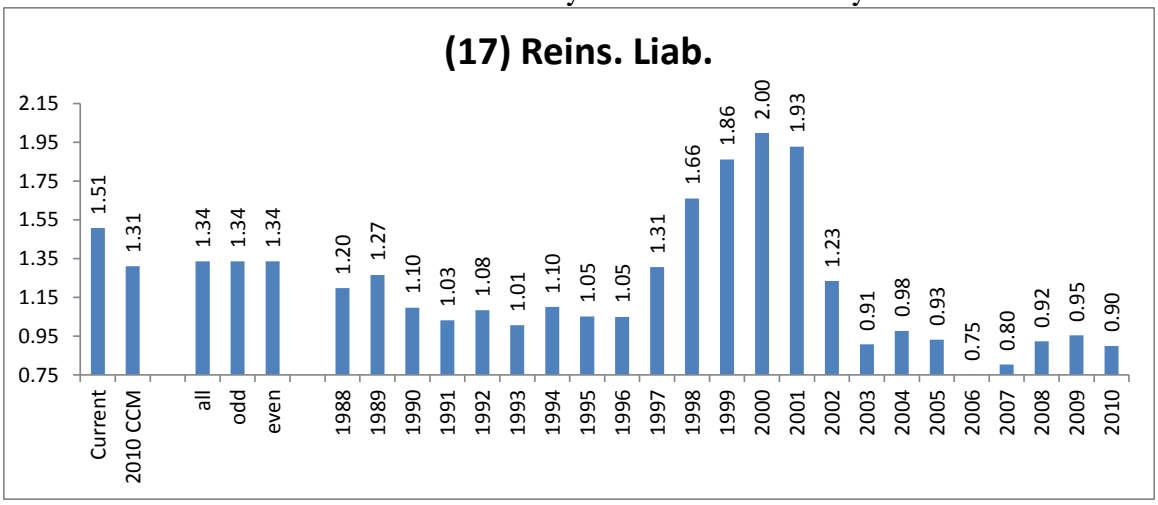
Table 4.3
MPL Occ. – Indicated PRFs by AY



Notwithstanding the large variability from year to year, the odd-year and even-year indicated MPL – Occurrence PRFs are stable at 1.45-1.46.

Finally, Table 4.4 shows the indicated PRFs for the Reinsurance – Liability LOB.

Table 4.4
Reinsurance-Liability – Indicated PRFs by AY



Again, although the year-to-year variability is large, the odd/even test again indicates the stability resulting from use of additional years of data.

Corresponding graphs for all LOBs are shown in Appendix C.

5. Analysis of LOB-size

In this section we examine the effect of LOB-size on indicated PRF.

To do this, we grouped LOB results into percentile LOB-size bands, and calculated PRFs and corresponding PRC%s for the data in each band. LOB-size bands refer to the LOB-size, regardless of the company size.

Table 5.1 displays the results for the PPA LOB. In column A, the row labels refer to upper-size end of the LOB-size band, so the first row, labeled 15%, refers to data points[24] with premium in percentiles 0%-15%. The second LOB-size band covers the next 10% of data points, up to the 25th percentile in premium LOB-size. In the final two rows of the table we show the largest 5% of data points, split between the "95% to largest 100" data points[25] (penultimate row) and the largest 100 data points (final row).

[24] As a single company can have as many as 23 data points, one for each AY, the top 100 data points might represent only 5 or 6 companies.
[25] For some LOBs, the largest 5% of data points constitutes less than 200 data points. For those LOBs, the "largest l00" means the top 2.5% of data points, even though that is less than 100 data points.

Columns B and C show the lower and upper annual LOB-sizes corresponding to the percentile levels. Column D shows the number of data points included in each row.

Column E shows the PRF based on data within the LOB-size band. As expected, we observe in column E that the indicated PRFs are highest in the smallest LOB-size band, and generally decrease in value as we progress through the larger LOB-size bands.

Column F shows the PRF based on all LOB-size bands at or above the LOB-size for that row. For example, the first row in Column F is the PRF for all data points, regardless of LOB-size. The second row in Column F is the indicated PRF for all data points in the top 85% of LOB-sizes; the third row is the indicated PRF for data points in the top 75% of LOB-sizes, and so on. The row called "100%" shows the PRF for the largest 100 data points alone. In this row column E = column F.

Table 5.1
PPA – PRF and PRC% by LOB-size

(2) PPA							
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge	
Endpoint Percentile	from	to	Data Points	all points in band	all points > "from"	all points in band	all points > "from"
15%	0	1,596	1,304	1.243	0.999	43%	18%
25%	1,596	3,634	869	1.019	**0.969**	20%	**15%**
35%	3,634	6,667	868	1.003	0.965	19%	15%
45%	6,667	11,219	869	1.013	0.958	20%	14%
55%	11,219	16,368	869	**0.971**	0.950	**16%**	14%
65%	16,368	28,352	869	0.971	0.945	16%	13%
75%	28,352	54,053	869	0.962	0.939	15%	12%
85%	54,053	130,201	868	0.959	0.929	14%	11%
95%	130,201	580,234	869	0.920	0.908	11%	9%
largest 100	580,234	3,936,971	334	0.895	0.894	8%	8%
100%	3,936,971	18,406,826	100	0.892	0.892	8%	8%
		Current Risk Charge Loss Ratio (PR017 Line 4)			0.969		
		Underwriting Expense Ratio in Risk Charge				19%	

Column G shows the PRC%s, by LOB-size band, calculated from the indicated PRF in Column E using an underwriting expense ratio that would produce a break-even combined ratio for all data points. For example, in Table 5.1, the average loss ratio for all data points is 0.815; this implies a break-even expense ratio of 0.185, shown as 19% in the final row of Table 5.1.

Column H, analogously to Column F, shows the PRC%s, for all LOB-size bands at or above the row, based on the cumulative PRFs in Column F.

There are various ways we might use this information to select the PRF for an RBC formula. One approach is to use the PRF indicated using data points with LOB-size above a threshold that varies by LOB (threshold approach). The threshold might be selected based on judgment, to maximize the number of data points used while minimizing distortions in the indicated PRF. This is in the baseline approach, described in Section 3. The PPA threshold in the baseline is $1 million. The LOB-size thresholds for all LOBs are shown in Appendix B Table 1.

Alternatively, the threshold might be based on a particular percentile of data points; e.g., excluding the smallest 15% of LOB-size data points. The items marked in bold and underline in Columns F and H of the row labeled "25%" (i.e., the 15%-25% row) are the PRF and PRC% obtained by setting the threshold to exclude the smallest 15% LOB data points. Here we note that the PRF based on data points above a 15th percentile threshold happens to coincide with the factor in the 2010 RBC Formula for this LOB.

A second approach is to select the PRF associated with the median LOB-size, or range of data points around the median LOB-size (median approach). The items marked in bold and underline in columns E and G of the "55%" row (i.e., values included between the 45th and 55th LOB-size percentiles) are the indicated median values. In Table 5.1, we note that the 87.5th percentile loss ratio for the median LOB-sizes, 0.971, is quite close to the 0.969 value used in the current RBC calculation for this LOB. This is not the case for all LOBs.

Another approach is to have PRFs vary by LOB-size. Currently, none of the standard formulas vary PRFs in this way; however, Table 5.1 shows that the indicated PRC% for the largest data points (8%) is only about half as large as the PRC% indicated by the median or threshold approaches (15% or 16%). Thus, using the median or threshold approach to setting the PRF and PRC% means that the safety margin for the larger companies, and therefore for most policyholders, is higher, perhaps much higher, than the 87.5th percentile.

Table 5.2 displays the results for the Homeowners/Farmowners LOB; the pattern of variation by LOB-size is similar to that of the PPA LOB. The PRFs based on median and threshold approaches are similar, but not as close to each other as they were for

PPA. The decrease in PRC% from the median to the largest data points, from 18% to 15%, is not as significant as it was for PPA. We do not have the data to test this, but one reason may be that catastrophes affect the PRF and PRC% significantly for all LOB-size's.

Table 5.2
Homeowners/Farmowners – PRF and PRC% by LOB-Size

(1) H/F							
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge	
Endpoint Percentile	from	to	Data Points	all points in band	all points > "from"	all points in band	all points > "from"
15%	0	730	1,429	1.287	0.989	53%	23%
25%	730	1,483	951	1.023	**0.956**	27%	**20%**
35%	1,483	2,758	951	0.985	0.948	23%	19%
45%	2,758	5,022	952	0.964	0.941	21%	18%
55%	5,022	8,866	952	**0.941**	0.938	**18%**	18%
65%	8,866	16,382	952	0.914	0.938	16%	18%
75%	16,382	31,572	951	0.959	0.945	20%	19%
85%	31,572	61,546	952	0.940	0.937	18%	18%
95%	61,546	252,884	952	0.929	0.935	17%	18%
largest 100	252,884	1,499,819	375	0.951	0.947	19%	19%
100%	1,499,819	10,820,092	100	0.912	0.912	15%	15%
	Current Risk Charge Loss Ratio (PR017 Line 4)				0.937		
	Underwriting Expense Ratio in Risk Charge					24%	

Table 5.3 displays the results for the MPL – Occurrence LOB. The PRFs by LOB-size are more erratic for this line than for the two lines discussed above. The indicated PRFs appear to be smallest near the median LOB-size level and larger for both smaller LOB-sizes and larger LOB-sizes. This atypical behavior may be due to the smaller number of data points, or differences in types of business (primary vs. excess or institutions vs. individual health care providers) among the smaller, medium, and larger LOB-sizes.

The PRFs for the median and threshold approaches in Table 5.3, 1.261 and 1.458 respectively, are both lower than the current PRF, 1.822. One factor contributing to this difference is the years of data used. As shown in Table 4.3, the PRFs for MPL – Occurrence vary by year. The current charges may reflect the effects of the adverse 1995, 1996, and 1998 years. Also, the current RBC PRFs, based on less recent data, do not reflect the effects of the more favorable 2009 and 2010 years included in Table 4.3.

Another factor contributing to the difference between current PRFs and Table 5.3 indicated PRFs may be that data in Table 5.3 excludes minor lines data point experience, while data underlying the current PRFs were not adjusted in that way. Table 3.3 showed that excluding minor lines has a significant effect on the indicated PRF for this LOB.

Table 5.3
MPL Occ. – PRF and PRC% by LOB-Size

(6) MPL Occ.							
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge	
Endpoint Percentile	from	to	Data Points	all points in band	all points > "from"	all points in band	all points > "from"
15%	0	823	168	2.434	1.521	147%	56%
25%	823	1,595	111	1.566	**1.458**	60%	**50%**
35%	1,595	2,623	111	1.265	1.447	30%	49%
45%	2,623	4,087	112	1.440	1.459	48%	50%
55%	4,087	6,672	111	**1.261**	1.464	**30%**	50%
65%	6,672	11,654	112	1.426	1.486	46%	52%
75%	11,654	24,496	111	1.696	1.521	73%	56%
85%	24,496	44,393	111	1.431	1.425	47%	46%
95%	44,393	152,900	112	1.380	1.422	42%	46%
largest 28	152,900	204,129	27	1.339	1.448	38%	49%
100%	204,129	516,498	28	1.545	1.545	58%	58%
	Current Risk Charge Loss Ratio (PR017 Line 4)				1.822		
	Underwriting Expense Ratio in Risk Charge					4%	

Table 5.4 displays the results for the Reinsurance – Liability LOB.

Table 5.4
Reinsurance-liability – PRF and PRC% by LOB-Size

(17) Reins. Liab.							
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge	
Endpoint Percentile	from	to	Data Points	all points in band	all points > "from"	all points in band	all points > "from"
15%	0	2,339	169	1.700	1.335	86%	49%
25%	2,339	5,258	112	1.436	**1.302**	59%	**46%**
35%	5,258	9,036	112	1.175	1.278	33%	44%
45%	9,036	18,520	112	1.288	1.290	45%	45%
55%	18,520	33,620	112	**1.272**	1.290	**43%**	45%
65%	33,620	54,532	112	1.335	1.290	49%	45%
75%	54,532	105,154	112	1.293	1.265	45%	42%
85%	105,154	223,643	112	1.174	1.227	33%	39%
95%	223,643	760,588	112	1.387	1.262	55%	42%
largest 28	760,588	1,098,101	27	0.980	0.972	14%	13%
100%	1,098,101	4,178,508	28	0.931	0.931	9%	9%
	Current Risk Charge Loss Ratio (PR017 Line 4)				1.507		
	Underwriting Expense Ratio in Risk Charge					16%	

As with MPL, we also observe that the Table 5.4 indicated PRFs for threshold or median approaches, 1.302 or 1.272, respectively, are lower than the current PRF, 1.507.

One factor contributing to this difference is the years used. As shown in Table 4.4, the PRFs for Reinsurance – Liability vary widely by year; the current PRFs may have the effects of the adverse 1998-2001 years. Also, the current charges, based on less recent data, do not reflect the effects of the more favorable 2009 and 2010 years included in Table 5.5.

Another factor contributing to this difference may be that data in this analysis excludes minor lines data points, while data underlying the current PRFs did not make that adjustment. Table 3.4 showed that excluding minor lines data points has a significant effect on the indicated PRF.

Corresponding tables for all LOBs are shown in Appendix D. The tables in Appendix D also include average loss ratio, loss ratio standard deviation, and loss ratio coefficient of variation statistics.

6. Maturity

The DCWP data set includes data points of varying development maturities. The most recent AY (2010) reflects one year of payments and management reserve estimate (case+

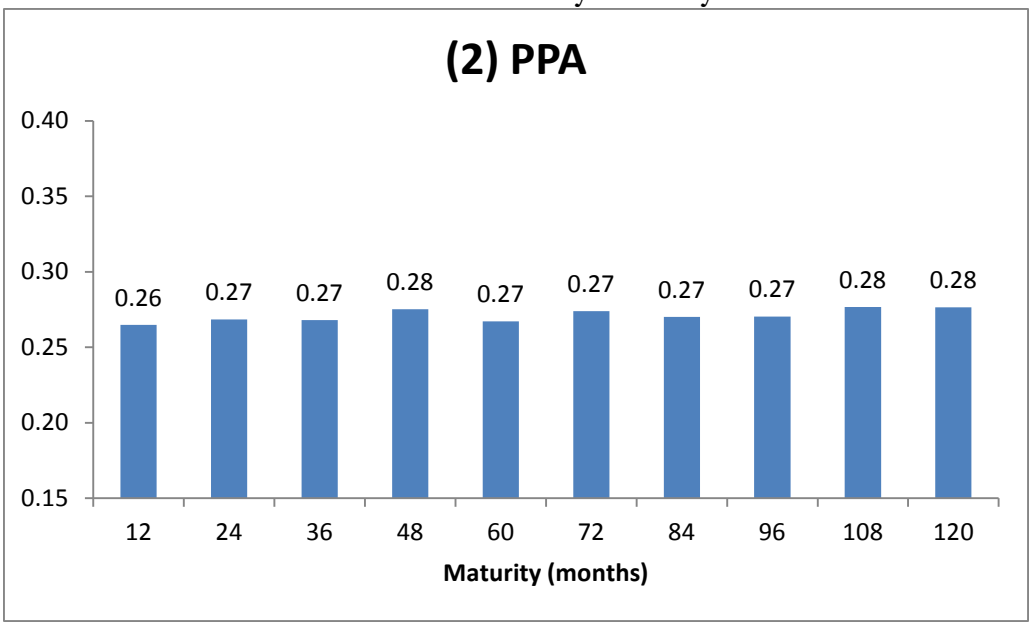
bulk + IBNR) at 12 months. AY 2009 reflects two years of payments and management reserve estimate at 24 months, etc. AYs 1997-2000 are the most mature, and reflect payments through 10 years and management reserve estimate at 120 months. The CCM and the baseline filtering in this paper treat all data points as equivalent, regardless of the maturity of the data.

In this section we test whether such equivalent treatment is appropriate. To do so, we examined data from AY 1997-2000. These are the AYs for which we have data points at every maturity from age 12 months to age 120 months. We use the same AYs for each maturity level to avoid bias that might arise from differences in PRC% by AY shown in Section 4 above.

We calculated PRC%s using data points for each maturity level separately using the baseline filtering. The results are discussed below.

Table 6.1 shows the PRC%s, for the PPA LOB, for AYs 1997-2000 combined, separately for each maturity level.

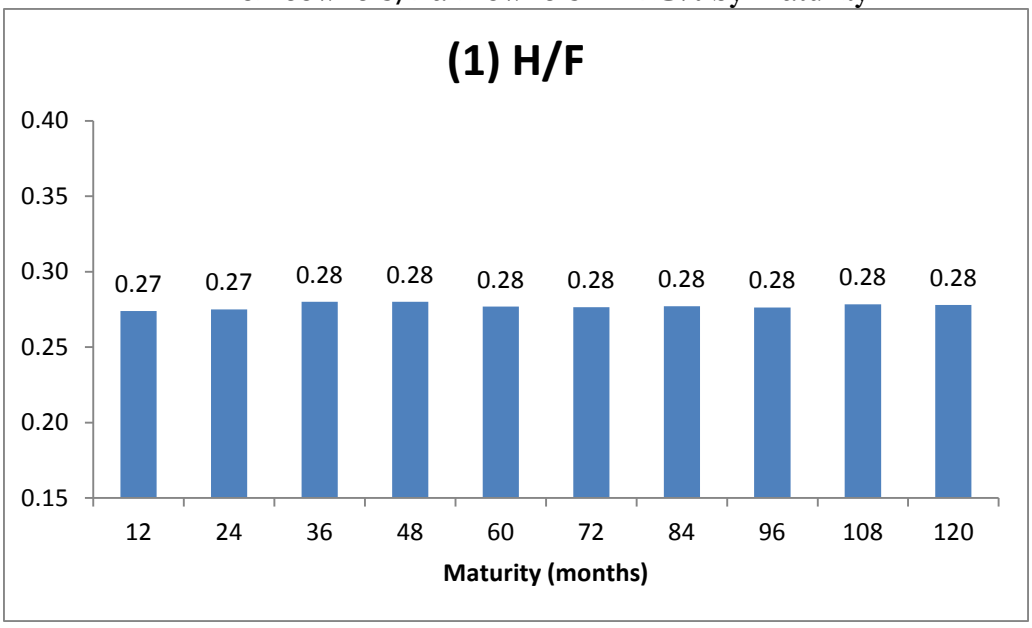
Table 6.1
PPA – PRC% by Maturity



Here we see that the PRC% reaches a stable value at 12 or 24 months of development.

Table 6.2 shows the corresponding PRC%s for the Homeowners/Farmowners LOB; the "fast development" pattern for Homeowners/Farmowners is similar to the PPA LOB pattern.

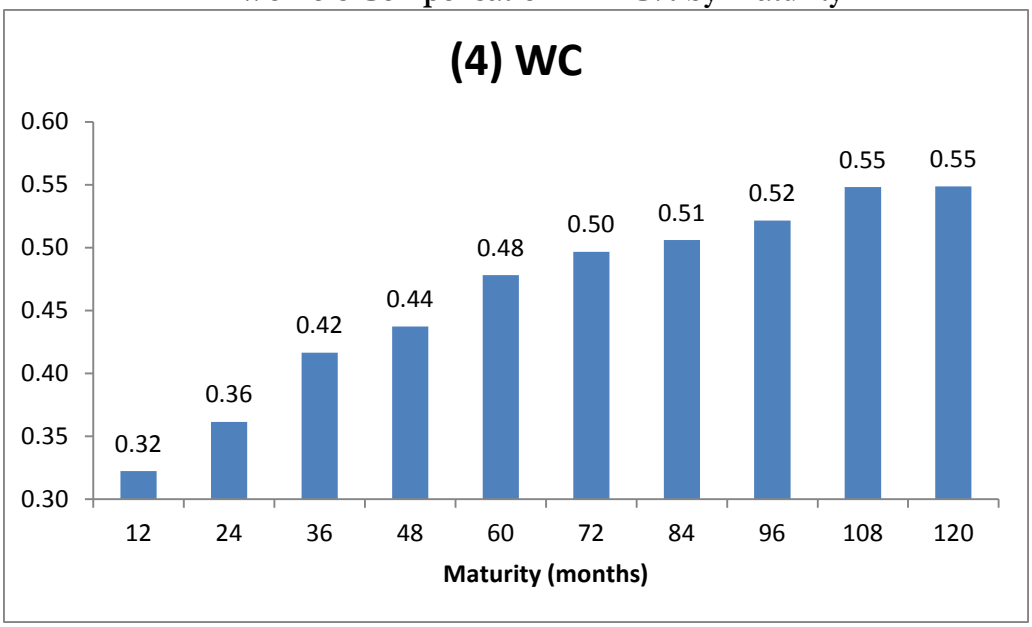
Table 6.2
Homeowners/Farmowners – PRC% by Maturity



The results shown so far are consistent with expectations for shorter-tailed liability LOBs.

Table 6.3 shows the PRC%s grouped by maturity for the workers compensation LOB.

Table 6.3
Workers Compensation – PRC% by Maturity



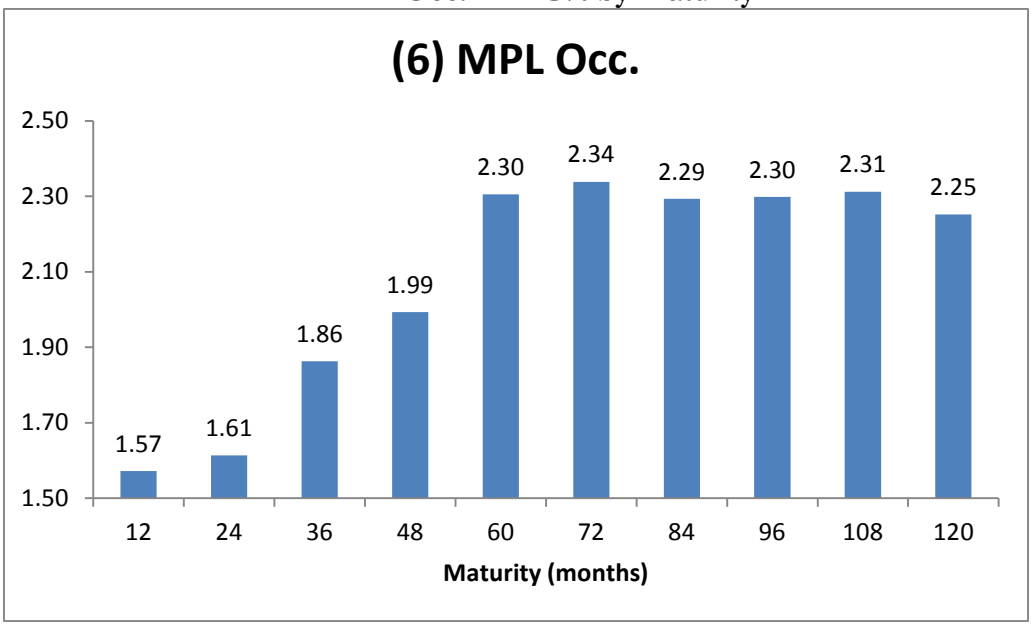
For the workers compensation LOB, the time required for PRC%s to reach a stable value, i.e., the "development period," is much longer than for the PPA and Homeowners/Farmowners LOBs illustrated in Tables 6.1 and 6.2.

Some of the development in workers compensation PRF might be due to emergence of tabular reserve.[26] This working party did not analyze that effect.

Table 6.4 shows the development period for the MPL – Occurrence LOB, shorter than workers compensation but longer than PPA or Homeowners/Farmowners. Nontabular reserve, which might appear for MPL lines, does not affect the PRFs and PRC%s because the Schedule P loss ratios used in our analysis are gross of nontabular discount.

[26] The PRF should be designed with data gross of all interest discount, to the extent possible, in that Investment Income Offset in the RBC formula separately reflects the value of investment income for risk-based capital adequacy purposes.

Table 6.4
MPL Occ. – PRC% by Maturity



Corresponding tables for all LOBs are shown in Appendix E.

Table 6.5 displays the number of years of maturity required for the PRF to be within three percentage points[27] of the mature PRF for the 1997-2000 AY experience period.

It is possible that the 1997-2000 time period reflected in Table 6.5 is not typical, at least for some lines, and further research is warranted to examine that. Even given that uncertainty, the simplest way to reflect the maturity issue in calibration of PRFs would be to discard data points that are not sufficiently mature.

A more complex method would be to adjust the PRFs for expected development and use the adjusted data in an all-year PRF calculation. That would require more analysis of the extent to which the PRF "development" for AYs 1997-2000 is typical.

The working party has not tested the effect of either maturity adjustment.

