

# Seasonality of Medical Claims

**Lyndon F. Fadri, FASP, ASA**

**Mary Victoria Escaño**

**13 November 2014**



**55<sup>th</sup> Annual Convention**

**Actuarial Society of the Philippines**

**13-14 November 2014, Bellevue Resort, Bohol**

# PRESENTATION OUTLINE

- I. Objectives / Scope of Study
- II. Results & Analyses - Claims Seasonality
- III. Underlying Seasons
- IV. Applications
- V. Other Uses



**55<sup>th</sup> Annual Convention**  
Actuarial Society of the Philippines  
13-14 November 2014, Bellevue Resort, Bohol

# OBJECTIVES

1. Validate significance of claims seasonality analyses:
  - Pricing
  - Reserving
  - IBNR determination
2. Introduce other possible uses of claims seasonality analyses
  - Cash flow analyses
  - Managing utilization

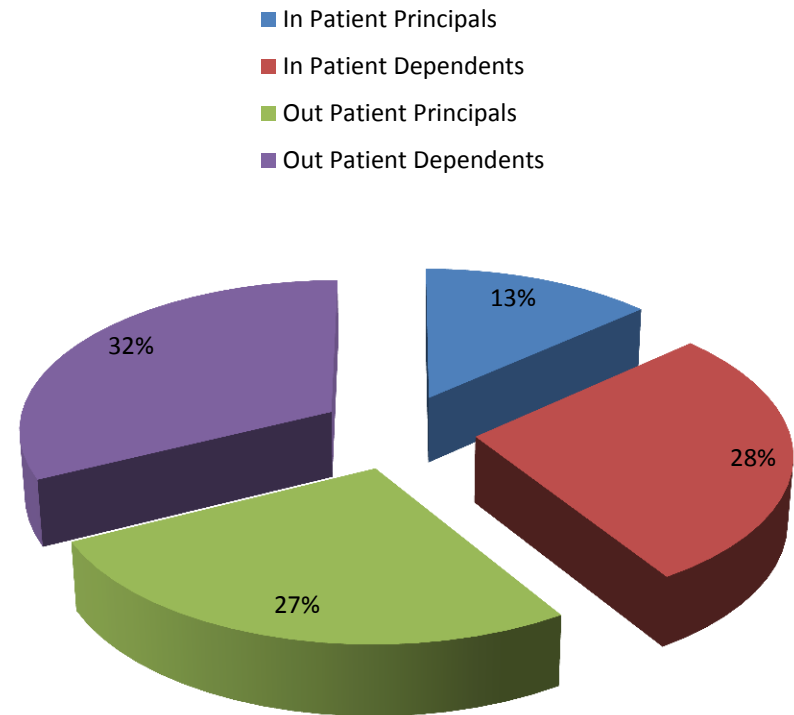


**55<sup>th</sup> Annual Convention**  
Actuarial Society of the Philippines  
13-14 November 2014, Bellevue Resort, Bohol

# Scope of Study

- 13 major accounts of a medical insurance broker
- Covering experience in policy years ending in 2009 to 2012
- Four (4) different HMOs
- Aggregate claim of 68,541,913.93

## Claim Type Breakdown



**55<sup>th</sup> Annual Convention**  
Actuarial Society of the Philippines  
13-14 November 2014, Bellevue Resort, Bohol

# Average Monthly Claims

Month	Average	% Total
January	405,067.41	8.62%
February	372,292.14	7.92%
March	428,983.15	9.13%
April	387,878.81	8.26%
May	391,862.27	8.34%
June	335,249.56	7.13%
July	394,778.81	8.40%
August	444,981.12	9.47%
September	470,360.68	10.01%
October	450,337.55	9.58%
November	335,603.52	7.14%
December	281,268.34	5.99%
<b>TOTAL</b>	<b>4,698,663.35</b>	<b>100.00%</b>



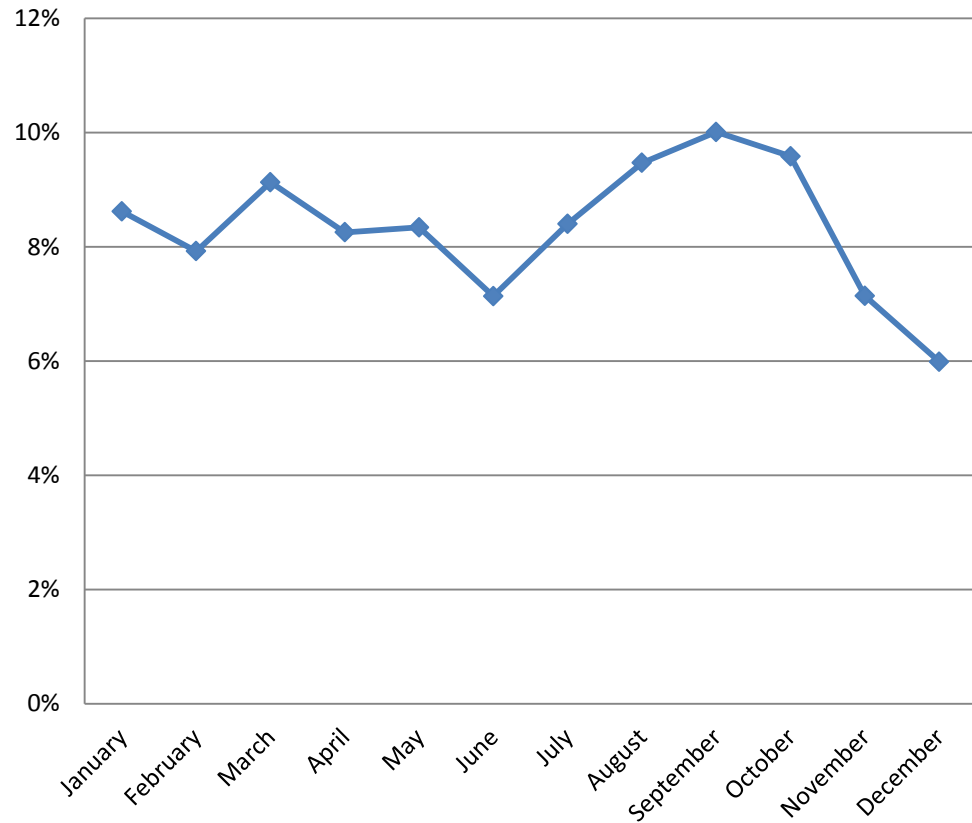
## 55<sup>th</sup> Annual Convention

Actuarial Society of the Philippines

13-14 November 2014, Bellevue Resort, Bohol

# Monthly Claims as % of Annual Claim

- Monthly ave. claims range from 6% to 10% of annual claims.
- Median at 8%
- Highest in September at 10% of total claims
- Lowest in December at 6% of total claims.



**55<sup>th</sup> Annual Convention**

**Actuarial Society of the Philippines**

**13-14 November 2014, Bellevue Resort, Bohol**

# Ave. Monthly Claims (Principals vs. Dependents)

Month	Amount		% of Total Claims	
	Principals	Dependents	Principals	Dependents
January	180,247.85	224,819.55	9.6%	8.0%
February	122,783.80	249,508.34	6.5%	8.8%
March	163,544.16	265,438.99	8.7%	9.4%
April	176,015.48	211,863.33	9.4%	7.5%
May	159,174.33	232,687.95	8.5%	8.3%
June	154,504.58	180,744.98	8.2%	6.4%
July	150,812.52	243,966.30	8.0%	8.7%
August	133,722.00	311,259.11	7.1%	11.0%
September	171,057.95	299,302.73	9.1%	10.6%
October	201,912.63	248,424.92	10.7%	8.8%
November	147,986.84	187,616.68	7.9%	6.7%
December	116,669.02	164,599.32	6.2%	5.8%
<b>TOTAL</b>	<b>1,878,431.15</b>	<b>2,820,232.20</b>	<b>100.0%</b>	<b>100.0%</b>