[27] 3% is an arbitrary, but we think reasonable, target for "mature".

Table 6.5
Development Years Needed to Reach Maturity[28]
AYs 1997-2000

LOB	Years to Reach Maturity
(1) H/F	1
(2) PPA	2
(3) CA	4
(4) WC	9
(5) CMP	5
(6) MPL Occ.	5
(7) MPL C-M	5
(8) SL	3
(9) OL	5
(11) Spec. Prop.	1
(12) APD	2
(10) Fidelity / Surety	9
(13) Other	8
(16) Reins. Prop. / Fin.	2
(17) Reins. Liab.	8
(18) PL	10

7. Years of NEP >0

The baseline filtering excludes data points from LOBs where the company has had less than five years of positive NEP in that LOB. The five-year trigger was selected given that some minimum seemed appropriate, and we wanted to test a criterion that was less strict than the 10-year requirement in the CCM.

To evaluate the extent to which PRFs vary by years of NEP, we grouped the data points based on the number of years of positive NEP for the LOB-company/pool and calculated the PRFs for each data group.

Table 7.1 shows the premium and number of data points in each of the NEP>0 year groupings. We see that the 20 and over group is a significant proportion of the total:

[28] For Auto Physical Damage and Special Property LOBs, the PRC%s at 12 months are slightly higher, rather than lower, than the mature PRC%s.

approximately 90% of the premium and approximately 59% of the data points. There is relatively little data in the category 0-4 years of NEP>0.[29]

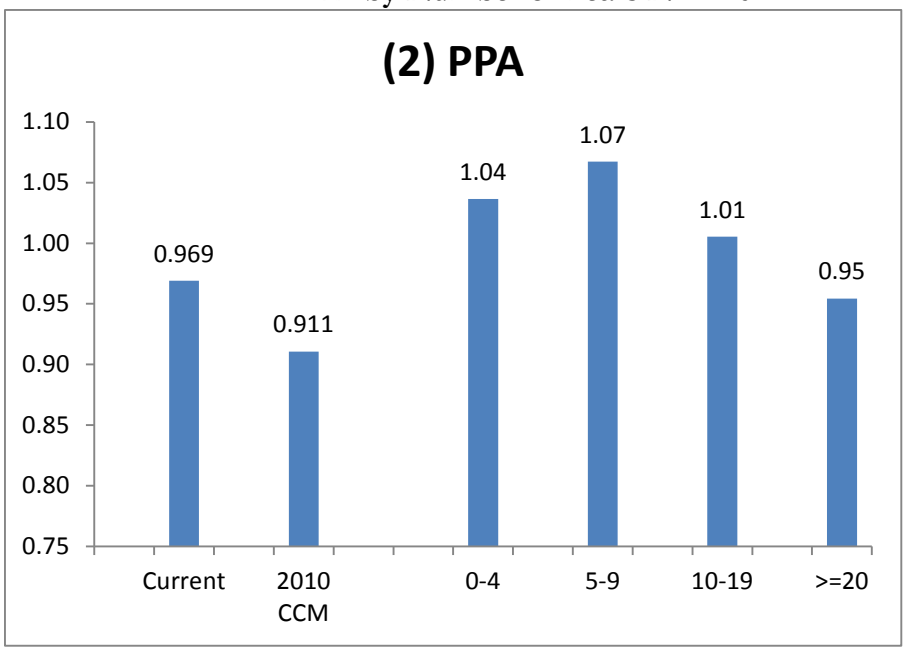
Table 7.1
Premium and Data Points by Number of Years NEP>0

	All-Year Premium ($millionss)					All-Year Data Points				
LOB	0-4	5-9	10-19	>=20	Total	0-4	5-9	10-19	>=20	Total
(1) H/F	2,305	10,256	75,576	713,396	801,534	317	920	1,862	6,735	9,834
(2) PPA	2,207	12,449	80,093	1,514,014	1,608,763	344	894	2,237	5,557	9,032
(3) CA	1,106	4,574	17,069	241,078	263,828	249	614	1,625	3,822	6,310
(4) WC	3,131	25,866	65,965	662,871	757,832	349	754	1,812	3,568	6,483
(5) CMP	1,283	5,561	32,078	408,948	447,870	240	577	1,734	4,882	7,433
(6) MPL Occ.	662	1,230	1,376	24,941	28,208	72	222	248	644	1,186
(7) MPL C-M	909	6,795	3,759	63,415	74,879	213	818	495	1,171	2,697
(8) SL	128	1,169	2,378	35,911	39,585	71	190	320	625	1,206
(9) OL	1,319	6,105	32,586	429,753	469,763	407	1,029	2,095	5,580	9,111
(11) Spec. Prop.	2,049	5,967	27,412	262,821	298,248	330	815	2,696	5,382	9,223
(12) APD	1,494	5,243	65,548	909,953	982,239	395	863	2,942	5,680	9,880
(10) Fidelity / Surety	123	699	3,505	101,102	105,429	89	213	396	836	1,534
(13) Other	454	4,358	24,704	49,338	78,854	114	325	773	609	1,821
(15) International	4,687	2,482	21,763	9,044	37,976	20	19	38	21	98
(16) Reins. Prop. / Fin.	123	1,151	5,725	45,707	52,706	70	184	311	559	1,124
(17) Reins. Liab.	238	2,851	9,510	107,832	120,431	93	227	273	620	1,213
(18) PL	288	764	3,446	26,906	31,404	55	48	225	383	711
Total	22,507	97,520	472,494	5,607,029	6,199,550	3,428	8,712	20,082	46,674	78,896
	0%	2%	8%	90%	100%	4%	11%	25%	59%	100%

Table 7.2 shows the PRFs grouped in bands by "number of years" for the PPA LOB.

[29] Some of the data points in the NEP<5 category have already been removed from the data set by the minor lines or the size threshold filters.

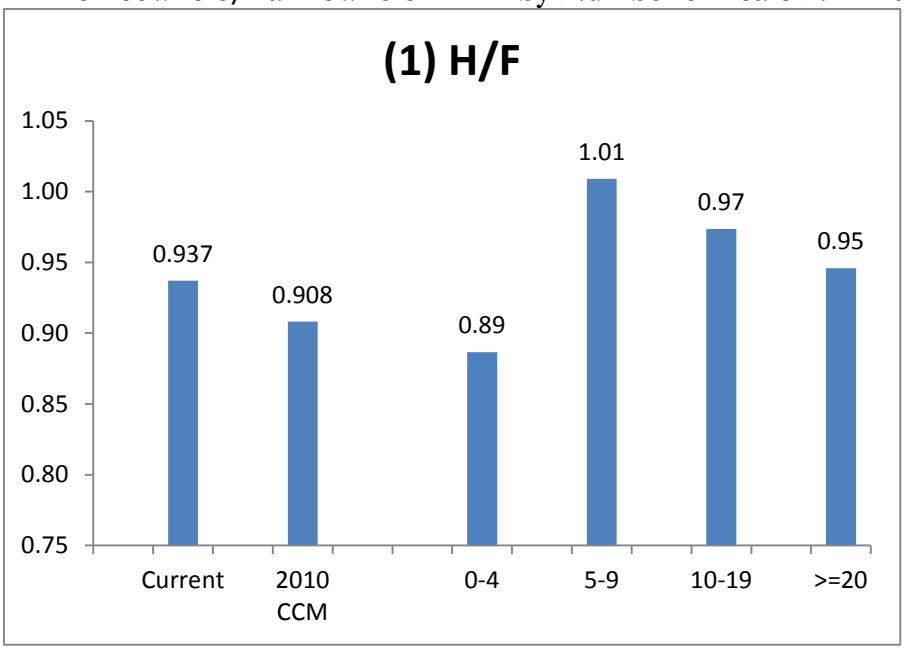
Table 7.2
PPA – PRF by Number of Years NEP>0



For the groups with more than four years of NEP>0, we see a decrease in the PRF as years of NEP>0 increase, as might be expected if variability is lower the longer a company is in business for a LOB.

Table 7.3 shows the PRFs grouped by number of years NEP>0 for the Homeowners/Farmowners LOB.

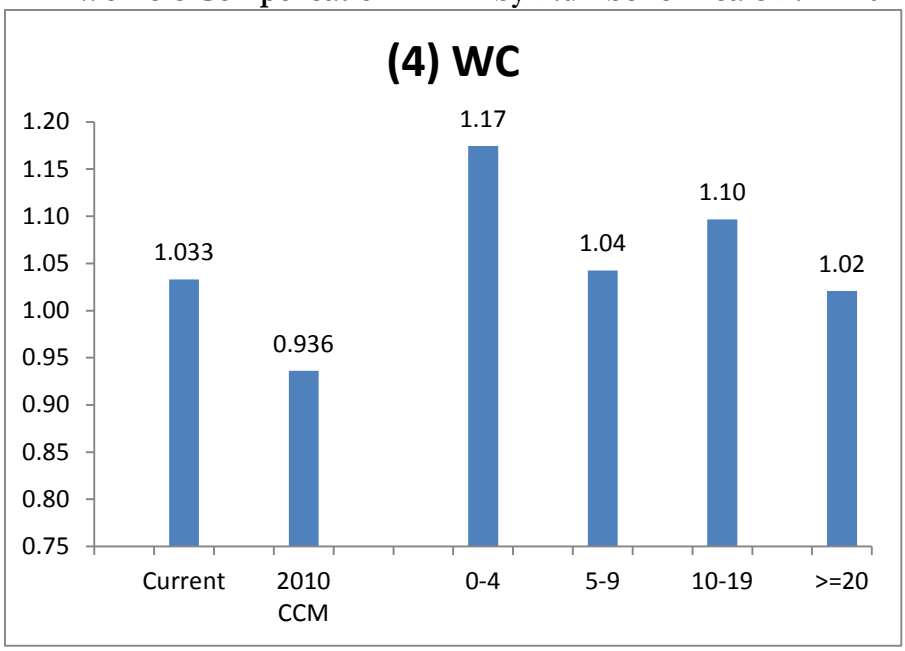
Table 7.3
Homeowners/Farmowners – PRF by Number of Years NEP>0



Here again we see a decreasing pattern for the groups with more than four years NEP>0.

Table 7.4 shows the PRFs grouped by number of years NEP>0 for the workers compensation LOB.

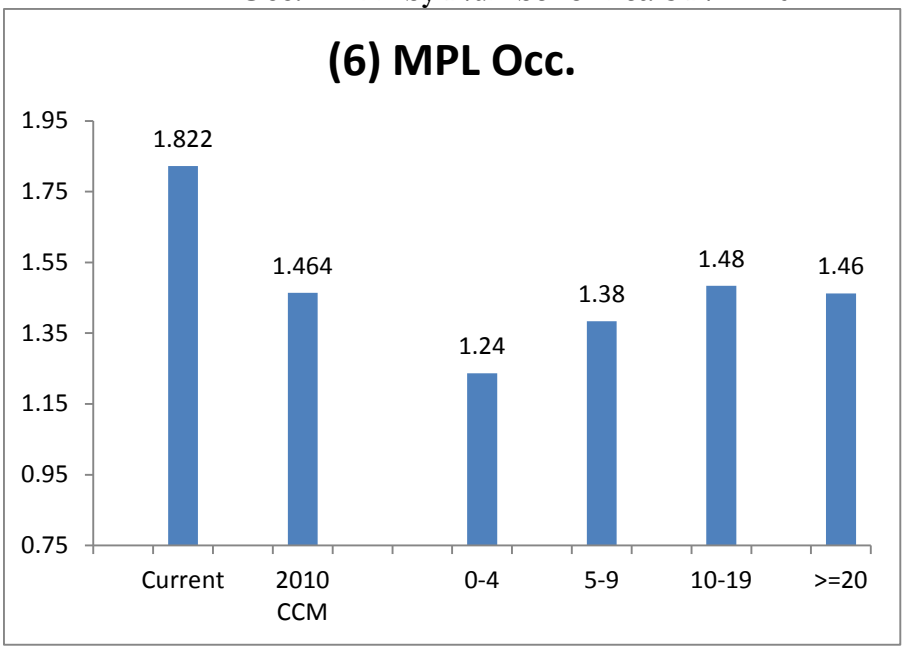
Table 7.4
Workers Compensation – PRF by Number of Years NEP>0



Unlike the case for the other LOBs, the values for groups with more than four years NEP>0 do not exhibit a monotonically-decreasing pattern.

Table 7.5 shows the PRFs grouped by number of years NEP>0 for the MPL – Occurrence LOB. As with workers compensation, there is no pattern to the PRFs based on years of NEP>0.

Table 7.5
MPL Occ. – PRF by Number of Years NEP>0



Corresponding tables for all LOBs are shown in Appendix F.

8. Survivorship

In compiling the baseline data set, we assumed that companies had a 2010 Annual Statement. Consequently, we obtained loss ratios for AYs 2001-2010 from the 2010 Annual Statement. We then used the 2009 Annual Statement to obtain AY 2000 loss ratios, the 2008 Annual Statement to obtain AY 1999 loss ratios, etc.

However, later research revealed companies which had no 2010 Annual Statement but did have data for AYs 2001-2009. To test the effect of including this additional data, we adjusted our data set to use the 10 AYs from the latest available Annual Statement, even if the latest available Annual Statement was not the 2010 Annual Statement.

This revised process added approximately 9,100 data points, an increase of about 13%. Table 8.1 below summarizes the comparison of data points and indicated PRC%s using the two data sets.

Table 8.1
Effect of "Survivorship Bias" on Indicated PRC%

	Baseline		Revised		Difference	
LOB	Data Points Used	Indicated PRC%	Data Points Used	Indicated PRC%	Data Points Used	Indicated PRC%
(1) H/F	7,720	19.6%	8,372	20.1%	652	0.5%
(2) PPA	7,828	15.9%	8,663	17.0%	835	1.0%
(3) CA	4,923	24.1%	5,580	26.0%	657	1.9%
(4) WC	5,750	25.6%	6,844	26.8%	1,094	1.2%
(5) CMP	6,640	23.0%	7,467	24.2%	827	1.2%
(6) MPL Occ.	951	49.6%	1,083	55.1%	132	5.4%
(7) MPL C-M	2,325	38.0%	2,686	43.9%	361	5.8%
(8) SL	967	29.0%	1,079	30.6%	112	1.7%
(9) OL	7,719	35.4%	8,679	37.1%	960	1.7%
(11) Spec. Prop.	8,385	25.1%	9,431	26.2%	1,046	1.1%
(12) APD	9,174	17.2%	10,402	18.5%	1,228	1.3%
(10) Fidelity / Surety	1,394	31.4%	1,655	33.8%	261	2.4%
(13) Other	1,652	31.0%	2,119	32.1%	467	1.1%
(15) International	77	23.9%	91	23.0%	14	-0.9%
(16) Reins. Prop. / Fin.	1,000	50.6%	1,143	50.1%	143	-0.6%
(17) Reins. Liab.	1,061	49.4%	1,251	48.7%	190	-0.7%
(18) PL	637	43.8%	760	46.2%	123	2.4%
(14) Financial / Mortgage	18	153.1%	70	74.1%	52	-79.1%
(19) Warranty	29	55.3%	30	52.6%	1	-2.7%
Total	68,250		77,405		9,155	

In general, the more inclusive data set produces higher PRFs and PRC%s. For most LOBs, the adjusted PRC%s are about one percent higher. The effect is larger for MPL. The effect is slightly beneficial for Reinsurance.

We refer to this adjustment as "survivorship" because it corrects for the apparent bias introduced when companies drop out of the data set.

9. Further Research

DCWP is conducting research in the following areas, and reports will be published in due course.

1. Variation in PRFs and PRC% by type of company; e.g., personal lines, professional reinsurer, etc.
2. Variation in PRFs and PRC% based on data including expenses; i.e., combined ratio rather than loss ratio.
3. Solvency II modeling approach vs. the "empirical approach" used in the research.

There are a number of other interesting issues, but DCWP is not now conducting research on those areas. These include the following:

4. Issues identified in the report:
    a. Effect of maturity for experience periods other than 1997-2000.
    b. Effect of workers compensation tabular reserve on observed maturity effect.
    c. The extent to which the 23 AYs of experience in this data set does or does not sufficiently reflect the extent of systemic and cyclical variability in all lines of business.
5. Interactions between PRF calibration and own-company adjustment and other aspects of the filtering used in final calibration. It seems logical that industry average loss ratios used in the own company adjustment process should be based on industry average from companies that satisfy the filtering used to calibrate the PRFs; e.g., excluding minor lines and LOB-size above the size threshold. This report does not examine the impact of that issue.
6. Investment Income offset – The investment income offset might best be determined considering the years used to calibrate the PRF, as higher interest rates would produce higher loss ratios and higher PRFs in the past.
7. Risk metrics
    a. Higher confidence levels, e.g., 90%, 95%,… vs. 87.5%
    b. TVaR vs. VaR vs. Butsic (risk-adjusted VaR, DCWP Report 5)

8. Risk metric – Currently it is based on a percentile over all data points all years. Alternatives include percentiles determined:
    a. within years, or
    b. within companies.

10. Authors

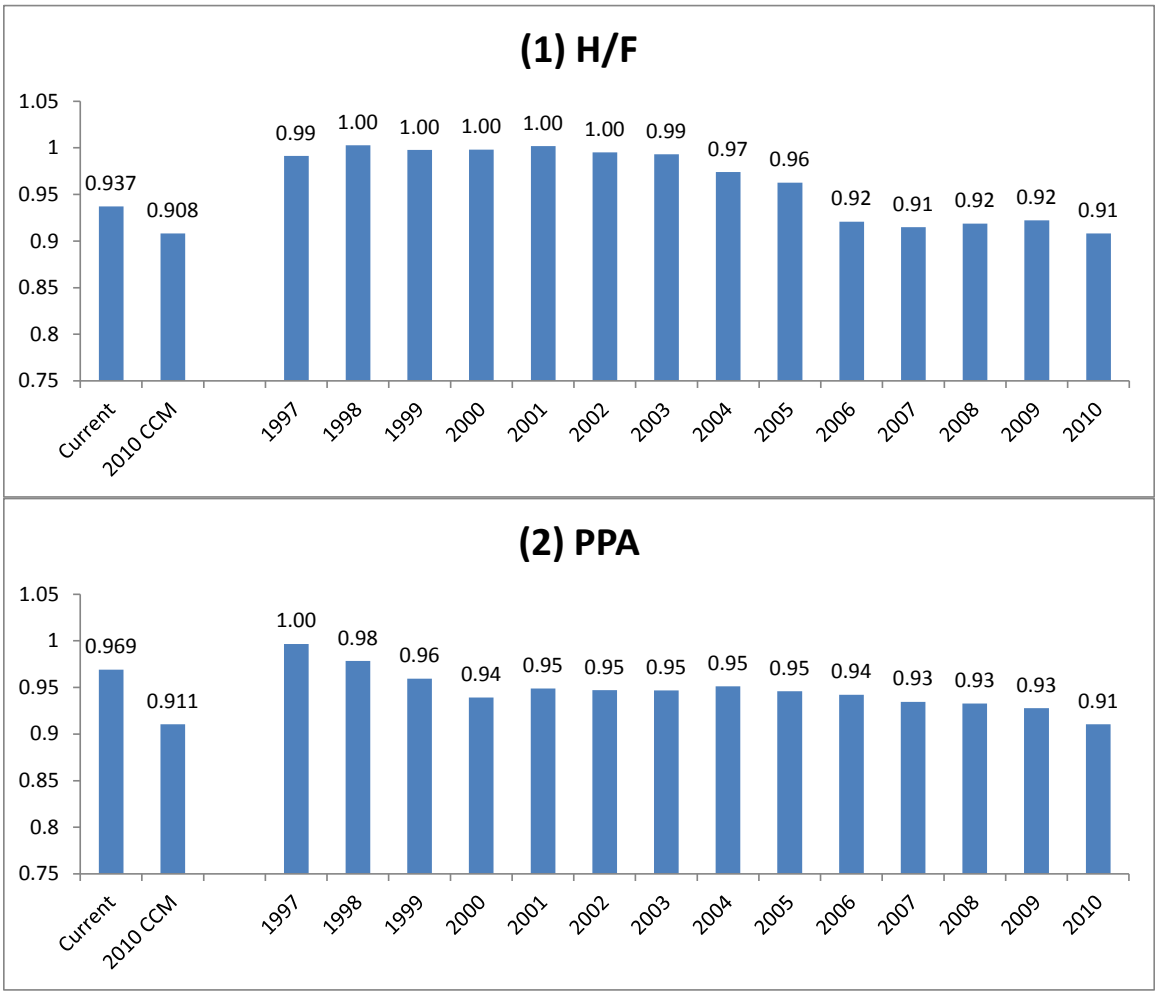
Principal Authors:
Analysis: Jennifer Wu, Allan Kaufman
Text: Dennis Franciskovich, Allan Kaufman
Other work stream members:
Karen H. Adams, Daniel M. Murphy, Timothy Sweetser, Giuseppe (Franco) LePera

Work was supported by the DCWP working party with membership as follows:

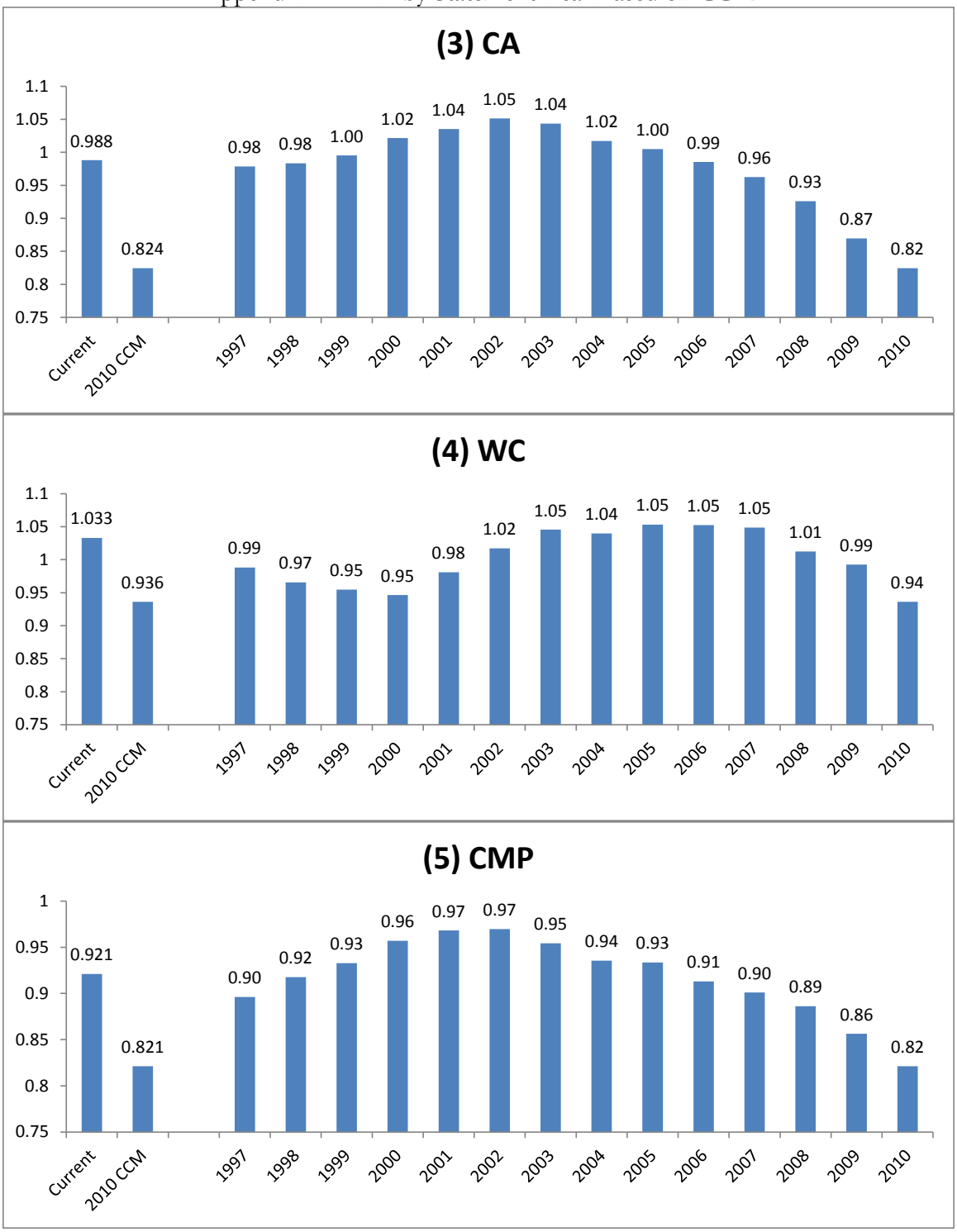
Allan M. Kaufman, Chair
Karen H. Adams
Emmanuel Theodore Bardis
Jess B. Broussard
Robert P Butsic
Pablo Castets
Joseph F. Cofield
Jose R. Couret
Orla Donnelly
Chris Dougherty
Brian A. Fannin
Sholom Feldblum
Kendra Felisky
Dennis A. Franciskovich
Spencer Gluck
James C. Guszcza
Jed Nathaniel Isaman
Shira L. Jacobson
Shiwen Jiang
Alex Krutov
Terry T. Kuruvilla
Apundeep Singh Lamba
Giuseppe F. LePera
Zhe Robin Li
Lily (Manjuan) Liang
Thomas Toong-Chiang Loy
Eduardo P. Marchena
Mark McCluskey
James P. McNichols
Glen G. Meyers
Daniel M. Murphy
Douglas Robert Nation
G. Chris Nyce
Jeffrey J. Pfluger
Yi Pu
Ashely Arlene Reller
David A. Rosenzweig
David L. Ruhm
Andrew Jon Staudt
Timothy Delmar Sweetser
Anna Marie Wetterhus
Jennifer X. Wu
Jianwei Xie
Ji Jyo
Linda Zhang
Christina Tieyan Zhou