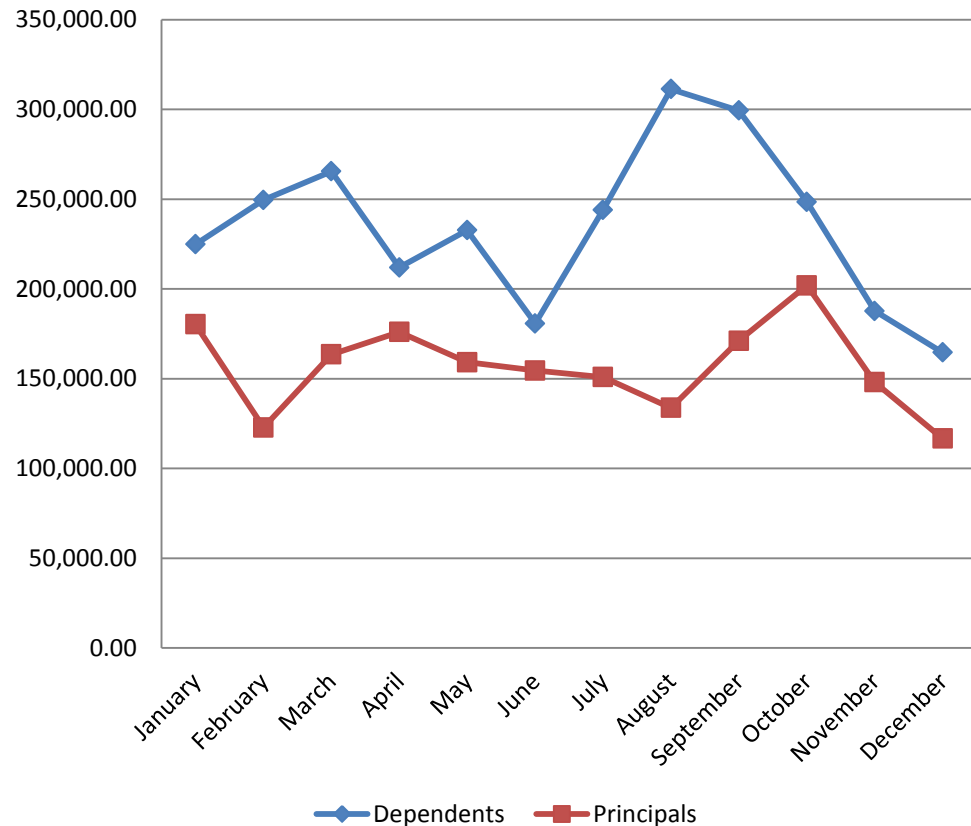
**55<sup>th</sup> Annual Convention**

**Actuarial Society of the Philippines**

**13-14 November 2014, Bellevue Resort, Bohol**

# Ave. Monthly Claims (Principals vs. Dependents)

- Claims seasonality more significant with dependents peaking in July through October.
- Moderate claims seasonality for principals – with peaks in September and October, dips in November and December but with abrupt increase in January & another dip in February



**55<sup>th</sup> Annual Convention**

**Actuarial Society of the Philippines**

**13-14 November 2014, Bellevue Resort, Bohol**



# Average Monthly Claims (In-patient vs. Out-patient)

Month	In-patient	Out-patient	% In-patient	% Out-patient
January	151,104.31	253,963.10	7.82%	9.18%
February	150,650.69	221,641.45	7.80%	8.01%
March	169,818.63	259,164.51	8.79%	9.36%
April	166,087.95	221,790.86	8.60%	8.01%
May	144,046.85	247,815.43	7.46%	8.95%
June	138,323.09	196,926.47	7.16%	7.12%
July	148,182.86	246,595.95	7.67%	8.91%
August	234,257.39	210,723.72	12.13%	7.61%
September	220,628.67	249,732.01	11.42%	9.02%
October	166,002.95	284,334.60	8.60%	10.27%
November	115,119.00	220,484.52	5.96%	7.97%
December	127,010.51	154,257.83	6.58%	5.57%
<b>TOTAL</b>	<b>1,931,232.91</b>	<b>2,767,430.44</b>	<b>100.00%</b>	<b>100.00%</b>