CAS Staff – Karen Sonnet
Actuarial Students – Damon Chom, Francis Guo

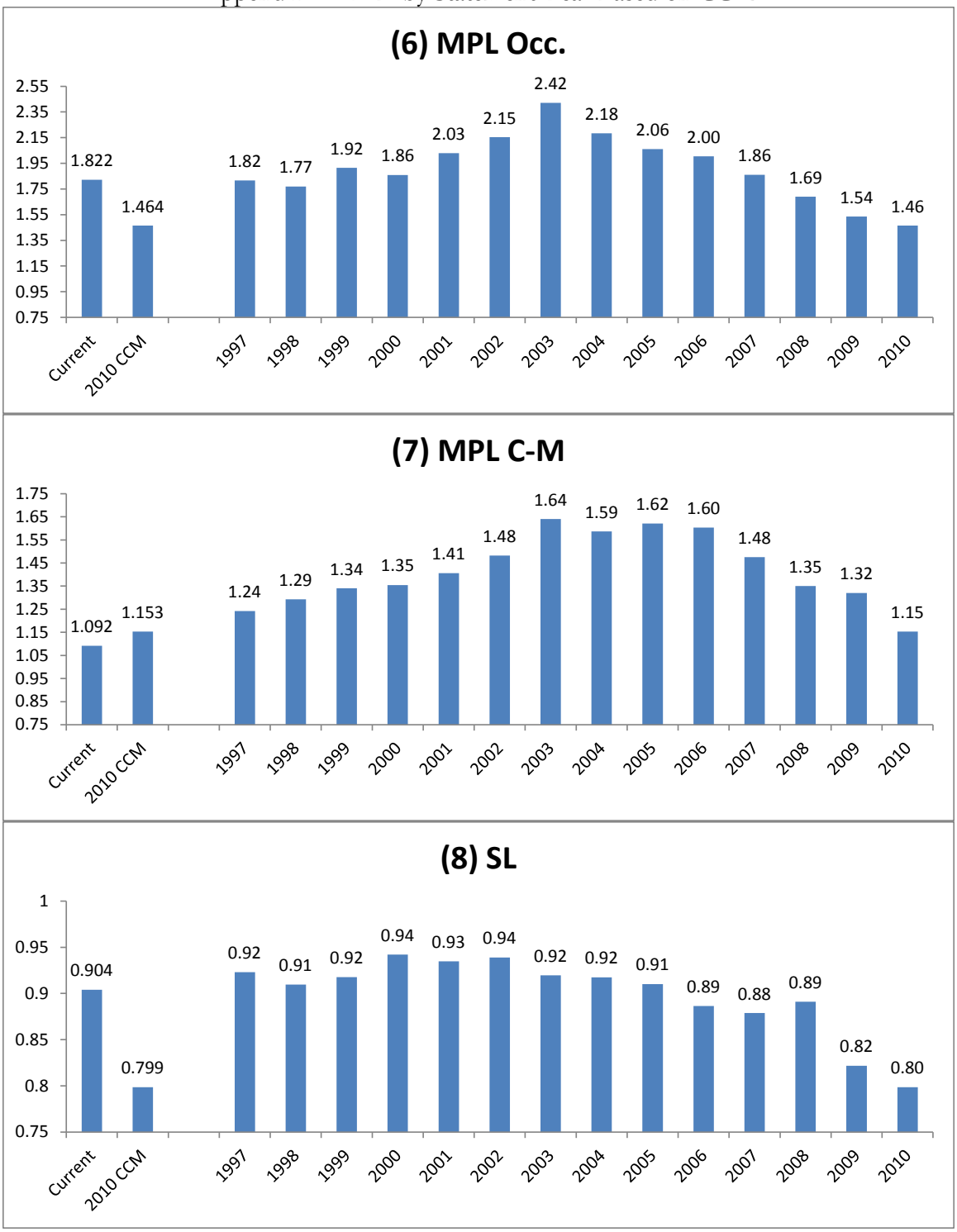
Appendix A –PRF by Statement Year Based on CCM



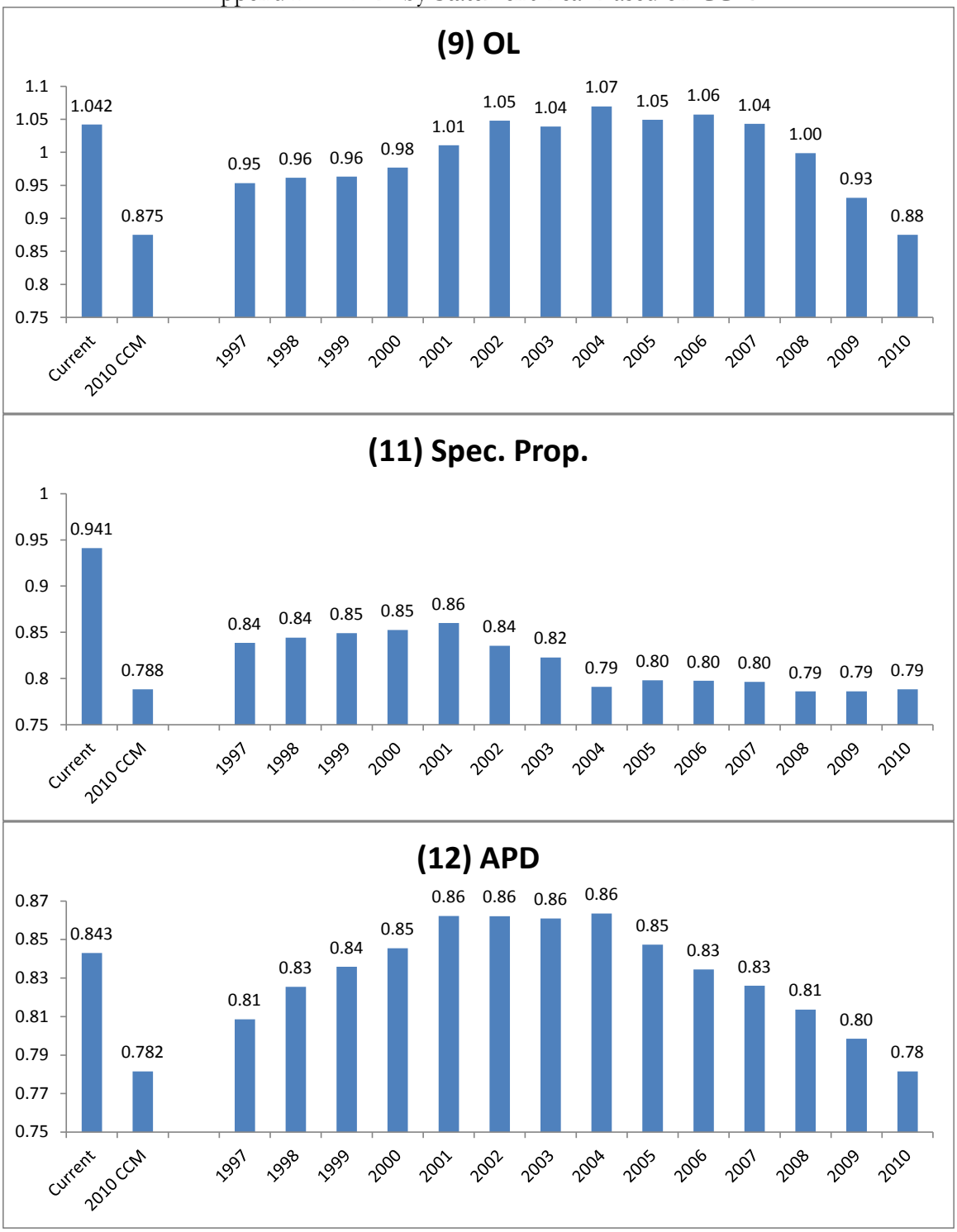
Appendix A - PRF by Statement Year Based on CCM



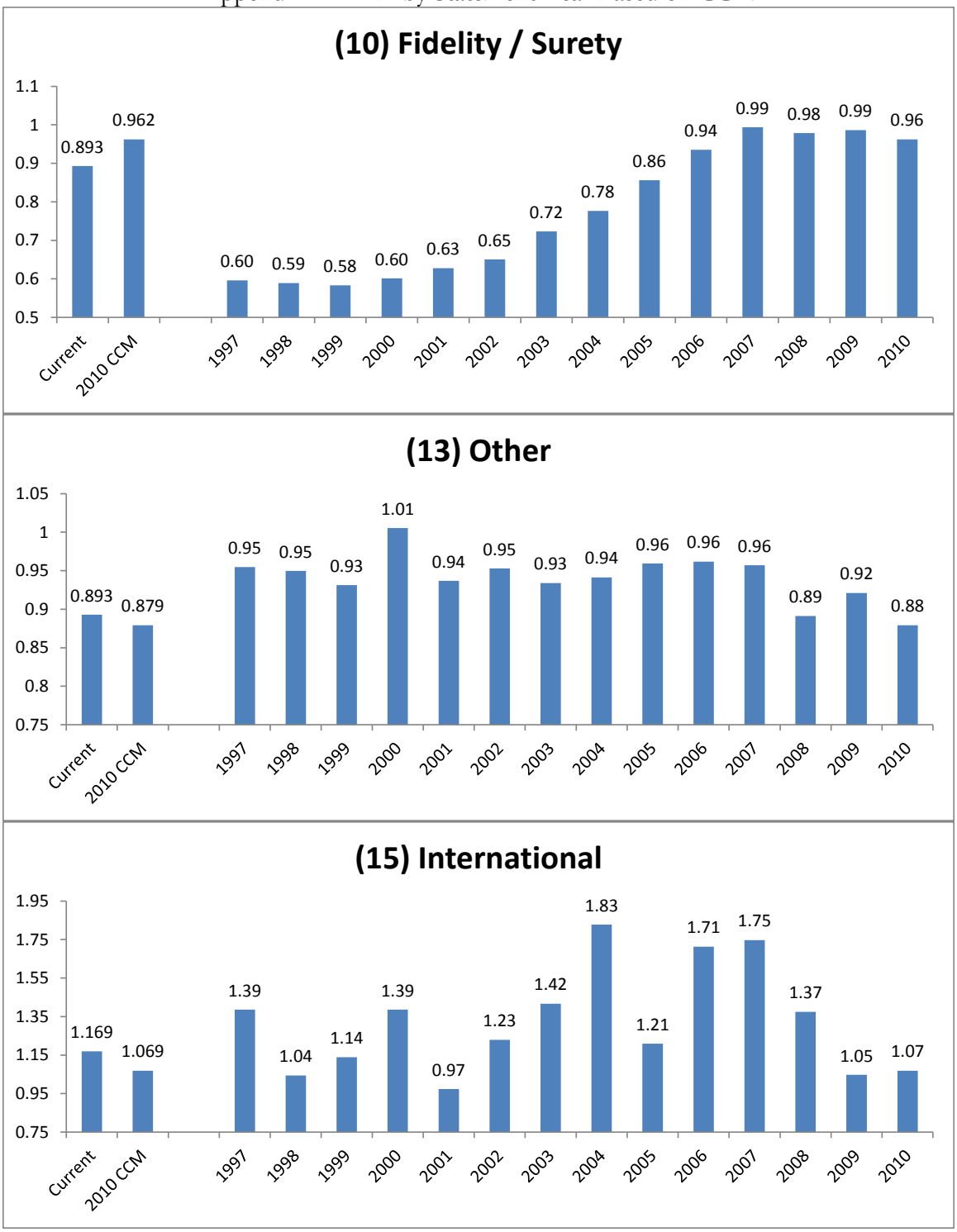
Appendix A - PRF by Statement Year Based on CCM



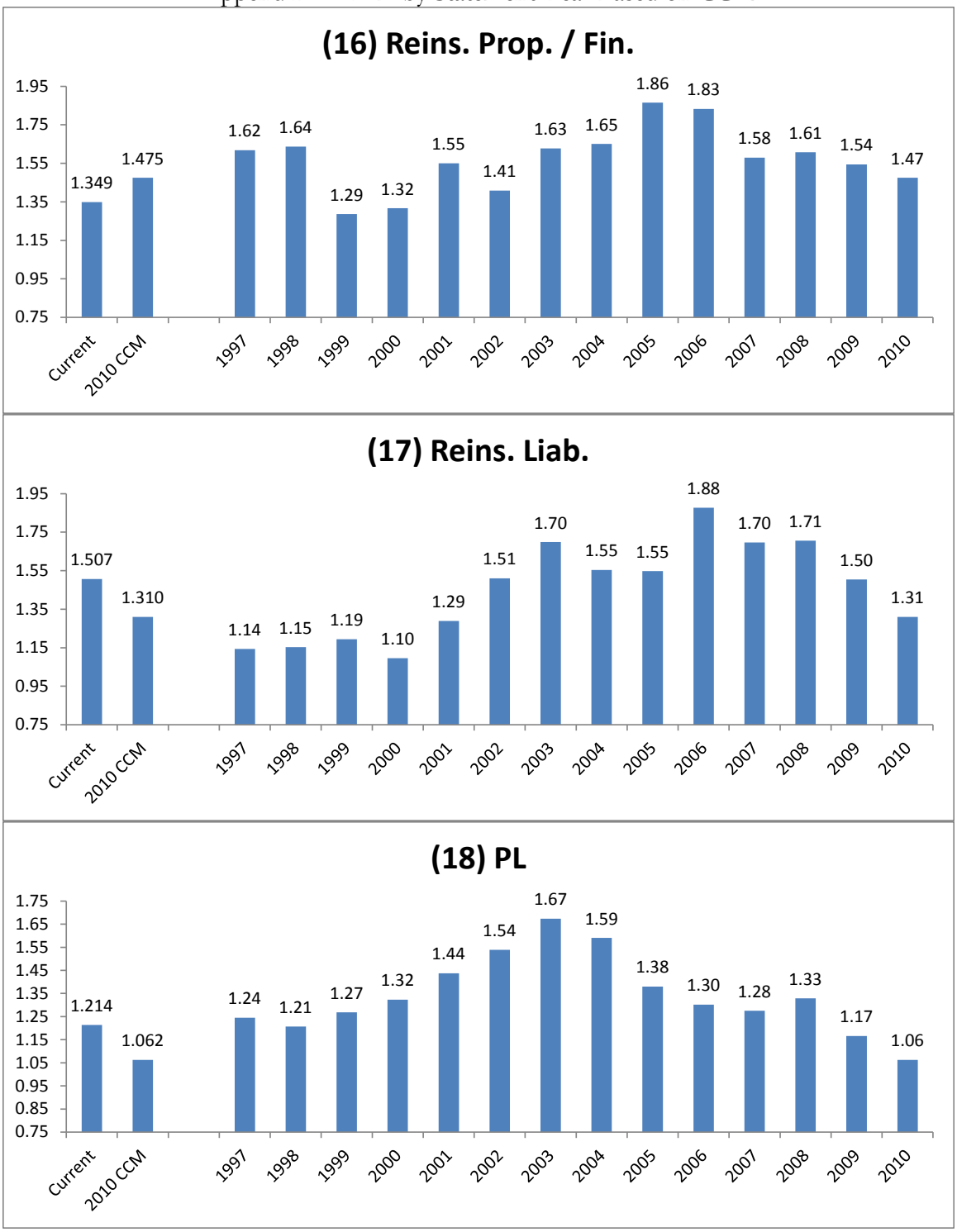
Appendix A - PRF by Statement Year Based on CCM



Appendix A - PRF by Statement Year Based on CCM

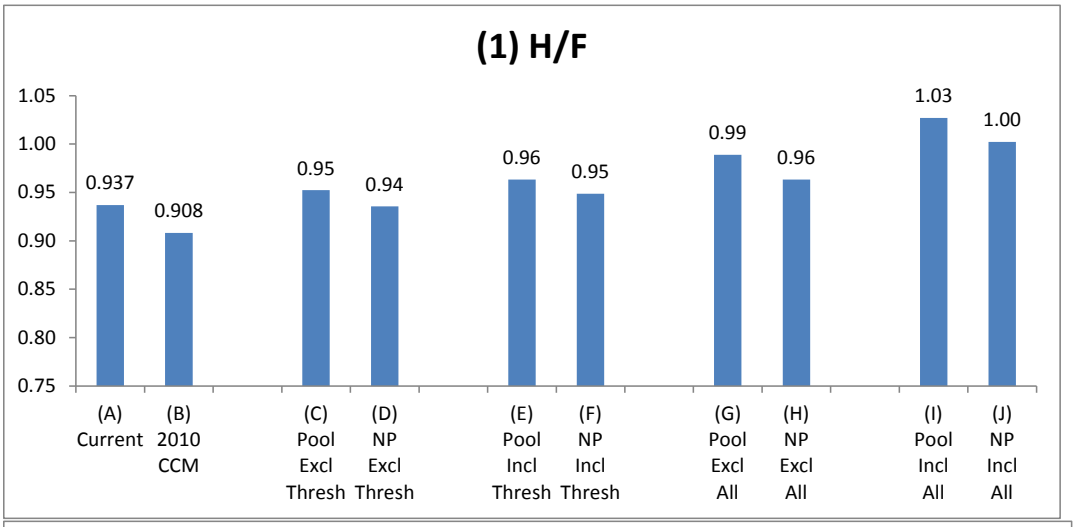


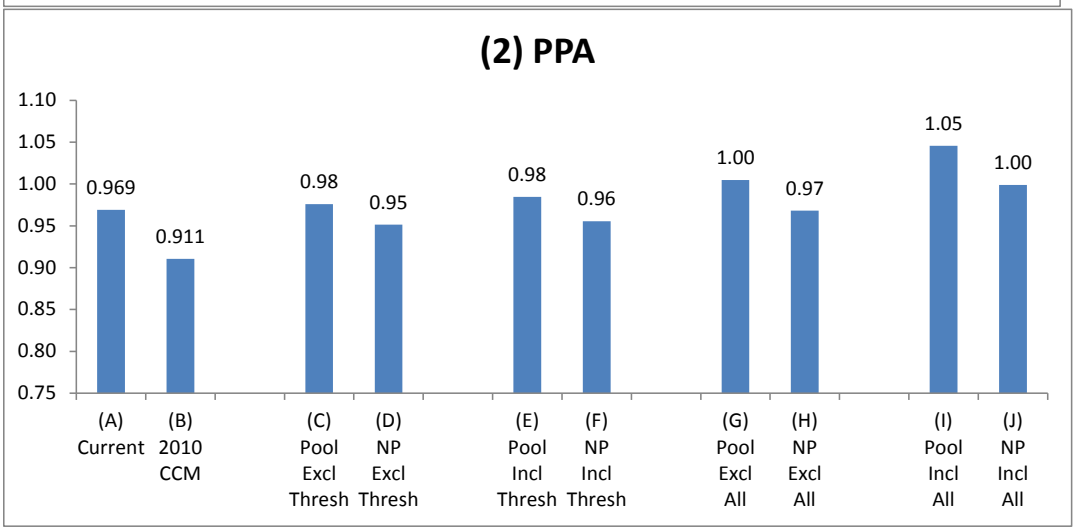
Appendix A - PRF by Statement Year Based on CCM

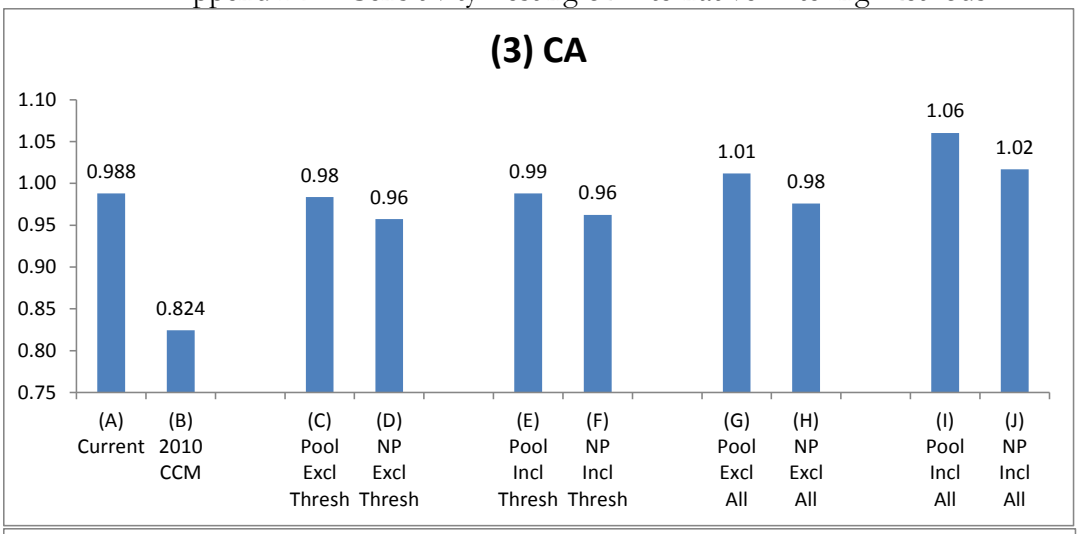


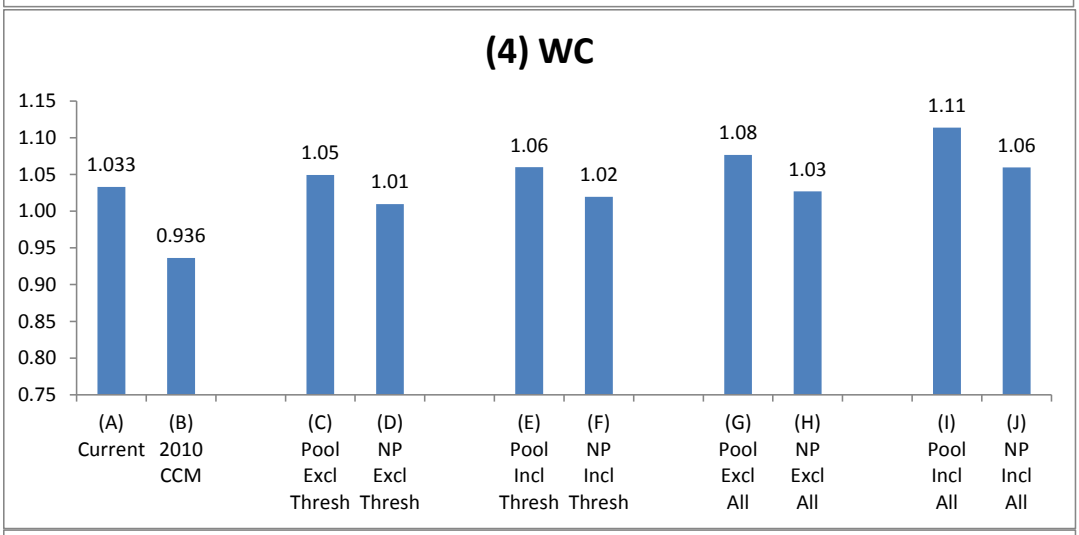
Note: (14) Financial/Mortgage and (19) Warranty LOBs are not shown as data for those lines is so new and sparse that charts are not meaningful.

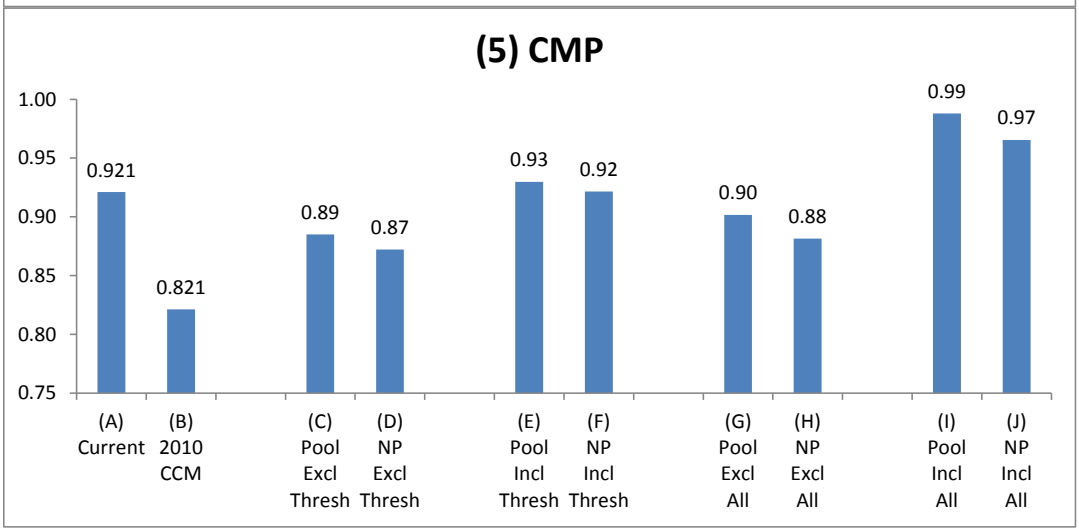
Appendix B – Sensitivity Testing of Alternative Filtering Methods

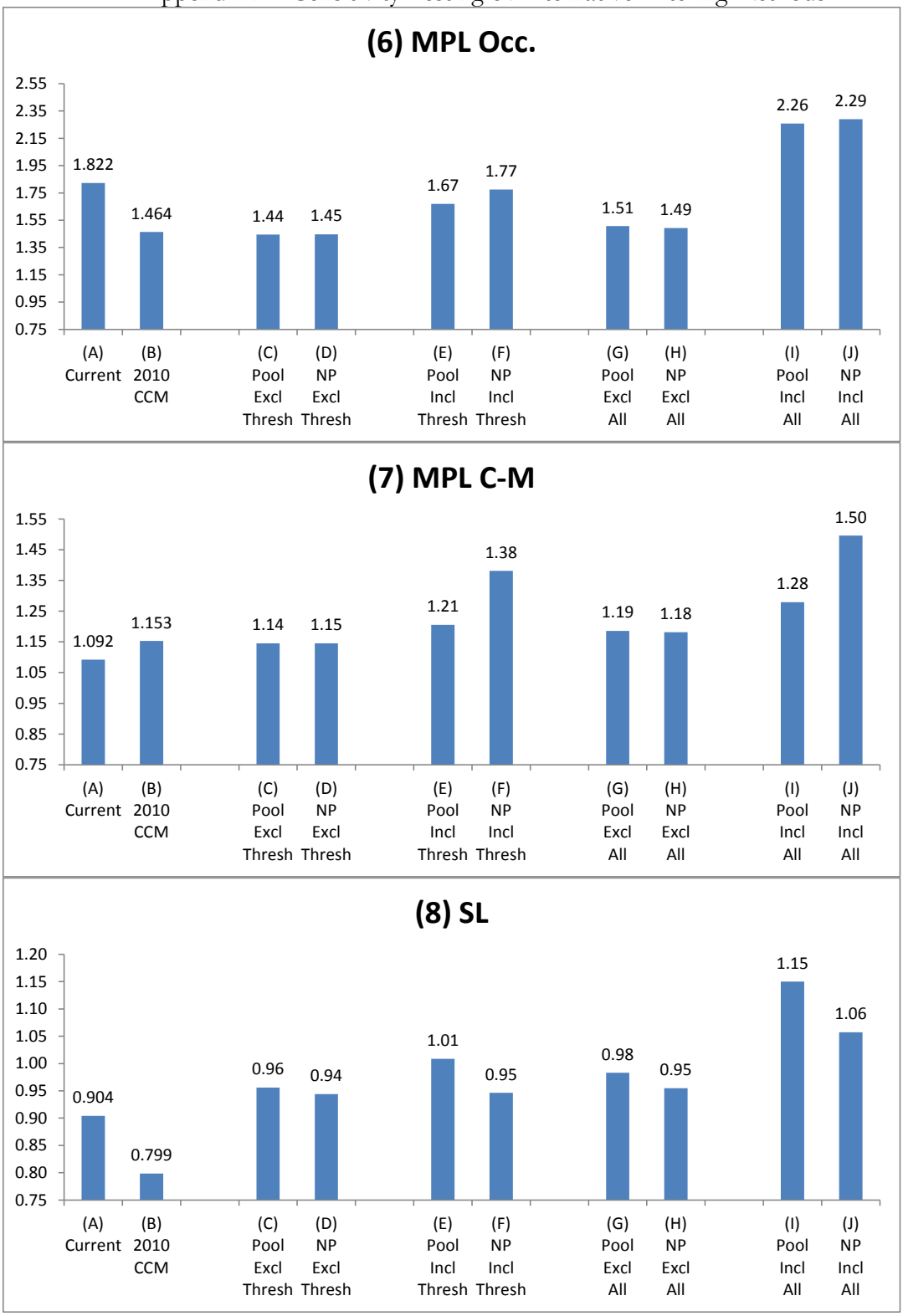


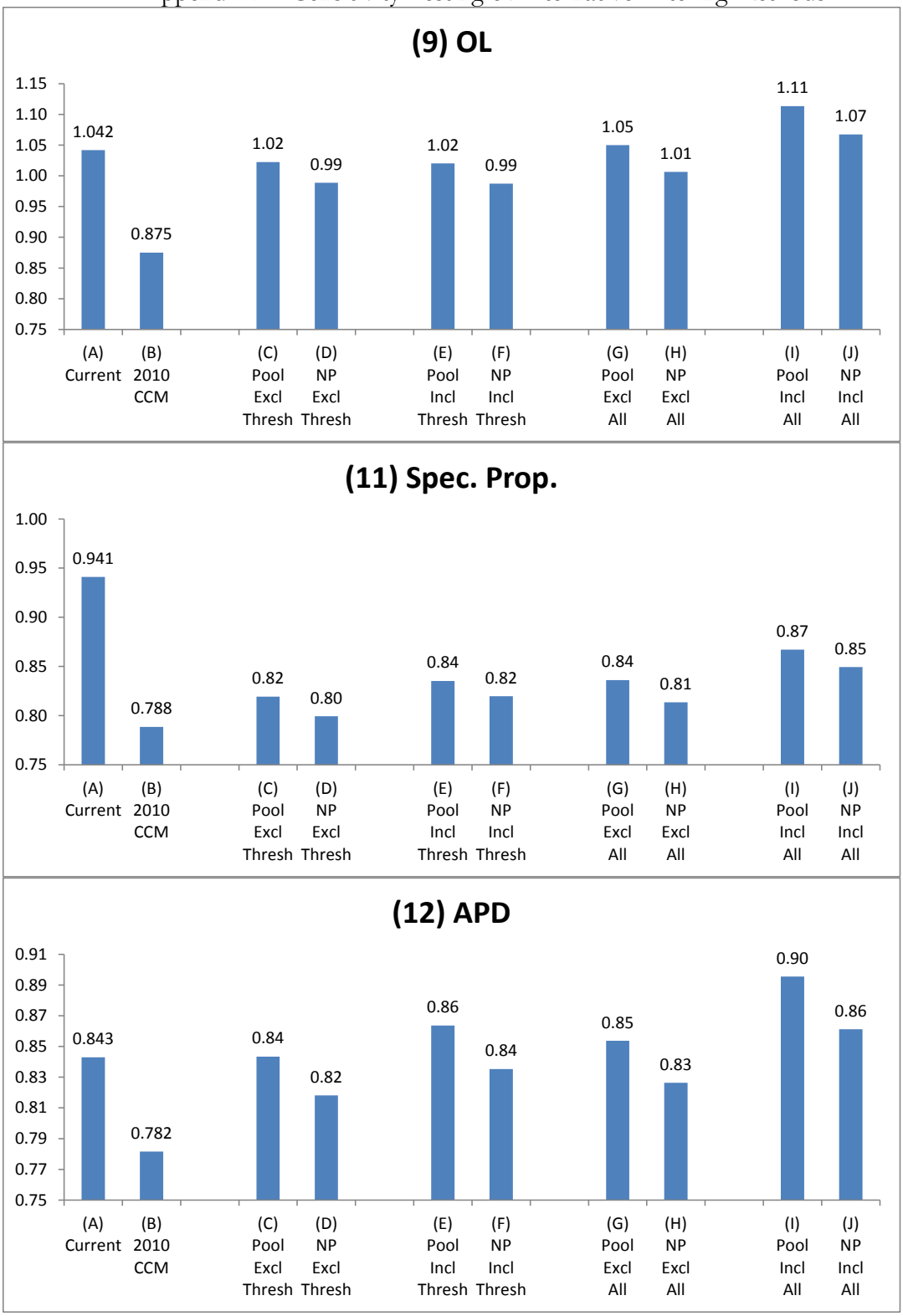


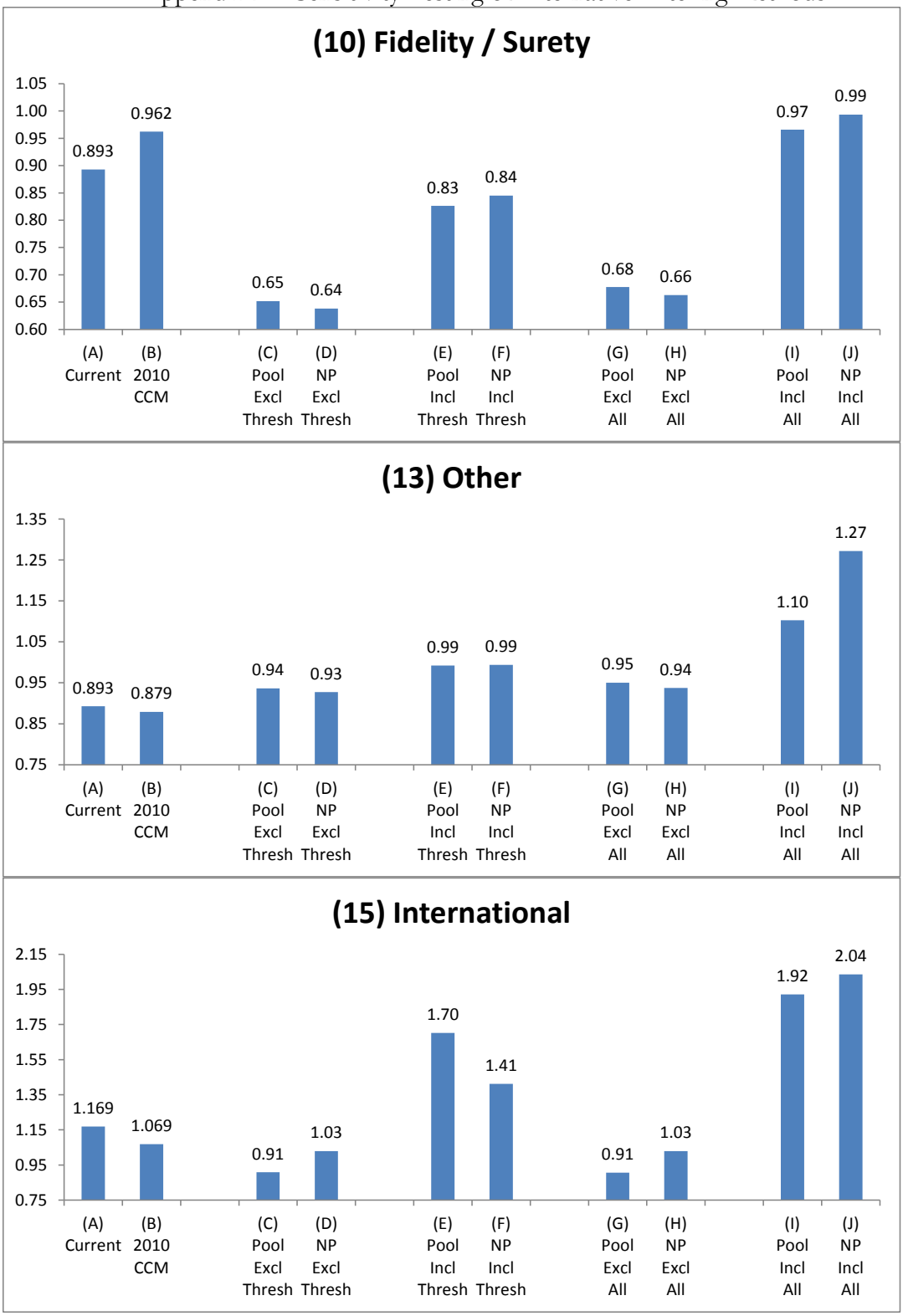

(3) CA
1.10
1.05
1.00
0.95
0.90
0.85
0.80
0.75
0.988
0.824
0.98
0.96
0.99
0.96
1.01
0.98
1.06
1.02
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All


(4) WC
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
0.75
1.033
0.936
1.05
1.01
1.06
1.02
1.08
1.03
1.11
1.06
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All


(5) CMP
1.00
0.95
0.90
0.85
0.80
0.75
0.921
0.821
0.89
0.87
0.93
0.92
0.90
0.88
0.99
0.97
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All


(6) MPL Occ.
2.55
2.35
2.15
1.95
1.75
1.55
1.35
1.15
0.95
0.75
1.822
1.464
1.44
1.45
1.67
1.77
1.51
1.49
2.26
2.29
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All
(7) MPL C-M
1.55
1.45
1.35
1.25
1.15
1.05
0.95
0.85
0.75
1.092
1.153
1.14
1.15
1.21
1.38
1.19
1.18
1.28
1.50
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All
(8) SL
1.20
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
0.75
0.904
0.799
0.96
0.94
1.01
0.95
0.98
0.95
1.15
1.06
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All


(9) OL
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
0.75
1.042
0.875
1.02
0.99
1.02
0.99
1.05
1.01
1.11
1.07
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All
(11) Spec. Prop.
1.00
0.95
0.90
0.85
0.80
0.75
0.941
0.788
0.82
0.80
0.84
0.82
0.84
0.81
0.87
0.85
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All
(12) APD
0.91
0.89
0.87
0.85
0.83
0.81
0.79
0.77
0.75
0.843
0.782
0.84
0.82
0.86
0.84
0.85
0.83
0.90
0.86
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All


(10) Fidelity / Surety
1.05
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.893
0.962
0.65
0.64
0.83
0.84
0.68
0.66
0.97
0.99
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All
(13) Other
1.35
1.25
1.15
1.05
0.95
0.85
0.75
0.893
0.879
0.94
0.93
0.99
0.99
0.95
0.94
1.10
1.27
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All
(15) International
2.15
1.95
1.75
1.55
1.35
1.15
0.95
0.75
1.169
1.069
0.91
1.03
1.70
1.41
0.91
1.03
1.92
2.04
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All

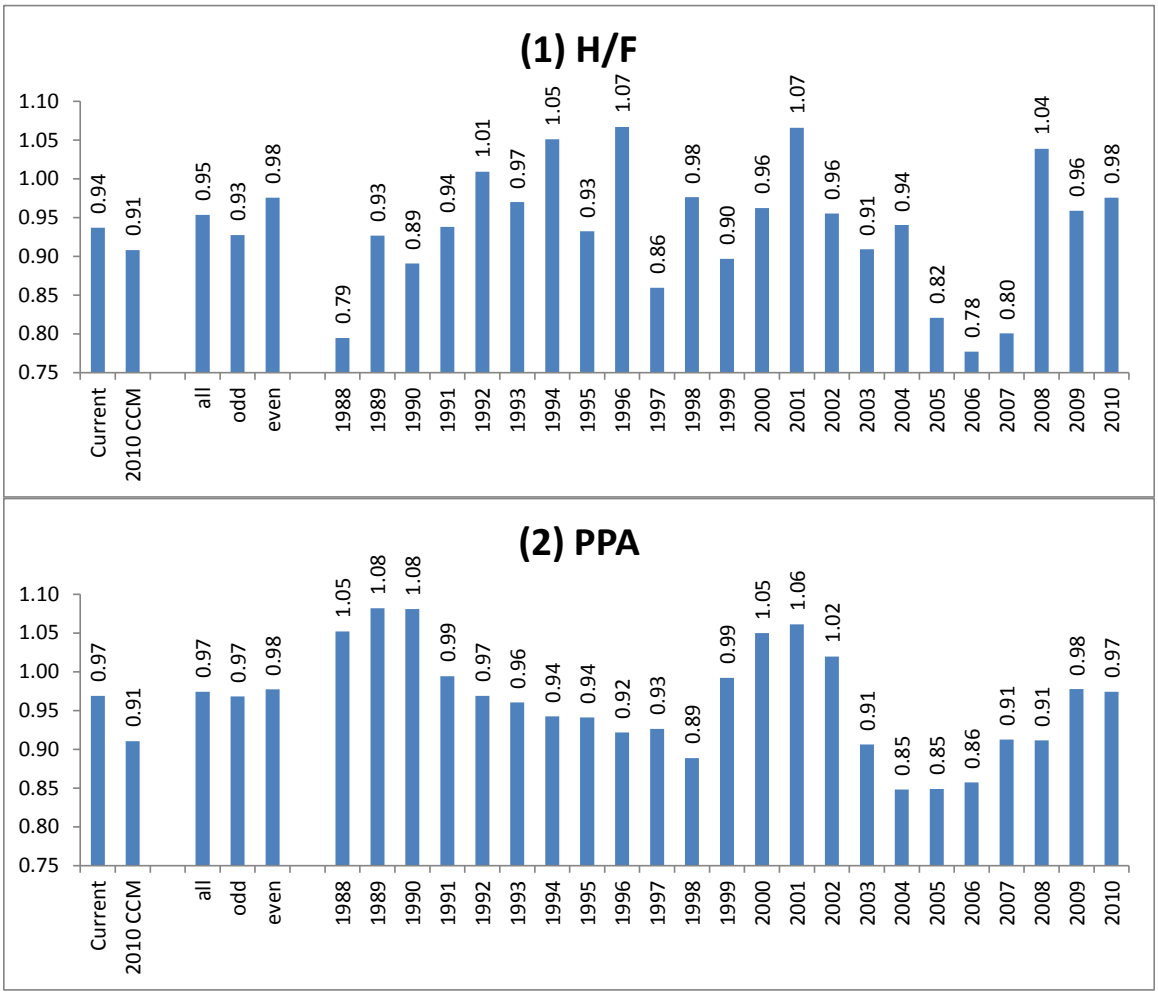

(16) Reins. Prop. / Fin.
1.95
1.75
1.55
1.35
1.15
0.95
0.75
1.349
1.475
1.30
1.31
1.54
1.58
1.33
1.33
1.62
1.83
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All
(17) Reins. Liab.
1.95
1.75
1.55
1.35
1.15
0.95
0.75
1.507
1.310
1.34
1.34
1.52
1.61
1.34
1.34
1.61
1.77
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All
(18) PL
1.45
1.35
1.25
1.15
1.05
0.95
0.85
0.75
1.214
1.062
1.17
1.20
1.27
1.31
1.17
1.20
1.39
1.40
(A) Current
(B) 2010 CCM
(C) Pool Excl Thresh
(D) NP Excl Thresh
(E) Pool Incl Thresh
(F) NP Incl Thresh
(G) Pool Excl All
(H) NP Excl All
(I) Pool Incl All
(J) NP Incl All

The baseline filter used the judgmentally selected thresholds by line of business shown in Table B1.

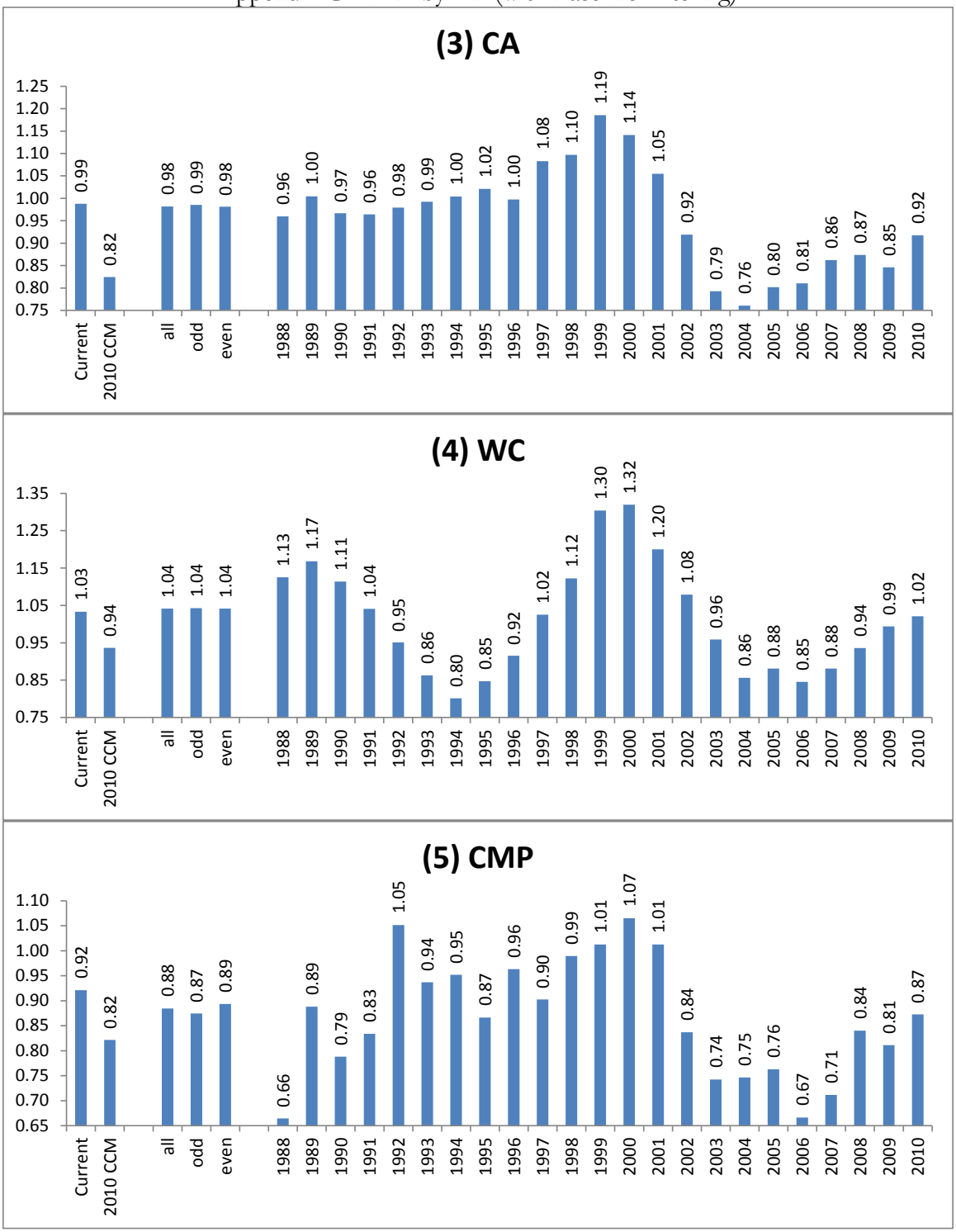
Appendix B - Table 1
Selected Baseline LOB-size Thresholds

Line of Business	Premium Threshold (000's)
A Homeowners/Farmowners	1,000
B Priv. Passenger Auto Liability	1,000
C Commercial Auto Liability.	1,000
D Workers Compensation	600
E Commercial Multiperil	300
F1 Medical Malpractice – Occurrence	800
F2 Medical Malpractice - Claims made	600
G Special Liability	1,000
H Other Liability	300
I Special Property	200
J Auto Physical Damage	200
K Fidelity & Surety	200
L Other	200
M International	200
N&P Reinsurance A &C (property and financial)	200
O Reinsurance B (liability)	300
R Products Liability	200
S Financial Guarantee	100
T Warranty	0