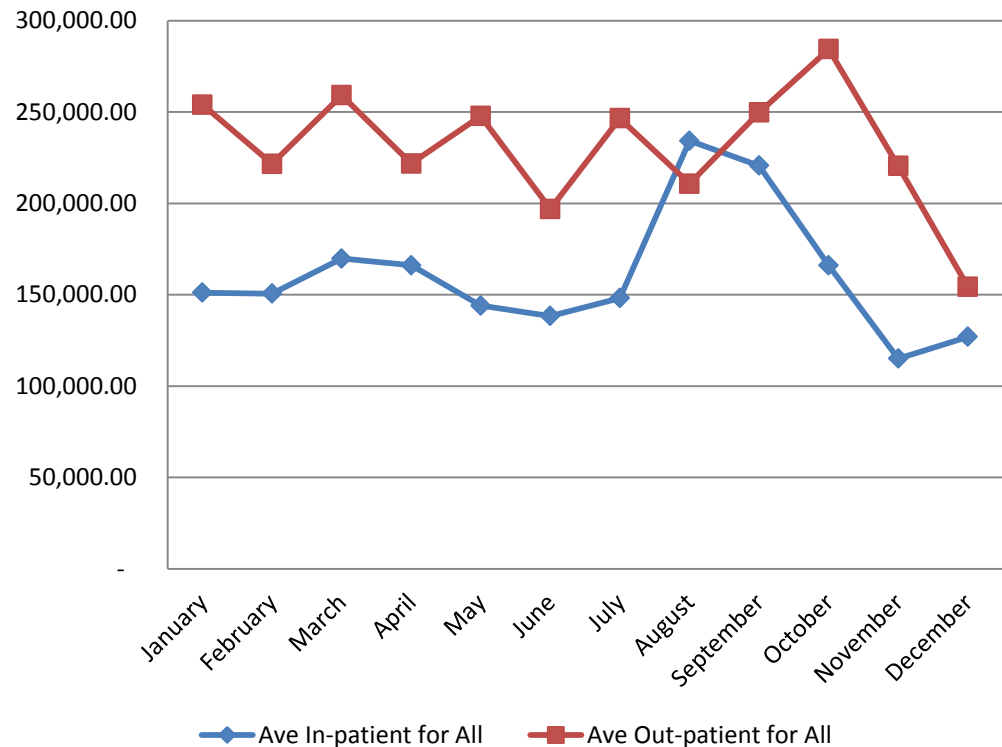
## 55<sup>th</sup> Annual Convention

Actuarial Society of the Philippines

13-14 November 2014, Bellevue Resort, Bohol

# Average Monthly Claims (In-patient vs. Out-patient)

- Similar claims pattern except from August to December
- In-patient claims relatively more seasonal



**55<sup>th</sup> Annual Convention**  
**Actuarial Society of the Philippines**  
13-14 November 2014, Bellevue Resort, Bohol

# Ave. Monthly Claims – Principal (In-Patient vs. Outpatient)

Month	In-patient	Out-patient	% In-patient	% Out-patient
January	74,653.18	105,594.67	11.84%	8.46%
February	32,815.09	89,968.71	5.20%	7.21%
March	53,882.05	109,662.11	8.55%	8.79%
April	80,349.07	95,666.41	12.74%	7.67%
May	46,370.15	112,804.17	7.35%	9.04%
June	52,285.59	102,218.99	8.29%	8.19%
July	35,497.52	115,314.99	5.63%	9.24%
August	39,869.16	93,852.84	6.32%	7.52%
September	50,133.96	120,923.99	7.95%	9.69%
October	63,429.64	138,482.99	10.06%	11.10%
November	49,131.87	98,854.96	7.79%	7.92%
December	52,135.00	64,534.02	8.27%	5.17%
<b>TOTAL</b>	<b>630,552.29</b>	<b>1,247,878.85</b>	<b>100.00%</b>	<b>100.00%</b>