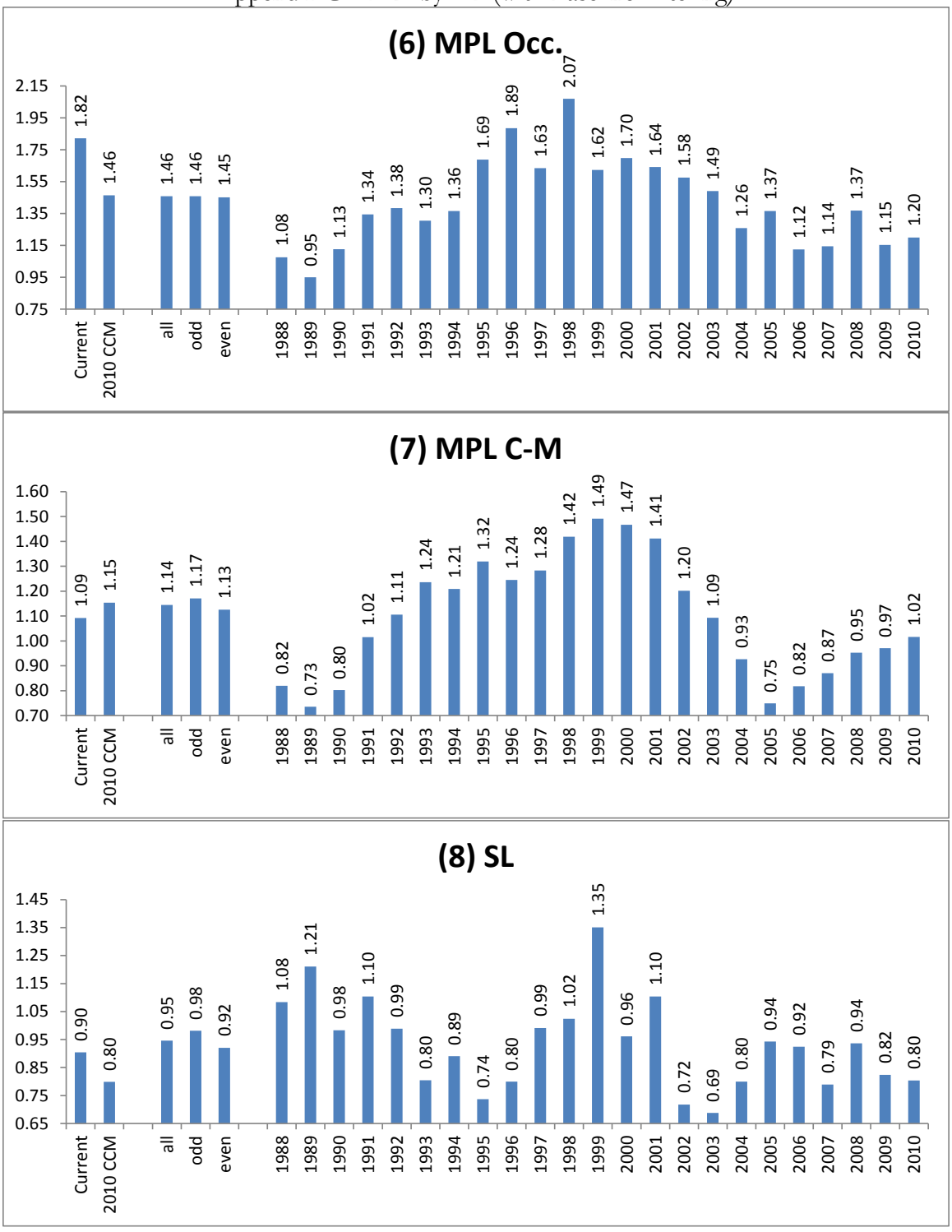
Appendix C –PRF by AY (with Baseline Filtering)



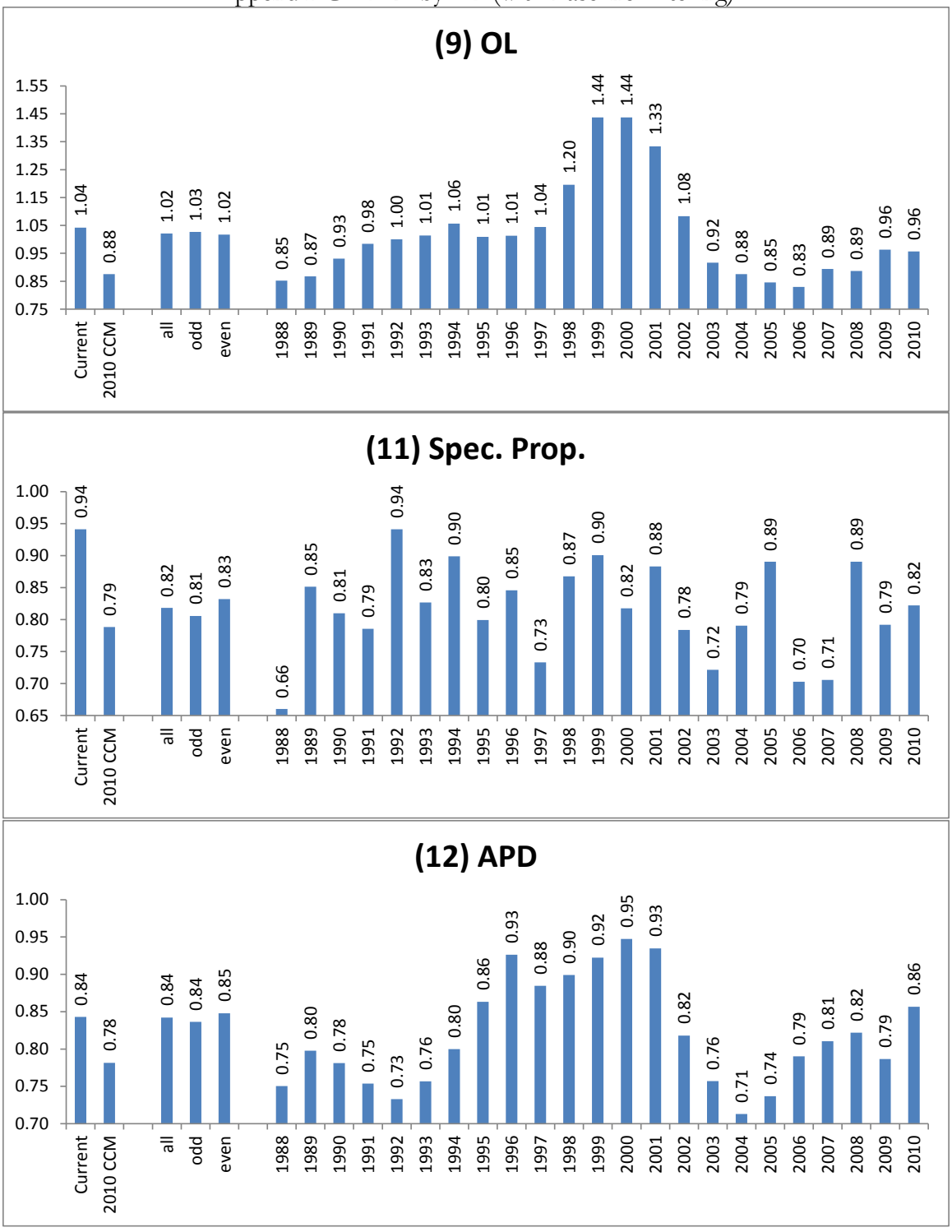
Appendix C – PRF by AY (with Baseline Filtering)



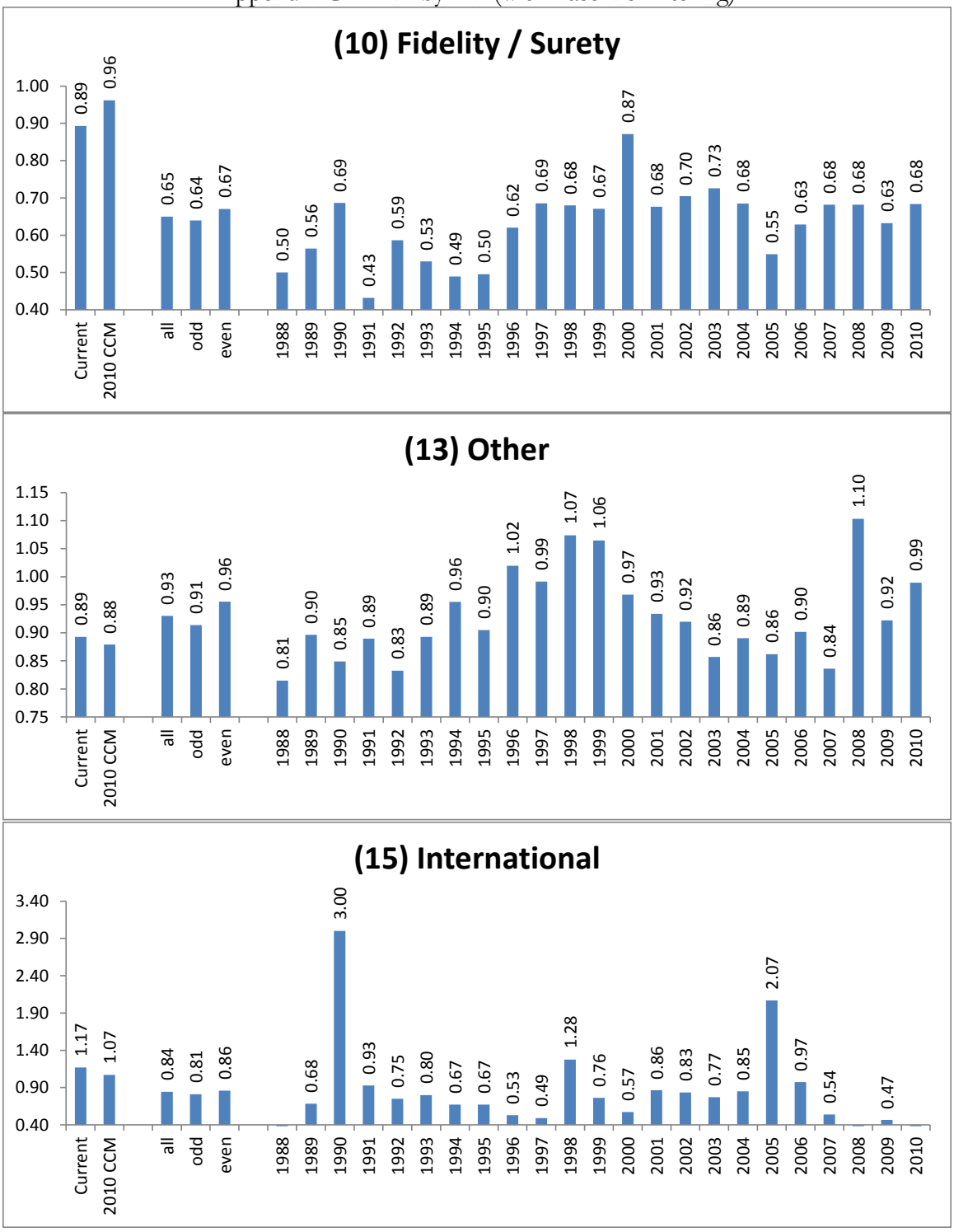
Appendix C – PRF by AY (with Baseline Filtering)



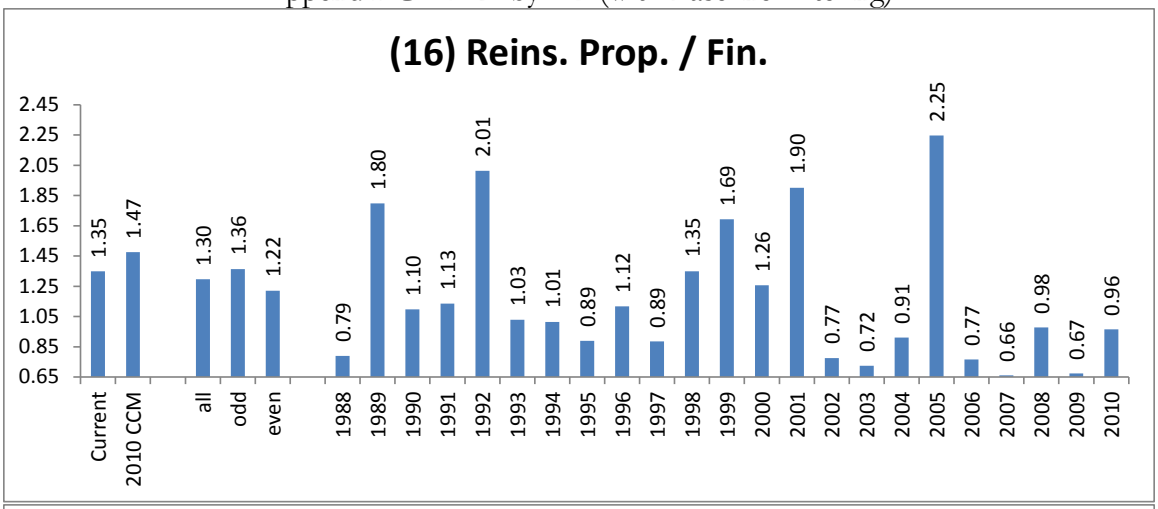
Appendix C – PRF by AY (with Baseline Filtering)

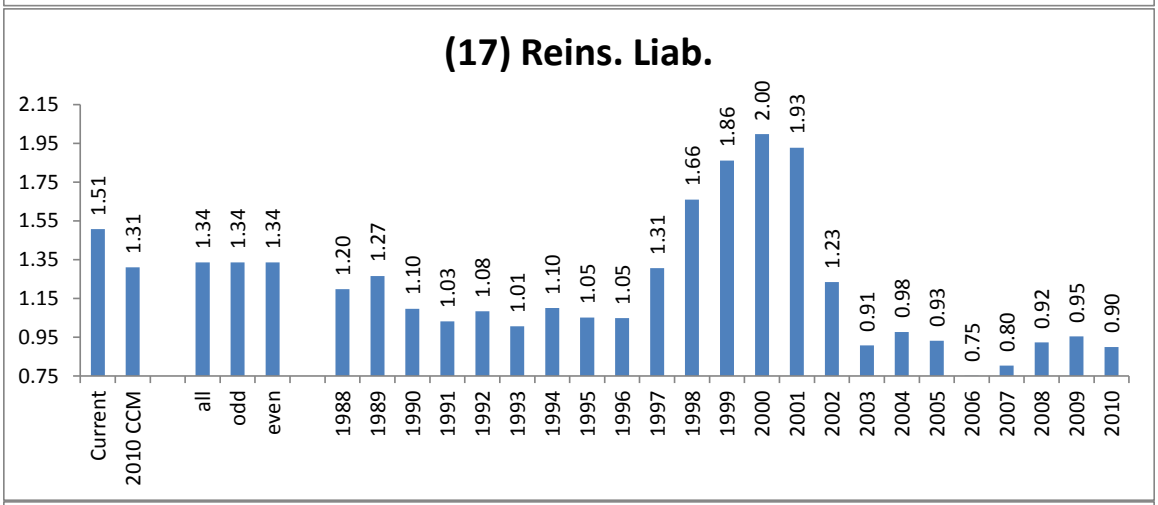


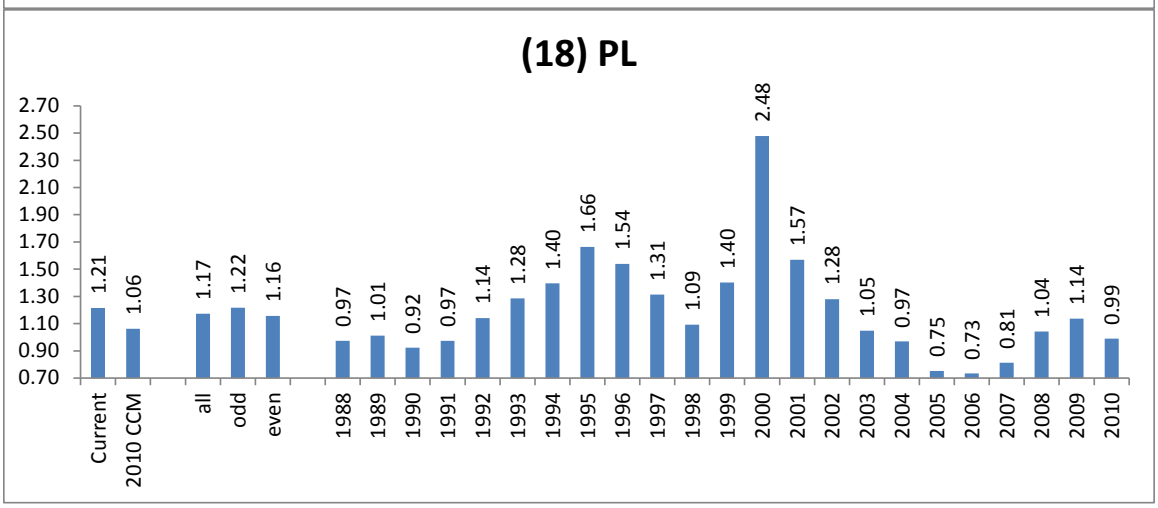
Appendix C – PRF by AY (with Baseline Filtering)



Appendix C – PRF by AY (with Baseline Filtering)







Appendix C Appendix C – PRF by AY (with Baseline Filtering)
Even/Odd and Every-Fourth-Year Tests

Premium Risk - LLAE Ratio
Baseline Filtering

		Segment			Segment (in fourths)				Differences - Segment minus All					
Accident Year Percentile		all	odd	even	0mod4	1mod4	2mod4	3mod4	odd	even	0mod4	1mod4	2mod4	3mod4
(1) H/F	A	0.953	0.928	0.976	0.998	0.954	0.955	0.903	-0.026	0.022	**0.044**	0.001	0.002	**-0.050**
(2) PPA	B	0.974	0.968	0.977	0.981	0.985	0.975	0.947	-0.006	0.003	0.007	0.011	0.001	-0.027
(3) CA	C	0.982	0.985	0.981	0.983	0.982	0.979	0.986	0.003	-0.001	0.001	0.000	-0.003	0.004
(4) WC	D	1.042	1.042	1.041	1.057	1.053	1.021	1.029	0.001	0.000	0.015	0.012	-0.020	-0.013
(5) CMP	E	0.885	0.874	0.894	0.917	0.889	0.870	0.861	-0.010	0.009	0.032	0.005	-0.014	-0.023
(6) MM Occurrence	F1	1.458	1.459	1.451	1.448	1.422	1.448	1.494	0.001	-0.006	-0.009	-0.036	-0.009	0.036
(7) MM CM	F2	1.145	1.171	1.125	1.110	1.150	1.135	1.194	0.026	-0.019	-0.035	0.005	-0.009	**0.049**
(8) SL	G	0.946	0.982	0.920	0.917	0.996	0.920	0.920	0.036	-0.026	-0.029	0.050	-0.026	-0.027
(9) OL	H	1.021	1.027	1.017	1.011	1.015	1.020	1.046	0.006	-0.003	-0.010	-0.006	-0.001	0.025
(11) Spec Prop	I	0.818	0.806	0.832	0.836	0.829	0.828	0.777	-0.013	0.014	0.017	0.011	0.010	**-0.041**
(12) Auto Phys Damage	J	0.842	0.836	0.848	0.863	0.837	0.832	0.835	-0.006	0.006	0.021	-0.005	-0.010	-0.007
(10) Fidelity & Surety	K	0.650	0.639	0.671	0.672	0.638	0.655	0.639	-0.011	0.021	0.022	-0.012	0.005	-0.011
(13) Other	L	0.930	0.914	0.955	0.942	0.914	0.961	0.905	-0.017	0.025	0.012	-0.017	0.031	-0.026
(15) International	M	0.844	0.809	0.858	0.739	0.884	1.102	0.767	-0.035	0.014	**-0.104**	**0.040**	**0.258**	**-0.076**
(16) Rein Property & Financial	N&P	1.295	1.364	1.219	1.343	1.544	1.123	1.147	**0.068**	**-0.076**	**0.047**	**0.248**	**-0.172**	**-0.149**
(17) Reinsurance Liab	O	1.335	1.336	1.335	1.331	1.345	1.343	1.331	0.001	0.000	-0.004	0.010	0.007	-0.005
(18) Products Liability	R	1.173	1.216	1.156	1.201	1.273	1.075	1.090	**0.043**	-0.016	0.028	**0.100**	**-0.098**	**-0.083**
(14) Fin & Mort	S	2.410	2.796	1.542	1.903	1.219	1.210	2.942	**0.386**	**-0.868**	**-0.507**	**-1.191**	**-1.200**	**0.532**
(19) Warranty	T	1.270	1.226	1.178	0.924	1.139	1.438	1.143	**-0.045**	**-0.092**	**-0.346**	**-0.132**	**0.168**	**-0.127**

Differences over .040 shown bolded and underlined

Appendix D – PRF and PRC% by LOB-Size

(1) H/F

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	730	1,429	1.287	0.989	53%	23%	0.844	0.757	0.570	0.336	0.675	0.444
25%	730	1,483	951	1.023	**0.956**	27%	**20%**	0.745	0.742	0.305	0.272	0.410	0.366
35%	1,483	2,758	951	0.985	0.948	23%	19%	0.733	0.741	0.325	0.267	0.443	0.360
45%	2,758	5,022	952	0.964	0.941	21%	18%	0.740	0.743	0.294	0.257	0.398	0.346
55%	5,022	8,866	952	**0.941**	0.938	**18%**	18%	0.737	0.743	0.293	0.250	0.397	0.336
65%	8,866	16,382	952	0.914	0.938	16%	18%	0.721	0.745	0.279	0.239	0.387	0.321
75%	16,382	31,572	951	0.959	0.945	20%	19%	0.746	0.751	0.220	0.225	0.295	0.300
85%	31,572	61,546	952	0.940	0.937	18%	18%	0.747	0.754	0.241	0.227	0.322	0.302
95%	61,546	252,884	952	0.929	0.935	17%	18%	0.752	0.758	0.209	0.218	0.278	0.287
largest 100	252,884	1,499,819	375	0.951	0.947	19%	19%	0.770	0.769	0.244	0.234	0.317	0.305
100%	1,499,819	10,820,092	100	0.912	0.912	15%	15%	0.763	0.764	0.193	0.193	0.252	0.252
	Current Risk Charge Loss Ratio (PR017 Line 4)				0.937								
	Underwriting Expense Ratio in Risk Charge					24%							

(2) PPA

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	1,596	1,304	1.243	0.999	43%	18%	0.878	0.815	0.458	0.240	0.522	0.295
25%	1,596	3,634	869	1.019	**0.969**	20%	**15%**	0.798	0.803	0.223	0.174	0.279	0.216
35%	3,634	6,667	868	1.003	0.965	19%	15%	0.796	0.804	0.220	0.166	0.277	0.206
45%	6,667	11,219	869	1.013	0.958	20%	14%	0.809	0.805	0.204	0.156	0.253	0.194
55%	11,219	16,368	869	**0.971**	0.950	**16%**	14%	0.789	0.805	0.186	0.145	0.235	0.181
65%	16,368	28,352	869	0.971	0.945	16%	13%	0.804	0.808	0.168	0.135	0.209	0.166
75%	28,352	54,053	869	0.962	0.939	15%	12%	0.814	0.810	0.144	0.123	0.177	0.152
85%	54,053	130,201	868	0.959	0.929	14%	11%	0.822	0.808	0.130	0.114	0.158	0.141
95%	130,201	580,234	869	0.920	0.908	11%	9%	0.799	0.798	0.107	0.101	0.134	0.126
largest 100	580,234	3,936,971	334	0.895	0.894	8%	8%	0.796	0.796	0.090	0.087	0.113	0.109
100%	3,936,971	18,406,826	100	0.892	0.892	8%	8%	0.797	0.797	0.078	0.078	0.098	0.098
	Current Risk Charge Loss Ratio (PR017 Line 4)				0.969								
	Underwriting Expense Ratio in Risk Charge					19%							

(3) CA

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	767	911	1.260	1.006	52%	26%	0.711	0.741	0.555	0.324	0.781	0.437
25%	767	1,491	606	1.070	**0.988**	33%	**25%**	0.695	0.746	0.367	0.262	0.528	0.352
35%	1,491	2,755	605	1.009	0.979	27%	24%	0.727	0.753	0.301	0.244	0.414	0.324
45%	2,755	4,639	606	0.995	0.975	25%	23%	0.739	0.757	0.284	0.234	0.384	0.309
55%	4,639	8,038	606	**0.989**	0.971	**25%**	23%	0.739	0.760	0.256	0.224	0.346	0.294
65%	8,038	13,680	606	0.973	0.965	23%	22%	0.752	0.765	0.262	0.215	0.349	0.282
75%	13,680	23,821	606	0.989	0.964	25%	22%	0.769	0.769	0.232	0.200	0.301	0.260
85%	23,821	53,660	606	0.973	0.952	23%	21%	0.780	0.768	0.224	0.186	0.287	0.241
95%	53,660	189,338	606	0.944	0.944	20%	20%	0.759	0.761	0.161	0.154	0.212	0.203
largest 100	189,338	526,117	203	0.916	0.938	17%	20%	0.763	0.766	0.136	0.140	0.179	0.182
100%	526,117	1,875,641	100	0.974	0.974	23%	23%	0.772	0.773	0.146	0.146	0.189	0.189
	Current Risk Charge Loss Ratio (PR017 Line 4)				0.988								
	Underwriting Expense Ratio in Risk Charge					26%							

Appendix D – PRF and PRC% by LOB-Size

(4) WC

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	1,756	921	1.315	1.062	53%	28%	0.821	0.786	0.590	0.334	0.719	0.425
25%	1,756	3,872	613	1.223	**1.039**	44%	**25%**	0.824	0.780	0.373	0.264	0.452	0.339
35%	3,872	6,827	613	1.104	1.018	32%	23%	0.777	0.774	0.304	0.245	0.390	0.317
45%	6,827	12,098	614	1.079	1.008	29%	22%	0.783	0.773	0.284	0.235	0.363	0.304
55%	12,098	21,267	613	**1.020**	0.994	**23%**	21%	0.755	0.771	0.269	0.225	0.356	0.291
65%	21,267	37,341	614	0.977	0.990	19%	20%	0.753	0.775	0.234	0.214	0.310	0.276
75%	37,341	70,403	613	0.954	0.993	17%	21%	0.744	0.781	0.214	0.207	0.287	0.265
85%	70,403	148,020	613	0.956	1.006	17%	22%	0.768	0.796	0.190	0.203	0.248	0.255
95%	148,020	518,403	614	1.017	1.047	23%	26%	0.799	0.815	0.193	0.209	0.241	0.256
largest 100	518,403	1,521,266	206	1.121	1.107	34%	32%	0.845	0.846	0.247	0.235	0.292	0.277
100%	1,521,266	7,918,320	100	1.074	1.074	29%	29%	0.846	0.846	0.206	0.206	0.244	0.244
	Current Risk Charge Loss Ratio (PR017 Line 4)				1.033								
	Underwriting Expense Ratio in Risk Charge					21%							

(5) CMP

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	681	1,079	1.093	0.899	44%	24%	0.667	0.655	0.569	0.332	0.853	0.507
25%	681	1,520	720	0.877	**0.879**	22%	**22%**	0.612	0.653	0.327	0.269	0.534	0.412
35%	1,520	2,841	719	0.877	0.879	22%	22%	0.612	0.658	0.313	0.260	0.512	0.395
45%	2,841	4,810	720	0.883	0.880	23%	22%	0.625	0.666	0.302	0.250	0.483	0.376
55%	4,810	7,866	719	**0.899**	0.879	**24%**	22%	0.637	0.673	0.261	0.239	0.410	0.355
65%	7,866	14,256	719	0.887	0.875	23%	22%	0.679	0.681	0.280	0.233	0.413	0.342
75%	14,256	25,346	719	0.868	0.875	21%	22%	0.668	0.682	0.205	0.217	0.307	0.318
85%	25,346	54,619	720	0.855	0.876	20%	22%	0.669	0.687	0.213	0.221	0.318	0.322
95%	54,619	294,101	719	0.881	0.890	23%	23%	0.687	0.699	0.249	0.226	0.363	0.324
largest 100	294,101	1,063,131	259	0.924	0.901	27%	25%	0.739	0.723	0.174	0.168	0.236	0.233
100%	1,063,131	2,970,994	100	0.855	0.855	20%	20%	0.678	0.680	0.141	0.141	0.209	0.208
	Current Risk Charge Loss Ratio (PR017 Line 4)				0.921								
	Underwriting Expense Ratio in Risk Charge					34%							

(6) MPL Occ.

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	823	168	2.434	1.521	147%	56%	1.086	0.961	0.890	0.588	0.819	0.612
25%	823	1,595	111	1.566	**1.458**	60%	**50%**	0.897	0.939	0.645	0.513	0.719	0.547
35%	1,595	2,623	111	1.265	1.447	30%	49%	0.796	0.945	0.475	0.493	0.597	0.522
45%	2,623	4,087	112	1.440	1.459	48%	50%	0.897	0.968	0.608	0.492	0.678	0.508
55%	4,087	6,672	111	**1.261**	1.464	**30%**	50%	0.874	0.981	0.537	0.466	0.615	0.475
65%	6,672	11,654	112	1.426	1.486	46%	52%	0.953	1.004	0.403	0.445	0.423	0.443
75%	11,654	24,496	111	1.696	1.521	73%	56%	1.113	1.019	0.509	0.456	0.457	0.447
85%	24,496	44,393	111	1.431	1.425	47%	46%	1.002	0.982	0.447	0.427	0.446	0.435
95%	44,393	152,900	112	1.380	1.422	42%	46%	0.927	0.969	0.423	0.413	0.457	0.426
largest 28	152,900	204,129	27	1.339	1.448	38%	49%	0.993	1.054	0.303	0.376	0.306	0.357
100%	204,129	516,498	28	1.545	1.545	58%	58%	1.118	1.110	0.426	0.426	0.381	0.383
	Current Risk Charge Loss Ratio (PR017 Line 4)				1.822								
	Underwriting Expense Ratio in Risk Charge					4%							

(7) MPL C-M

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	1,422	373	1.760	1.185	100%	42%	0.826	0.764	0.781	0.451	0.946	0.591
25%	1,422	2,642	249	1.004	**1.146**	24%	**38%**	0.631	0.753	0.465	0.362	0.737	0.481
35%	2,642	4,082	248	1.159	1.160	39%	40%	0.686	0.770	0.410	0.343	0.598	0.445
45%	4,082	6,520	248	1.062	1.160	30%	40%	0.717	0.782	0.300	0.329	0.418	0.421
55%	6,520	11,635	249	**1.037**	1.184	**27%**	42%	0.690	0.794	0.332	0.333	0.481	0.419
65%	11,635	19,211	248	1.206	1.198	44%	43%	0.824	0.817	0.357	0.328	0.433	0.402
75%	19,211	32,649	249	1.239	1.198	47%	43%	0.829	0.816	0.373	0.320	0.450	0.392
85%	32,649	58,551	248	1.099	1.184	33%	42%	0.772	0.810	0.277	0.296	0.359	0.365
95%	58,551	142,452	248	1.215	1.212	45%	45%	0.845	0.836	0.309	0.305	0.366	0.365
largest 62	142,452	214,411	62	1.274	1.177	51%	41%	0.843	0.818	0.300	0.294	0.355	0.360
100%	214,411	726,535	62	1.081	1.081	32%	32%	0.792	0.794	0.287	0.287	0.362	0.361
	Current Risk Charge Loss Ratio (PR017 Line 4)				1.092								
	Underwriting Expense Ratio in Risk Charge					24%							

(8) SL

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	1,031	171	1.233	0.964	58%	31%	0.631	0.656	0.616	0.396	0.977	0.603
25%	1,031	2,069	113	1.114	**0.947**	46%	**29%**	0.685	0.661	0.547	0.342	0.798	0.517
35%	2,069	3,416	114	0.945	0.931	29%	27%	0.669	0.658	0.444	0.304	0.664	0.462
45%	3,416	6,024	113	1.005	0.925	35%	27%	0.657	0.656	0.328	0.276	0.499	0.421
55%	6,024	9,096	114	**1.041**	0.912	**38%**	26%	0.682	0.656	0.373	0.265	0.547	0.405
65%	9,096	14,995	113	0.871	0.880	21%	22%	0.654	0.650	0.194	0.234	0.297	0.361
75%	14,995	31,064	114	0.964	0.886	31%	23%	0.660	0.649	0.286	0.245	0.434	0.377
85%	31,064	66,873	113	0.944	0.859	29%	20%	0.686	0.645	0.213	0.226	0.311	0.350
95%	66,873	231,342	114	0.849	0.825	19%	17%	0.666	0.618	0.204	0.229	0.306	0.371
largest 28	231,342	323,270	28	0.699	0.702	4%	5%	0.541	0.520	0.145	0.244	0.268	0.469
100%	323,270	594,515	28	0.711	0.711	5%	5%	0.487	0.500	0.311	0.311	0.638	0.621

Current Risk Charge Loss Ratio (PR017 Line 4) 0.904

Underwriting Expense Ratio in Risk Charge 34%

(9) OL

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	481	1,306	1.383	1.043	72%	38%	0.681	0.667	0.753	0.464	1.106	0.696
25%	481	1,087	871	1.024	**1.015**	36%	**35%**	0.585	0.664	0.473	0.391	0.809	0.589
35%	1,087	2,008	871	1.079	1.014	41%	35%	0.644	0.675	0.482	0.378	0.748	0.560
45%	2,008	3,584	870	1.073	1.010	41%	34%	0.623	0.680	0.405	0.359	0.650	0.528
55%	3,584	6,057	870	**1.024**	1.000	**36%**	33%	0.653	0.690	0.344	0.349	0.527	0.506
65%	6,057	10,389	870	1.014	0.996	35%	33%	0.676	0.698	0.392	0.349	0.580	0.500
75%	10,389	19,960	871	0.984	0.991	32%	32%	0.693	0.704	0.372	0.336	0.537	0.477
85%	19,960	49,079	870	1.023	0.993	36%	33%	0.722	0.708	0.368	0.320	0.510	0.452
95%	49,079	210,786	870	0.962	0.969	30%	30%	0.686	0.700	0.301	0.283	0.439	0.405
largest 100	210,786	1,059,392	335	0.939	0.982	27%	32%	0.707	0.727	0.246	0.241	0.348	0.332
100%	1,059,392	9,366,624	100	1.042	1.042	38%	38%	0.792	0.792	0.213	0.213	0.269	0.269

Current Risk Charge Loss Ratio (PR017 Line 4) 1.042

Underwriting Expense Ratio in Risk Charge 33%

(11) Spec. Prop.

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	487	1,337	1.000	0.834	43%	27%	0.617	0.568	0.591	0.370	0.958	0.651
25%	487	931	888	0.769	**0.817**	20%	**25%**	0.527	0.559	0.337	0.314	0.640	0.562
35%	931	1,683	888	0.770	0.820	20%	25%	0.540	0.563	0.339	0.310	0.628	0.551
45%	1,683	2,913	890	0.799	0.828	23%	26%	0.563	0.567	0.341	0.306	0.606	0.539
55%	2,913	4,933	889	**0.772**	0.832	**20%**	26%	0.521	0.568	0.311	0.299	0.597	0.526
65%	4,933	9,021	889	0.827	0.838	26%	27%	0.560	0.578	0.333	0.295	0.595	0.510
75%	9,021	16,814	889	0.820	0.842	25%	27%	0.547	0.583	0.301	0.283	0.551	0.485
85%	16,814	36,266	890	0.857	0.851	29%	28%	0.594	0.598	0.297	0.274	0.500	0.458
95%	36,266	144,658	889	0.835	0.846	27%	28%	0.590	0.601	0.250	0.257	0.423	0.428
largest 100	144,658	644,456	344	0.907	0.855	34%	29%	0.628	0.623	0.280	0.270	0.446	0.434
100%	644,456	2,748,838	100	0.810	0.810	24%	24%	0.605	0.607	0.234	0.234	0.386	0.385

Current Risk Charge Loss Ratio (PR017 Line 4) 0.941

Underwriting Expense Ratio in Risk Charge 43%

Appendix D – PRF and PRC% by LOB-Size

(12) APD

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	1,133	1,423	1.039	0.850	37%	18%	0.716	0.670	0.427	0.238	0.597	0.355
25%	1,133	2,445	949	0.880	**0.828**	21%	**16%**	0.653	0.662	0.255	0.184	0.390	0.279
35%	2,445	4,415	948	0.845	0.822	17%	15%	0.645	0.663	0.192	0.173	0.297	0.261
45%	4,415	7,293	949	0.842	0.819	17%	15%	0.641	0.666	0.187	0.170	0.291	0.255
55%	7,293	11,829	948	**0.835**	0.817	**16%**	15%	0.665	0.671	0.217	0.166	0.326	0.248
65%	11,829	19,194	949	0.820	0.814	15%	14%	0.663	0.672	0.202	0.152	0.305	0.227
75%	19,194	38,239	948	0.849	0.812	18%	14%	0.677	0.675	0.159	0.135	0.235	0.200
85%	38,239	91,334	949	0.814	0.798	14%	13%	0.671	0.674	0.140	0.124	0.209	0.184
95%	91,334	343,654	948	0.792	0.792	12%	12%	0.667	0.676	0.116	0.112	0.174	0.165
largest 100	343,654	2,115,343	374	0.786	0.790	12%	12%	0.686	0.692	0.104	0.100	0.151	0.144
100%	2,115,343	12,748,056	100	0.804	0.804	13%	13%	0.712	0.714	0.082	0.082	0.115	0.115
	Current Risk Charge Loss Ratio (PR017 Line 4)				0.843								
	Underwriting Expense Ratio in Risk Charge					33%							

(10) Fidelity / Surety

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	848	217	0.977	0.665	64%	33%	0.462	0.336	0.697	0.414	1.508	1.231
25%	848	1,657	146	0.684	**0.644**	35%	**31%**	0.292	0.314	0.441	0.336	1.510	1.069
35%	1,657	3,168	143	0.635	0.641	30%	30%	0.280	0.317	0.373	0.319	1.331	1.005
45%	3,168	5,357	145	0.762	0.641	43%	30%	0.408	0.323	0.419	0.309	1.028	0.958
55%	5,357	7,721	144	**0.653**	0.603	**32%**	27%	0.323	0.307	0.275	0.282	0.853	0.917
65%	7,721	10,817	145	0.560	0.599	22%	26%	0.283	0.304	0.255	0.283	0.898	0.932
75%	10,817	17,464	144	0.625	0.600	29%	26%	0.314	0.310	0.409	0.290	1.303	0.938
85%	17,464	30,582	145	0.520	0.600	18%	26%	0.260	0.308	0.248	0.226	0.953	0.735
95%	30,582	109,891	144	0.648	0.614	31%	28%	0.325	0.340	0.224	0.205	0.691	0.602
largest 36	109,891	208,596	36	0.610	0.538	27%	20%	0.422	0.369	0.173	0.155	0.410	0.419
100%	208,596	974,546	36	0.408	0.408	7%	7%	0.302	0.318	0.104	0.104	0.343	0.327
	Current Risk Charge Loss Ratio (PR017 Line 4)				0.883								
	Underwriting Expense Ratio in Risk Charge					66%							

(13) Other

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	1,052	257	1.091	0.938	47%	32%	0.646	0.620	0.644	0.415	0.997	0.669
25%	1,052	2,105	170	0.902	**0.922**	28%	**30%**	0.582	0.616	0.509	0.360	0.875	0.584
35%	2,105	4,638	171	0.877	0.924	26%	30%	0.551	0.620	0.337	0.335	0.610	0.539
45%	4,638	8,326	171	0.831	0.925	21%	30%	0.556	0.631	0.314	0.333	0.565	0.528
55%	8,326	14,318	170	**0.917**	0.936	**30%**	32%	0.611	0.645	0.327	0.334	0.534	0.519
65%	14,318	24,267	171	0.951	0.938	33%	32%	0.605	0.652	0.301	0.336	0.498	0.515
75%	24,267	46,152	171	0.937	0.927	32%	31%	0.653	0.665	0.347	0.344	0.532	0.517
85%	46,152	88,823	170	0.795	0.923	17%	30%	0.597	0.670	0.306	0.342	0.513	0.511
95%	88,823	243,019	171	0.974	0.957	35%	34%	0.698	0.719	0.411	0.356	0.588	0.495
largest 43	243,019	360,682	42	0.958	0.913	34%	29%	0.803	0.760	0.223	0.201	0.278	0.264
100%	360,682	2,477,354	43	0.889	0.889	27%	27%	0.716	0.720	0.165	0.165	0.231	0.229
	Current Risk Charge Loss Ratio (PR017 Line 4)				0.893								
	Underwriting Expense Ratio in Risk Charge					38%							

(15) International

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	5,074	12	0.731	0.842	13%	24%	0.395	0.605	0.277	0.447	0.701	0.738
25%	5,074	8,286	8	2.212	**0.849**	161%	**24%**	1.177	0.643	0.854	0.461	0.726	0.717
35%	8,286	11,464	8	0.937	0.815	33%	21%	0.628	0.570	0.375	0.310	0.598	0.543
45%	11,464	14,601	8	0.973	0.791	37%	19%	0.757	0.561	0.235	0.297	0.310	0.529
55%	14,601	17,653	7	**0.640**	0.701	**3%**	10%	0.397	0.525	0.217	0.292	0.546	0.555
65%	17,653	21,188	8	0.712	0.701	11%	10%	0.551	0.550	0.160	0.299	0.289	0.543
75%	21,188	30,030	8	0.586	0.694	-2%	9%	0.504	0.549	0.129	0.329	0.255	0.598
85%	30,030	48,593	8	0.685	0.694	8%	9%	0.550	0.567	0.133	0.382	0.241	0.673
95%	48,593	83,510	8	0.674	0.692	7%	9%	0.467	0.579	0.186	0.489	0.399	0.845
largest 2	83,510	88,539	1	0.190	1.528	-42%	92%	0.190	0.804	0.000	0.844	0.000	1.051
100%	88,539	105,750	2	1.749	1.749	114%	114%	1.074	1.008	0.899	0.899	0.837	0.892
	Current Risk Charge Loss Ratio (PR017 Line 4)				1.169								
	Underwriting Expense Ratio in Risk Charge					39%							

(16) Reins. Prop. / Fin.

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	1,624	159	1.833	1.315	104%	53%	0.860	0.789	0.756	0.532	0.880	0.674
25%	1,624	3,429	105	1.288	**1.288**	50%	**50%**	0.813	0.777	0.542	0.481	0.666	0.619
35%	3,429	7,180	105	1.604	1.286	81%	50%	0.835	0.772	0.584	0.472	0.700	0.611
45%	7,180	11,004	106	1.305	1.236	52%	45%	0.816	0.762	0.483	0.451	0.592	0.592
55%	11,004	16,375	105	**1.156**	1.222	**37%**	43%	0.778	0.752	0.494	0.444	0.635	0.591
65%	16,375	27,959	106	1.409	1.230	62%	44%	0.863	0.746	0.493	0.432	0.572	0.579
75%	27,959	50,634	105	1.191	1.178	40%	39%	0.746	0.713	0.402	0.407	0.539	0.571
85%	50,634	104,700	105	1.224	1.168	44%	38%	0.748	0.700	0.461	0.408	0.616	0.583
95%	104,700	349,120	106	1.079	1.079	29%	29%	0.699	0.667	0.352	0.365	0.504	0.546
largest 26	349,120	477,622	26	1.197	1.030	41%	24%	0.648	0.605	0.453	0.380	0.699	0.628
100%	477,622	2,472,954	26	0.804	0.804	1%	1%	0.552	0.564	0.281	0.281	0.509	0.498

Current Risk Charge Loss Ratio (PR017 Line 4) 1.349

Underwriting Expense Ratio in Risk Charge 21%

(17) Reins. Liab.

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	2,339	169	1.700	1.335	86%	49%	0.892	0.842	0.788	0.506	0.883	0.601
25%	2,339	5,258	112	1.436	**1.302**	59%	**46%**	0.882	0.833	0.606	0.437	0.688	0.524
35%	5,258	9,036	112	1.175	1.278	33%	44%	0.822	0.826	0.385	0.408	0.468	0.494
45%	9,036	18,520	112	1.288	1.290	45%	45%	0.748	0.827	0.431	0.412	0.576	0.498
55%	18,520	33,620	112	**1.272**	1.290	**43%**	45%	0.829	0.841	0.437	0.406	0.527	0.483
65%	33,620	54,532	112	1.335	1.290	49%	45%	0.901	0.844	0.464	0.399	0.515	0.473
75%	54,532	105,154	112	1.293	1.265	45%	42%	0.837	0.827	0.327	0.377	0.390	0.456
85%	105,154	223,643	112	1.174	1.227	33%	39%	0.862	0.823	0.413	0.395	0.479	0.480
95%	223,643	760,588	112	1.387	1.262	55%	42%	0.857	0.797	0.402	0.381	0.469	0.478
largest 28	760,588	1,098,101	27	0.980	0.972	14%	13%	0.679	0.679	0.348	0.300	0.512	0.442
100%	1,098,101	4,178,508	28	0.931	0.931	9%	9%	0.671	0.678	0.246	0.246	0.366	0.362

Current Risk Charge Loss Ratio (PR017 Line 4) 1.507

Underwriting Expense Ratio in Risk Charge 16%

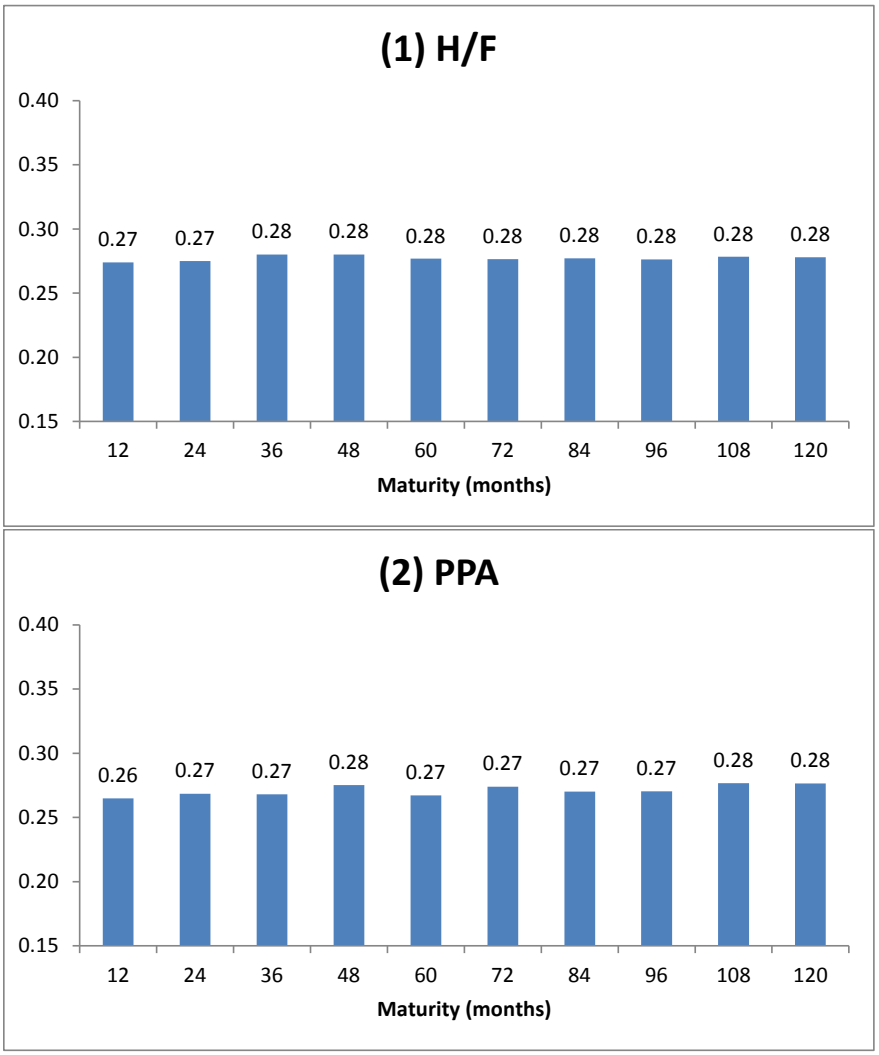
(18) PL

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
Size Band	Premium ($000s)			87.5th Percentile LR		Risk Charge		Average Loss Ratio		LR Std. Dev.		LR Coeff. Var.	
Endpoint			Data	all points	all points	all points	all points	all points	all points	all points	all points	all points	all points
Percentile	from	to	Points	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"	in band	> "from"
15%	0	792	99	1.416	1.225	68%	49%	0.806	0.734	0.752	0.620	0.933	0.845
25%	792	1,209	66	0.826	**1.184**	9%	**45%**	0.412	0.722	0.329	0.593	0.798	0.822
35%	1,209	1,999	65	1.510	1.280	78%	55%	0.762	0.763	0.656	0.608	0.861	0.797
45%	1,999	3,430	66	0.926	1.175	19%	44%	0.525	0.763	0.429	0.600	0.817	0.787
55%	3,430	6,400	65	**1.519**	1.250	**78%**	52%	0.862	0.807	0.806	0.617	0.935	0.764
65%	6,400	10,699	66	1.157	1.171	42%	44%	0.826	0.795	0.682	0.566	0.827	0.712
75%	10,699	18,112	66	2.008	1.173	127%	44%	0.892	0.786	0.731	0.527	0.819	0.671
85%	18,112	34,768	65	1.144	1.096	41%	36%	0.750	0.743	0.377	0.410	0.503	0.552
95%	34,768	77,989	66	1.087	1.085	35%	35%	0.794	0.739	0.467	0.430	0.588	0.583
largest 16	77,989	100,642	16	0.952	1.038	22%	30%	0.561	0.627	0.279	0.311	0.496	0.495
100%	100,642	216,048	16	1.105	1.105	37%	37%	0.678	0.689	0.329	0.329	0.486	0.478