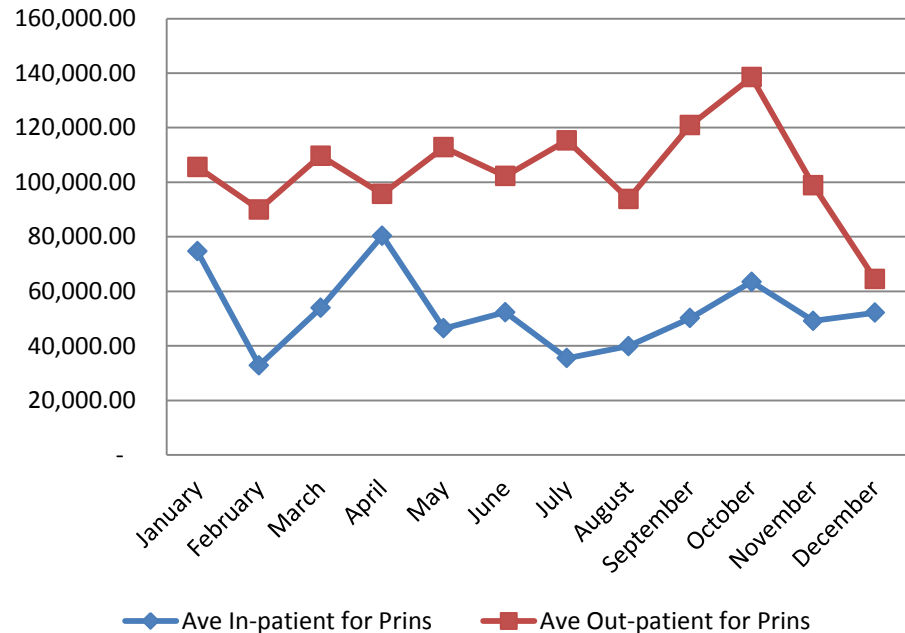
## 55<sup>th</sup> Annual Convention

Actuarial Society of the Philippines

13-14 November 2014, Bellevue Resort, Bohol

# Ave. Monthly Claims – Principal (In-Patient vs. Outpatient)

- In-patient and outpatient claims exhibit somewhat similar month-to-month pattern except for April through July



**55<sup>th</sup> Annual Convention**  
**Actuarial Society of the Philippines**  
 13-14 November 2014, Bellevue Resort, Bohol

# Ave. Monthly Claims – Dependents (In-Patient vs. Outpatient)

Month	In-patient	Out-patient	% In-patient	% Out-patient
January	76,451.13	148,368.43	5.88%	9.76%
February	117,835.60	131,672.74	9.06%	8.67%
March	115,936.58	149,502.40	8.91%	9.84%
April	85,738.88	126,124.45	6.59%	8.30%
May	97,676.69	135,011.25	7.51%	8.88%
June	86,037.50	94,707.48	6.61%	6.23%
July	112,685.34	131,280.96	8.66%	8.64%
August	194,388.23	116,870.88	14.95%	7.69%
September	170,494.71	128,808.02	13.11%	8.48%
October	102,573.32	145,851.61	7.89%	9.60%
November	65,987.13	121,629.55	5.07%	8.00%
December	74,875.51	89,723.81	5.76%	5.90%
<b>TOTAL</b>	<b>1,300,680.61</b>	<b>1,519,551.59</b>	<b>100.00%</b>	<b>100.00%</b>