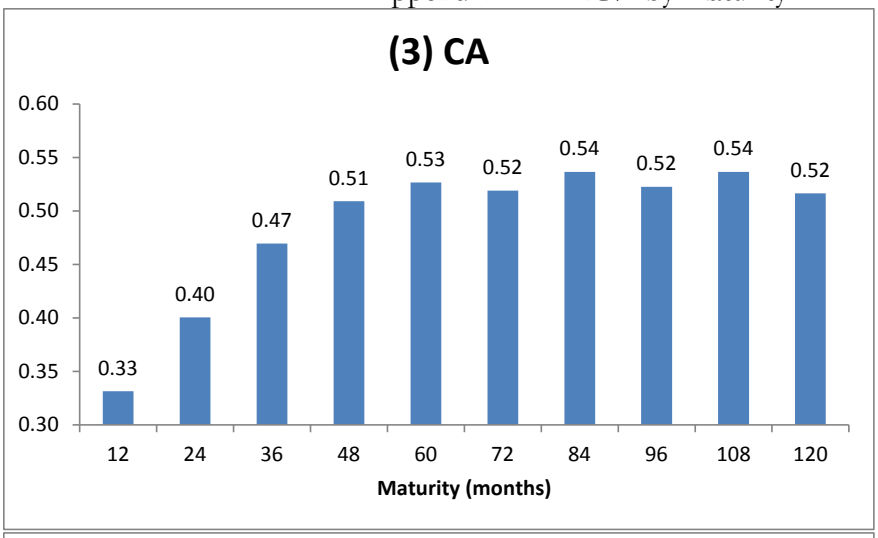
Current Risk Charge Loss Ratio (PR017 Line 4) 1.214

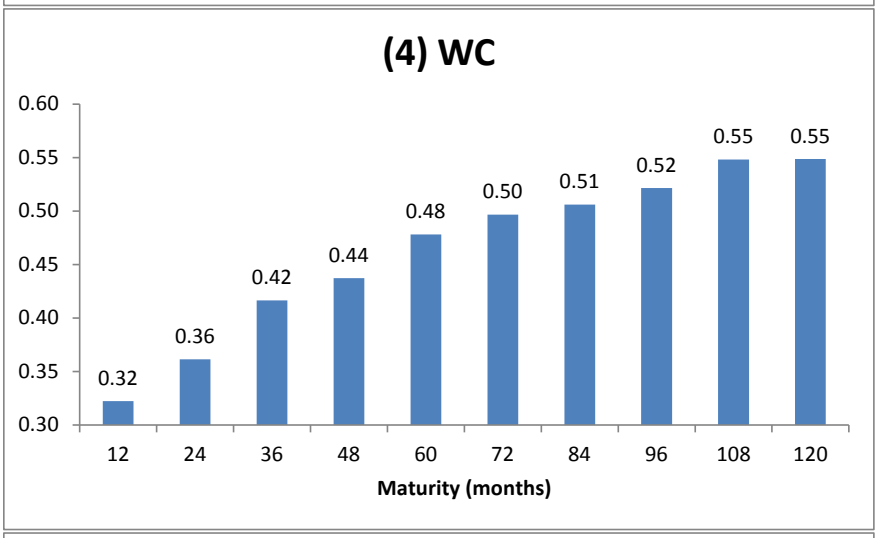
Underwriting Expense Ratio in Risk Charge 27%

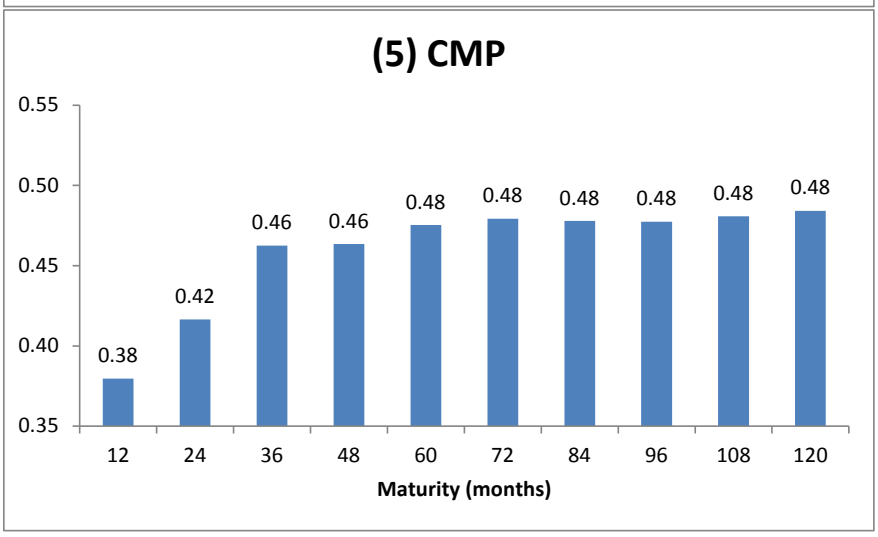
Appendix E – PRC% by Maturity



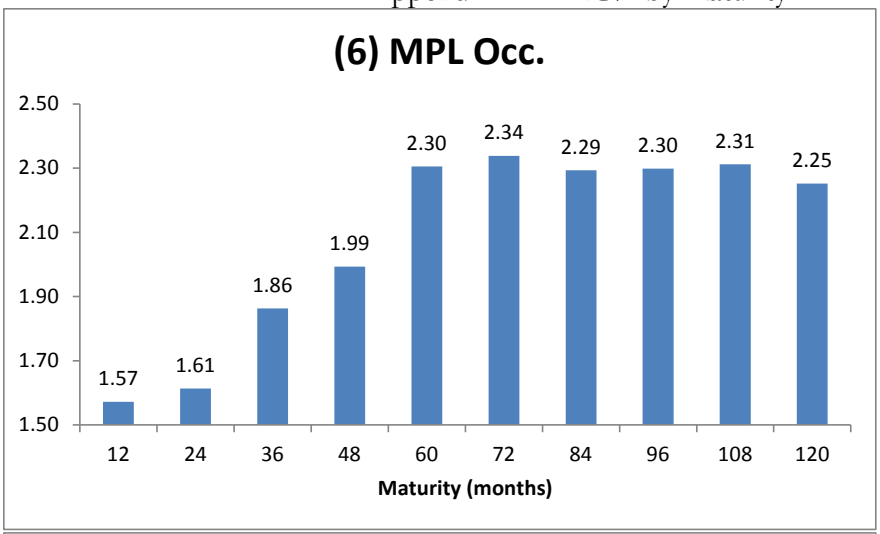
Appendix E – PRC% by Maturity

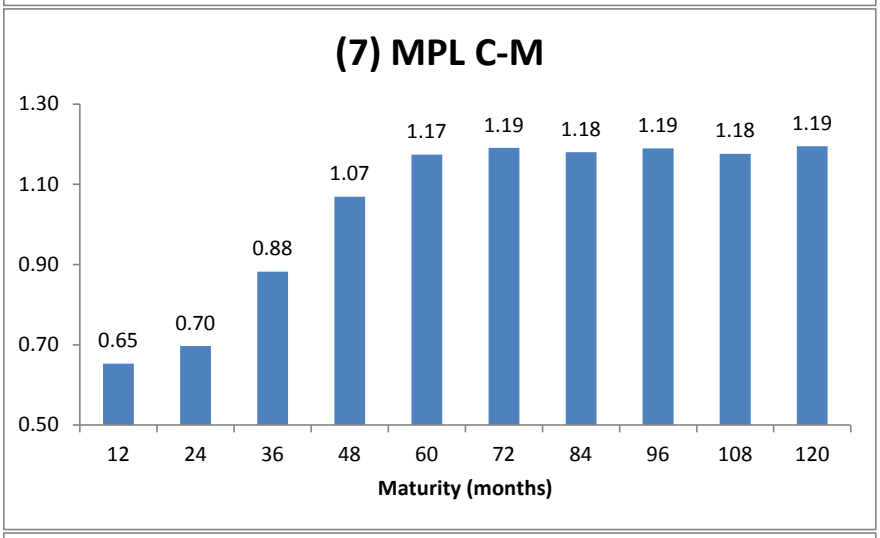


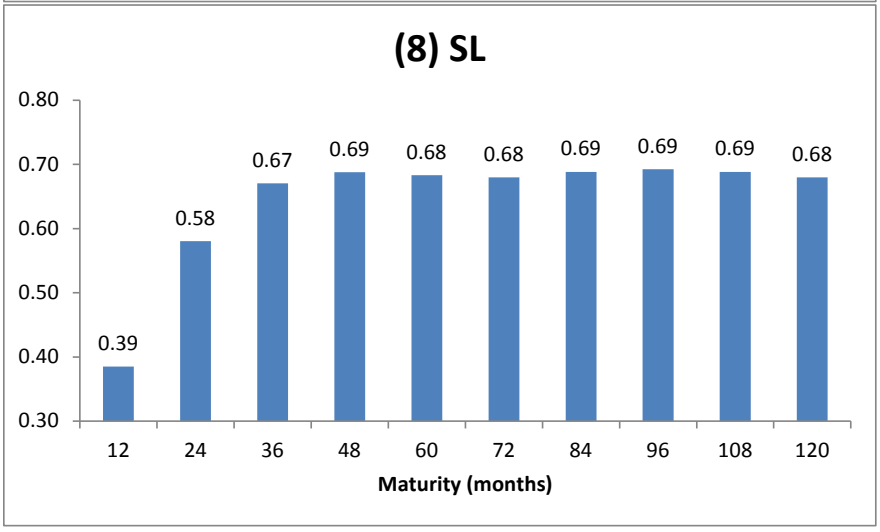




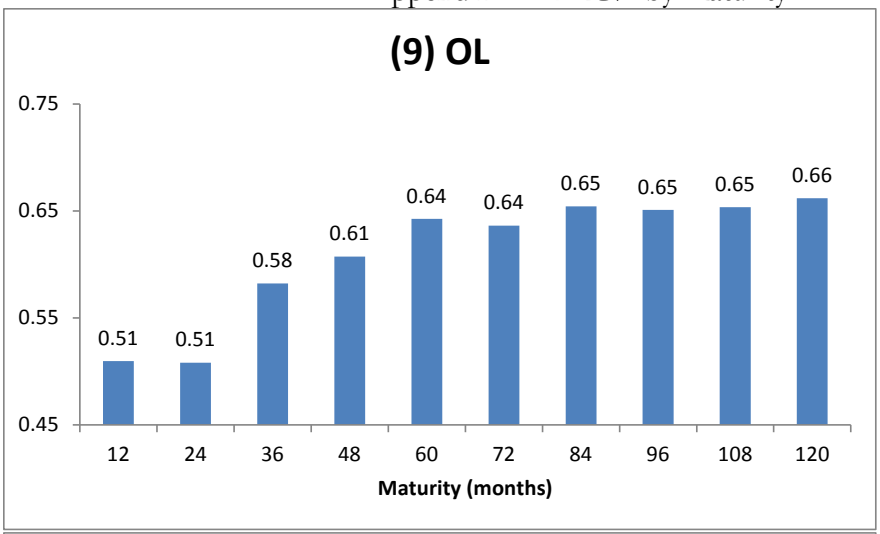
Appendix E – PRC% by Maturity

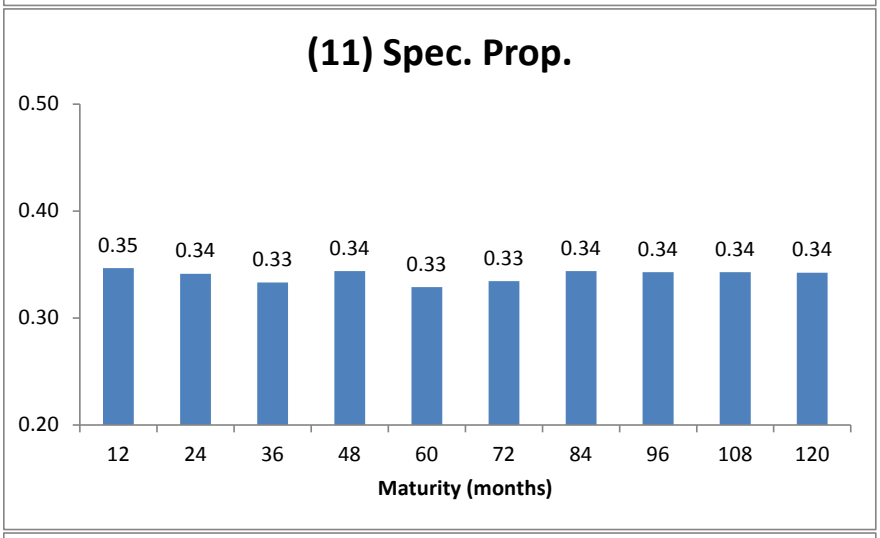


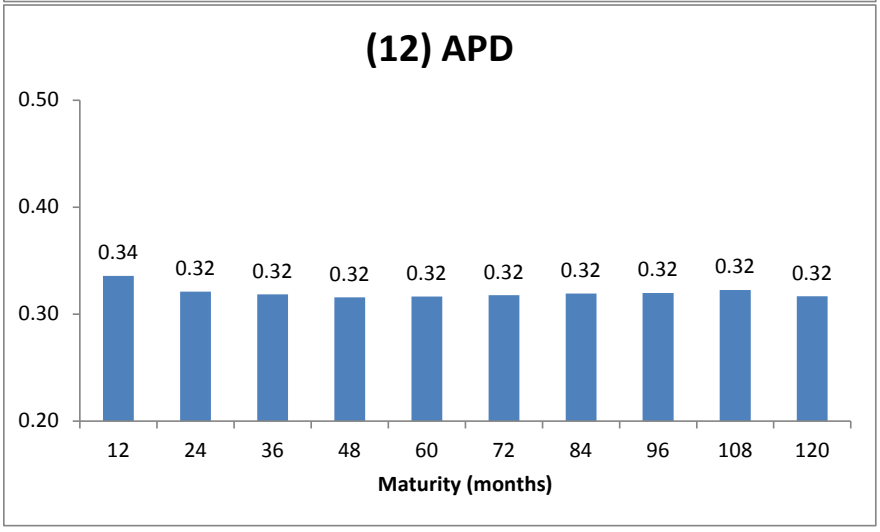




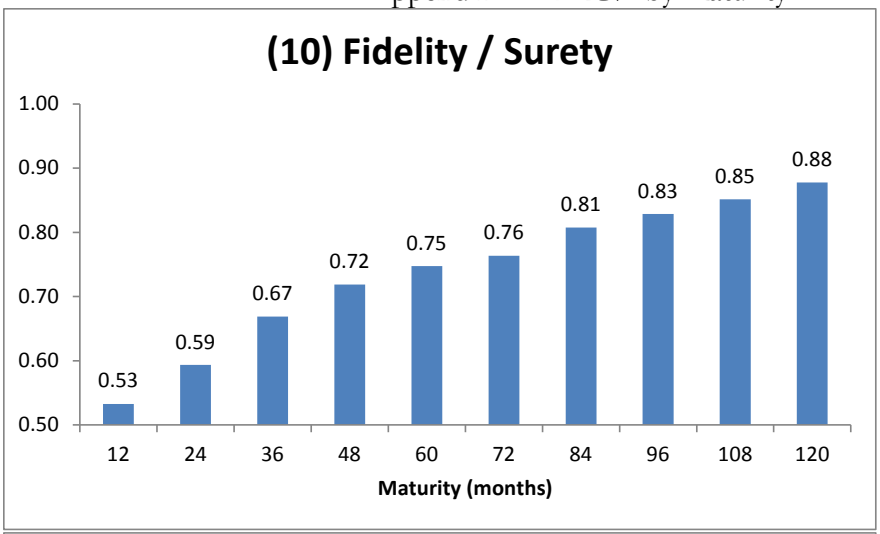
Appendix E – PRC% by Maturity

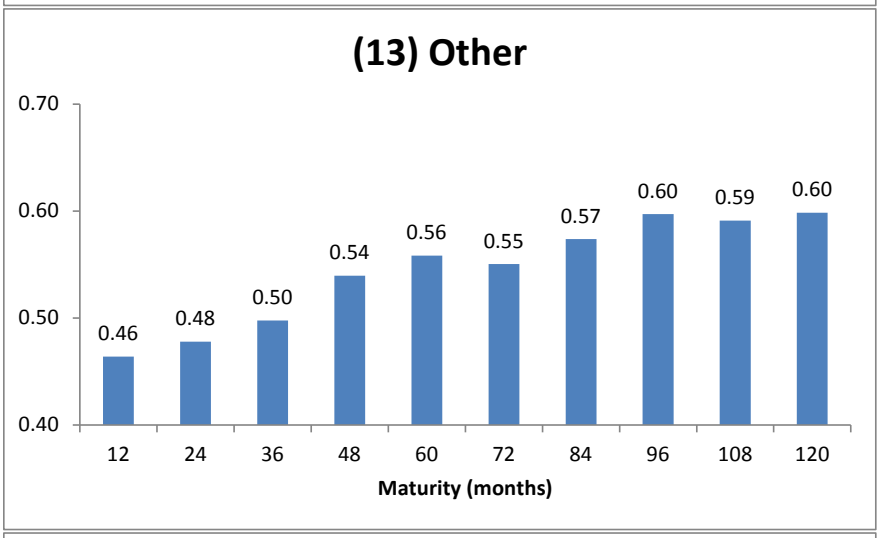


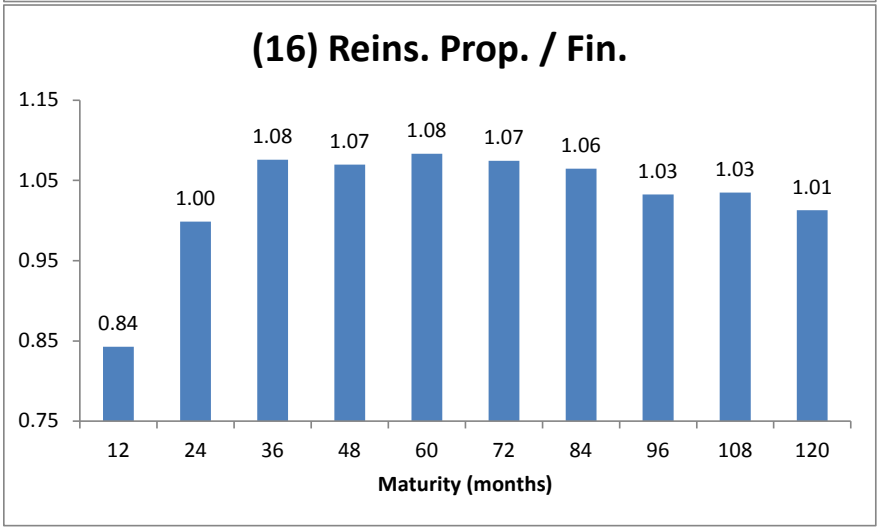




Appendix E – PRC% by Maturity







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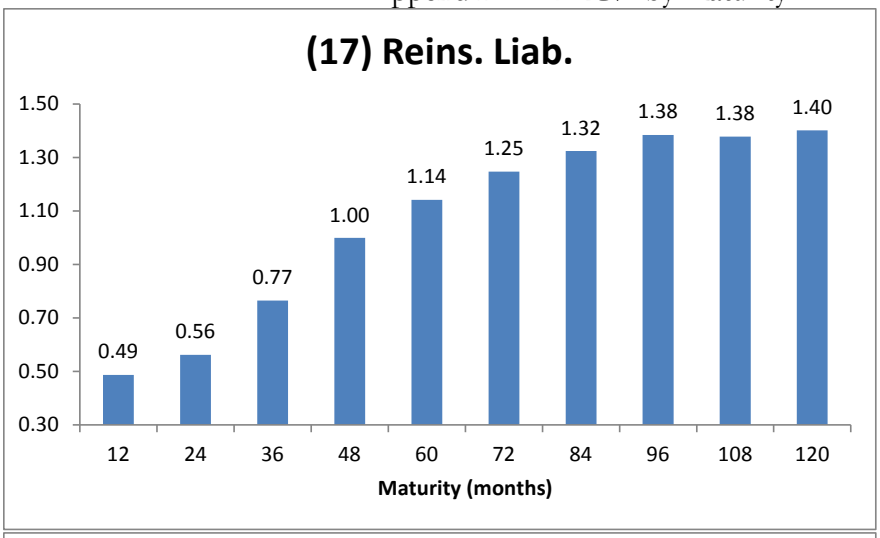

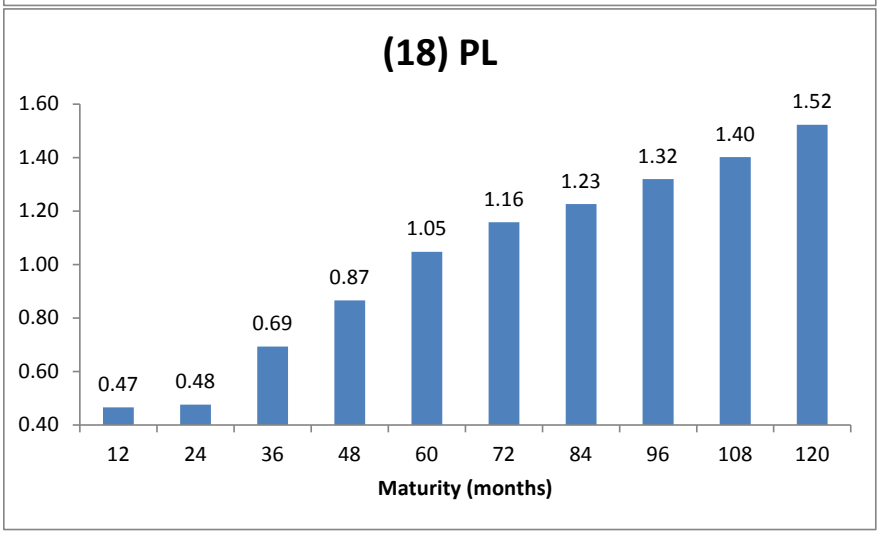

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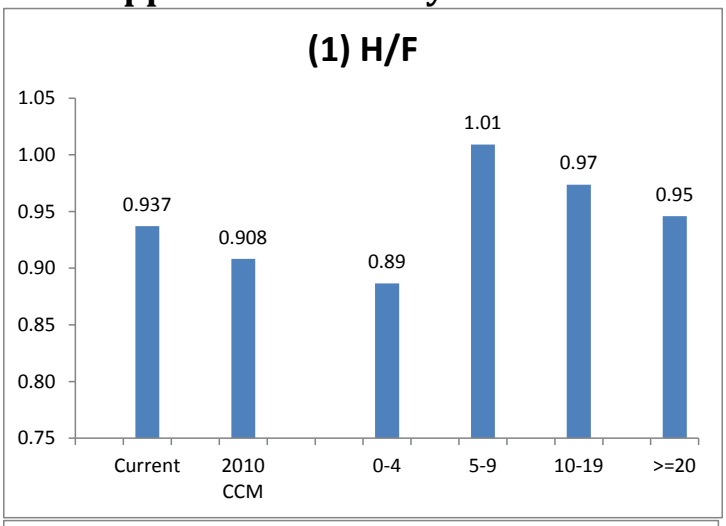