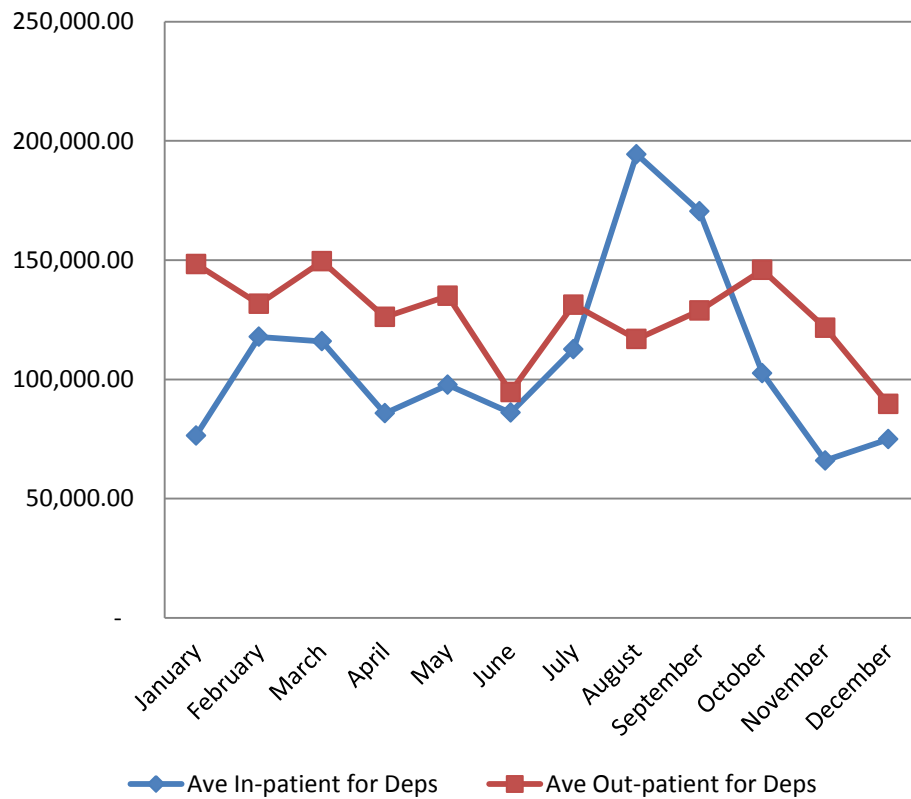


**55<sup>th</sup> Annual Convention**  
Actuarial Society of the Philippines

13-14 November 2014, Bellevue Resort, Bohol

# Ave. Monthly Claims – Dependents (In-Patient vs. Outpatient)

For dependents, outpatient and in-patient claims, more or less, show similar patterns except for August, September and January



**55<sup>th</sup> Annual Convention**  
**Actuarial Society of the Philippines**  
 13-14 November 2014, Bellevue Resort, Bohol

# Comparison of all Claim Trends

Month	In Patient		Out Patient	
	Principals	Dependents	Principals	Dependents
January	11.84%	5.88%	8.46%	9.76%
February	5.20%	9.06%	7.21%	8.67%
March	8.55%	8.91%	8.79%	9.84%
April	12.74%	6.59%	7.67%	8.30%
May	7.35%	7.51%	9.04%	8.88%
June	8.29%	6.61%	8.19%	6.23%
July	5.63%	8.66%	9.24%	8.64%
August	6.32%	14.95%	7.52%	7.69%
September	7.95%	13.11%	9.69%	8.48%
October	10.06%	7.89%	11.10%	9.60%
November	7.79%	5.07%	7.92%	8.00%
December	8.27%	5.76%	5.17%	5.90%
Annual	100.00%	100.00%	100.00%	100.00%