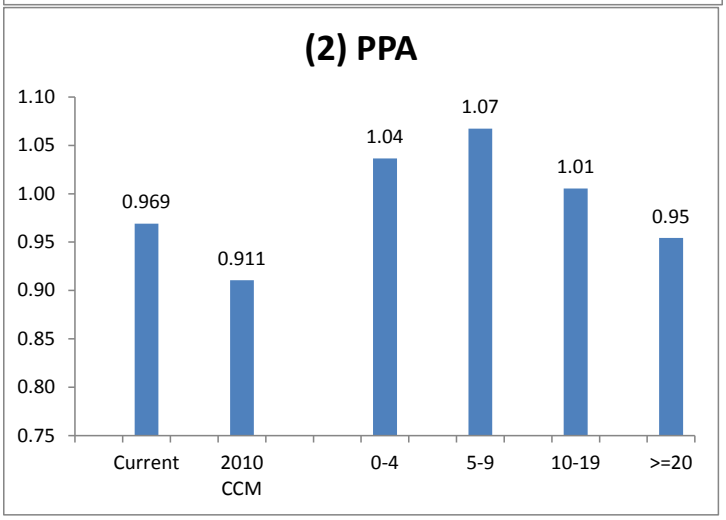

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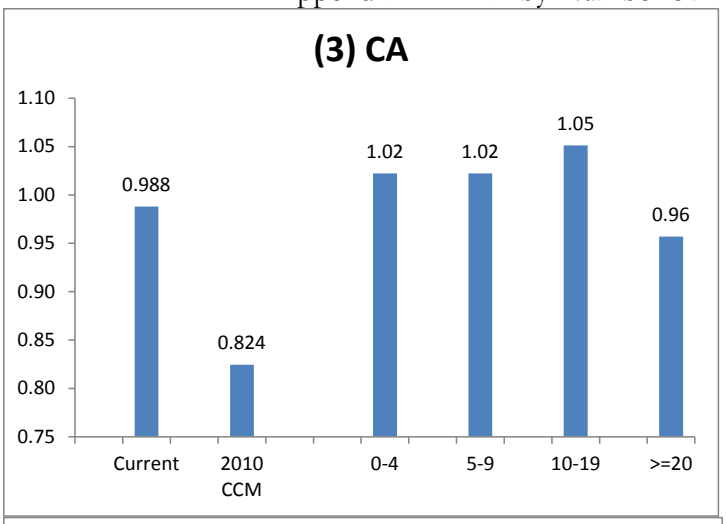

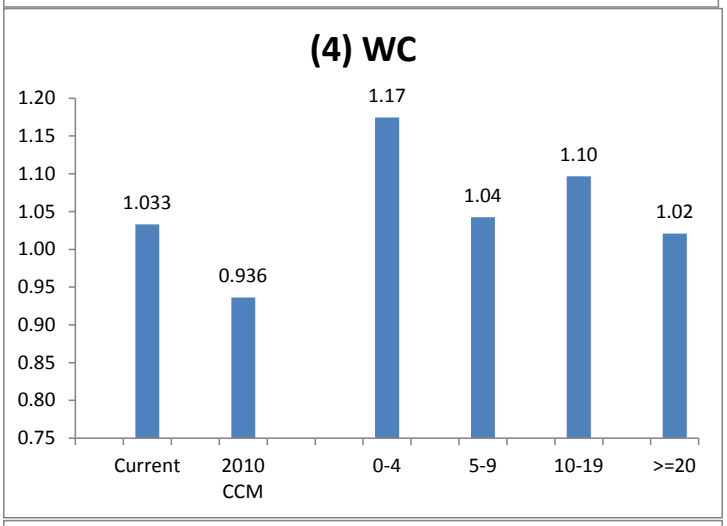

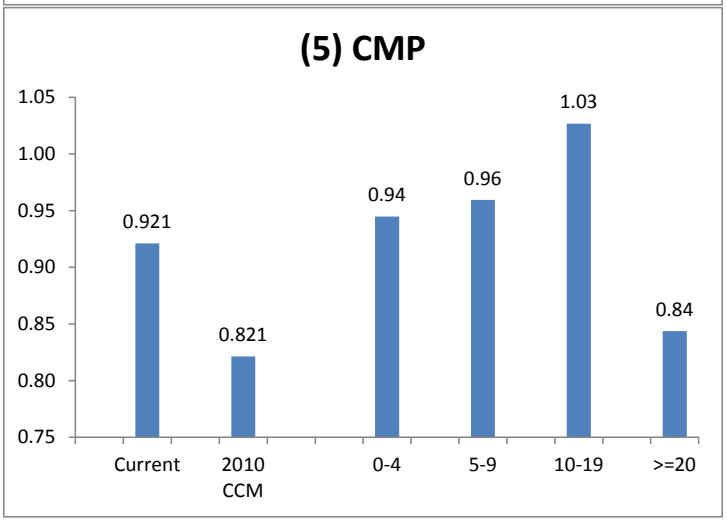

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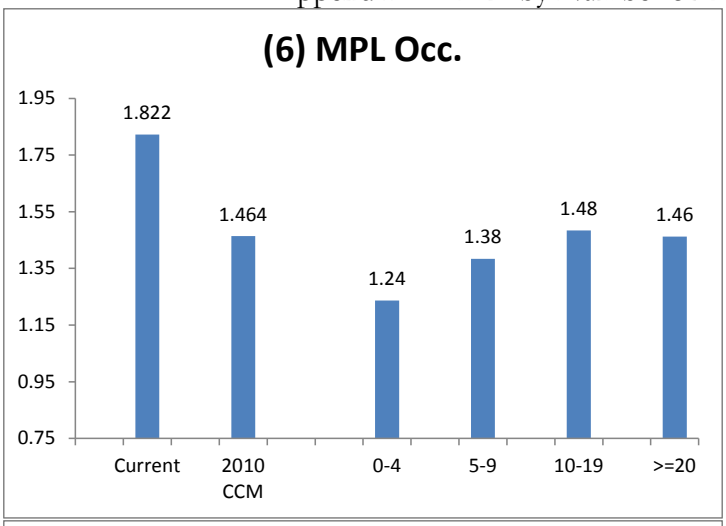

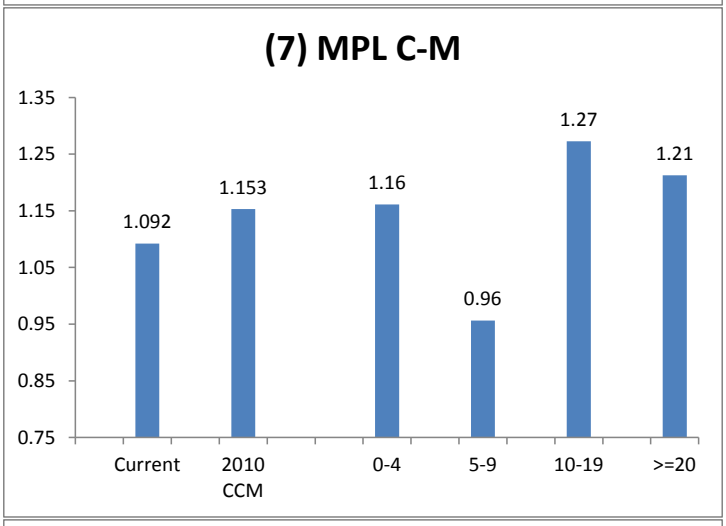

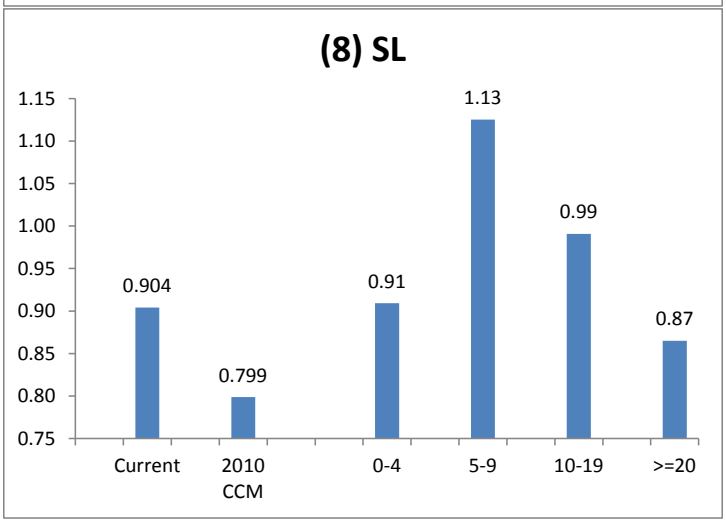

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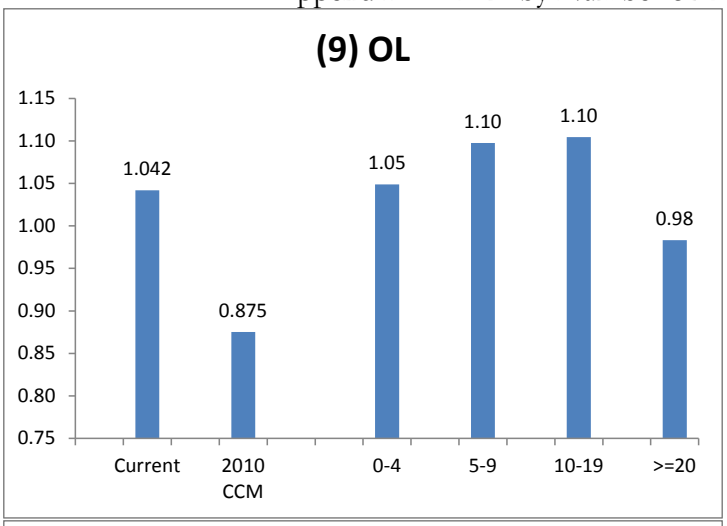

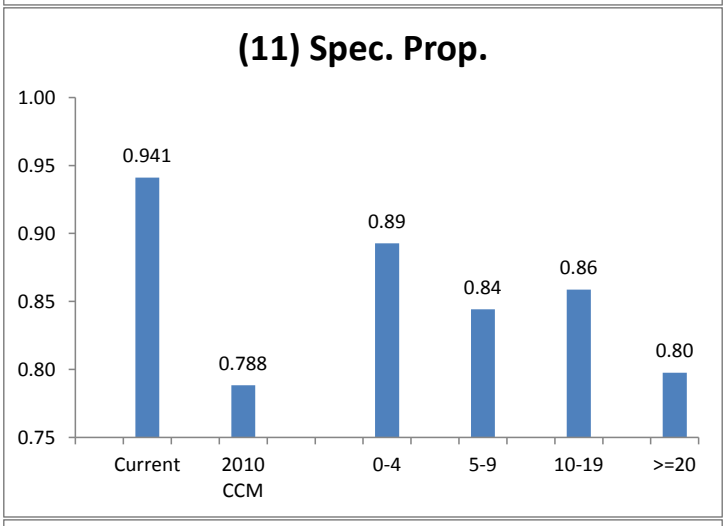

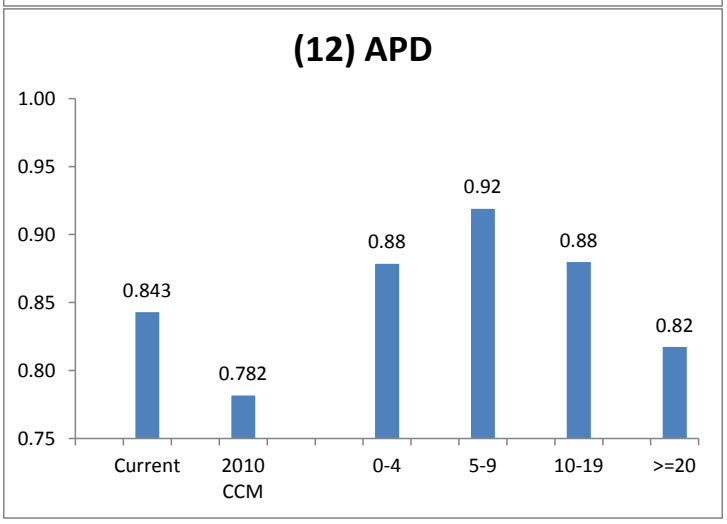

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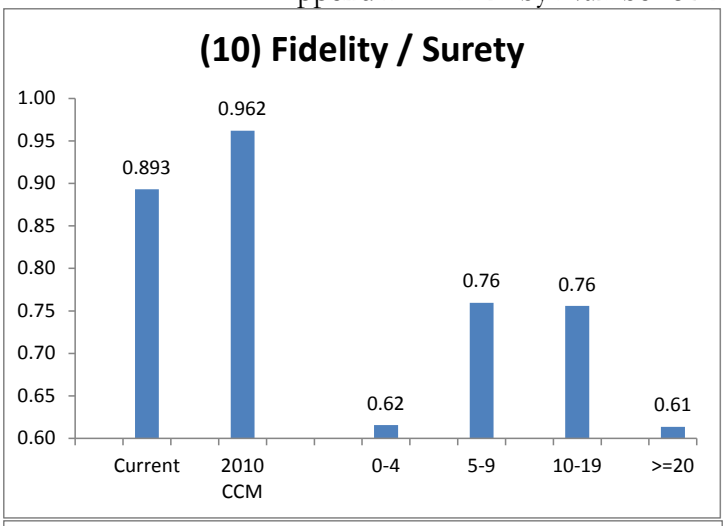

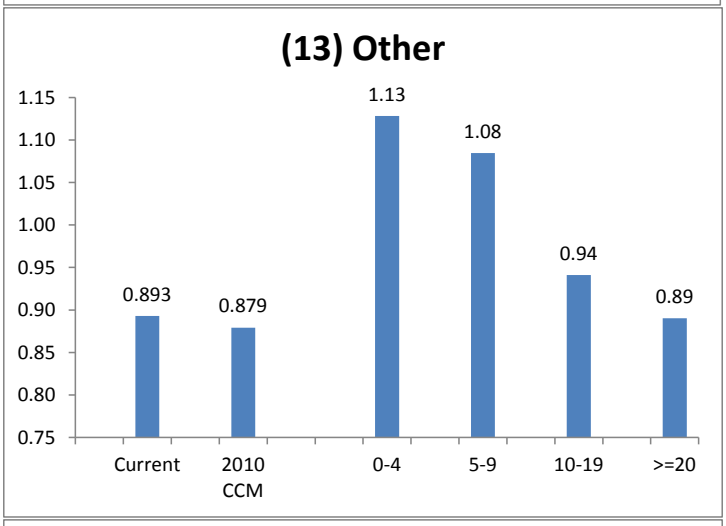

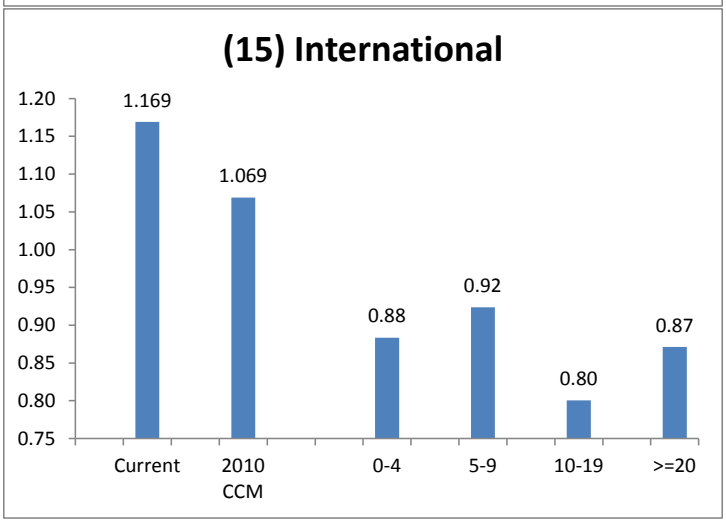

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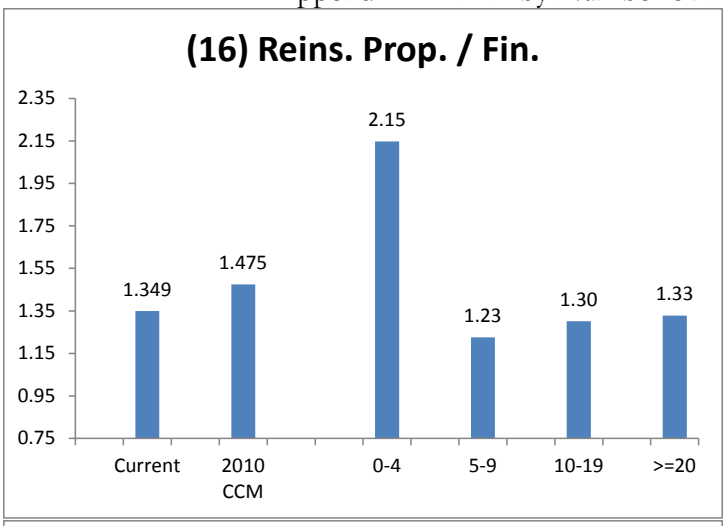

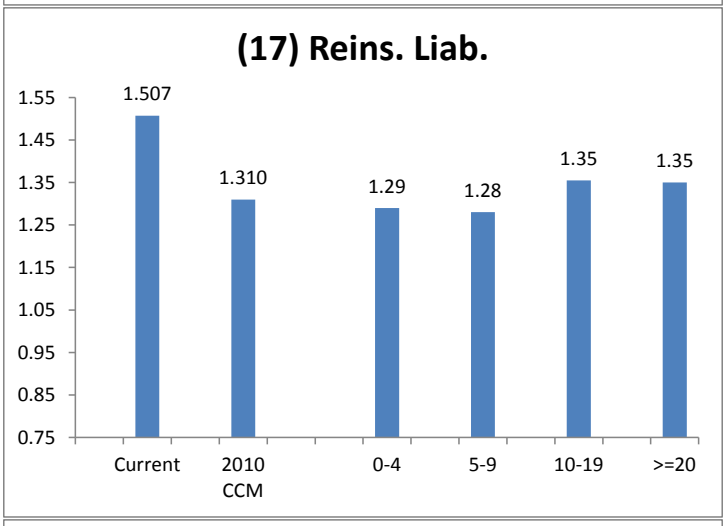

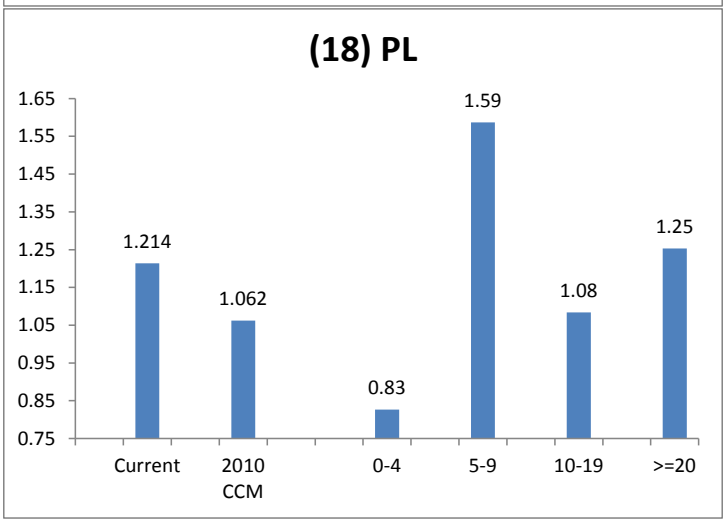

Appendix G – Pooling

As described by Feldblum and Blanchard, CAS Study Note for NAIC Annual Statement, October 2010:

> Many property/casualty insurance groups in the US have intercompany pooling arrangements (pools or pooling) among at least some of their group members. These arrangements typically take the form of a quota-share reinsurance treaty with no expiration date. The companies generally cede 100% of the business to the lead company in the pool, and then assume back a fixed percentage of the pooled results from the lead company.
>
> …
>
> Schedule P requires members of an intercompany pool to ignore the separate cessions to the lead company and assumptions from the lead company. Instead these pool members are required to first determine the Schedule P for the pool as a whole, and then apply their pool percentage to the pool's Schedule P. They are then required to report this scaled-down version of the total Schedule P, instead of reflecting the individual cessions and assumptions between pool members. [30]

This aspect of US P&C business affects the Annual Statement Schedule P data used for the DCWP research. In particular for each LOB-AY, the Schedule P loss ratio would be the same for each pool member; the common loss ratio would be the average net loss ratio for that LOB-AY for the entire pool rather than the individual pool member loss ratio before pooling.

That feature of the data would distort the results of our analysis in that:

1. The same loss ratio value would appear multiple times, reducing the apparent variability in the loss ratios across companies;
2. Companies that appear small based on their pooling percentages would show the lower year-to-year variability from year associated the larger size of the overall pool

[30] Feldblum, Sholom and Ralph Blanchard, CAS Study Note for NAIC Annual Statement, October 2010

G Appendix G - Pooling

rather than the higher year-to-year variability associated with a company of its apparent size.

To mitigate these effects, we would like to combine the separate pool participants into a single data point for each LOB-AY. If that were done, the data would reflect the correct variability among companies and the proper data point LOB-size.

Approach

Data

There are four sources of information on the extent to which Schedule P data reflects pooling:

- NAIC group code
- NAIC "consolidated company code"
- Pooling percentage data in Schedule P
- Schedule F reserves for "Affiliates – U. S. Intercompany Pooling".

Each source provides some information and none is perfect for this purpose of this research.

Methodology

For each current NAIC group, we identified the member companies that had either non-zero Schedule P "pooling percentages" or non-zero Schedule F reserves for "Affiliates – U.S. Intercompany Pooling" for seven or more of the fourteen Annual Statement years, for all LOBs combined. Within each group, we treated all such member companies as "pooled" and created a single "pooled entity."

The premium for the pooled entity is the sum of the premium for all pool members. The loss ratio for the pooled entity is the weighted average of the loss ratios for the individual pool members. The multiple individual pool member AY-LOB data points are removed from our data set. The pooled entity AY-LOB data point is added to the data set; in effect, the newly created data point replaces the multiple pool member data points.

Discussion of data considerations

We use seven years rather than 14 years because pooling arrangements change over time, but not so frequently that it seemed necessary to track pools by year. The seven-year rule might include some data points that are not pooled and not include some points that are pooled.

We used the current group structure to identify possible pool members. To the extent that group structures change over time, this approach might group some currently unrelated companies and might fail to group some historically, but not currently, related companies.

Those aspects of our approach might cause some of the issues noted below.

- The Schedule P and Schedule F information might be expected to identify the same pools, but we found pools identified in Schedule P that were not identified by Schedule F and vice versa.
- The pooling data appears reasonable in that the total pooling percentages for a LOB for group within a year typically was a round 100% (or sometimes 200% or 300%, as would happen if there was two or three pools within the group.) This was not universally the case. For some groups the companies showed pooling that did not total an even 100%, 200%, or 300%.
- 20 companies with pooling percentages were not part of a current group.

Effect on company counts in the data set

There are 3,730 NAIC legal entities in the initial data set.

The DCWP approach results in 2,901 entities. 2,695 are individual companies not affected by pooling approach. 206 are pooled entities formed from 1,035 consolidated entities. (2,901 = 2,695 + 206).

The pooled entities we used in this analysis are not the same as "NAIC Groups" or "NAIC Consolidated Companies". Our pooled entity approach retains more entities (and therefore more data points) than would be the case if we had based relied on either "NAIC Groups" or "NAIC Consolidated Companies".

- If we had combined all companies within an NAIC Group into a "group entity" there would be only 1,884 entities (vs. 2,901 entities used): 1,362 stand-alone companies and 522 groups with more than one member.

G Appendix G - Pooling

- If we had combined all NAIC consolidated entities into a "Consolidated Company entities," there would be only 2,387 consolidated entities (vs. 2,901 entities used), 1,359[31] stand-alone companies not part of a group or consolidated company, 698 individual companies that are part of an NAIC Group but not part of a consolidated company statement, and 330 consolidated companies.

Final Comment

Our approach does not necessarily identify all pools and it may combine some LOB/companies that are not actually pooled. Therefore, some pooling effects remains in the data used for this analysis.

However, we are confident this adjustment, while not perfect, is an improvement over using all companies as if there were no pooling.

Future research might refine this work by identifying data points as pooled by company-by-year rather than more simply by company as we did for this research.

[31] The 1,359 entities is 1,362 stand-alone companies not in group minus three companies in consolidated statements in which there is only one member company (probably a consolidation that included more than one member in the past).

GLOSSARY

Term	Interpretation
AY	Accident year
Baseline filtering	As defined in Section 3.4
CCM	Current Calibration Method
Data point	Each data point is an AY-LOB, for a single company or pool, at the latest available maturity (for most analyses) or at successive annual evaluation dates (in the maturity analysis in Section 6)
DCWP	CAS RBC Dependency and Calibration Working Party
Formula RBC Formula	The 2010 NAIC Property-Casualty RBC Formula
LOB	Line of Business
LOB-size	Line of business size, expressed as NEP
Loss ratio	Loss and all loss adjustment expenses net of reinsurance divided by earned premium net of reinsurance", as shown in Schedule P – Part 1, column 31.
Minor lines	A company (pool) LOB-AY for which the NEP represents less than 5% of all-lines total NEP by AY
MPL or MM	Medical Professional Liability/ Medical Malpractice
NEP	Net Earned Premium
NWP	Net Written Premium
PPA	Private Passenger Automobile liability
PRC	Premium Risk Charge
PRC%	PRC divided by NWP
PRF	Premium Risk Factor
RBC	Risk Based Capital
Survivorship	The extent to which PRFs are affected by included companies that did not file 2010 Annual Statements

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