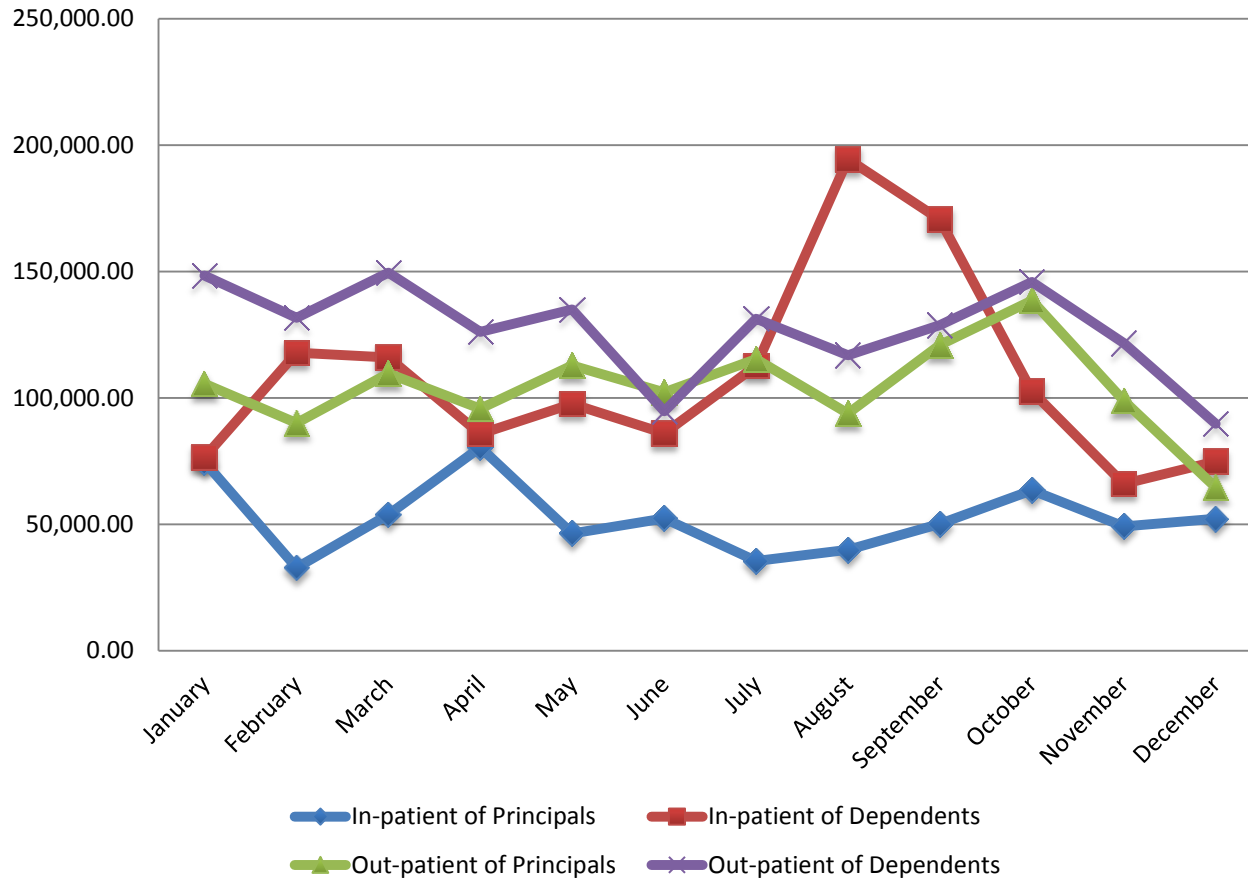


## 55<sup>th</sup> Annual Convention

Actuarial Society of the Philippines

13-14 November 2014, Bellevue Resort, Bohol

# Comparison of all Claim Trends



**55<sup>th</sup> Annual Convention**  
**Actuarial Society of the Philippines**  
 13-14 November 2014, Bellevue Resort, Bohol



# Preliminary Conclusions

1. Annual claims not uniformly distributed over the 12-month period affirming claims seasonality.
2. Seasonality of claims differs significantly between principals and dependents.
3. Seasonality of claims by type of claim (in-patient or out-patient) not as significant vs. seasonality by membership type
4. Seasonality of in-patient claims of dependents is most prominent

\*For simplicity, subsequent discussions focus on claims seasonality by membership type



**55<sup>th</sup> Annual Convention**

**Actuarial Society of the Philippines**

**13-14 November 2014, Bellevue Resort, Bohol**

# Underlying Seasons

- **Climatic Seasons** – some diseases are seasonal / directly related to the climate
- **Occupational Seasons** – timing by which members seek medical attention affected by what “occupies” them

Climatic Season	Months Included in Season
Dry	<i>February, March, April, May</i>
Rainy	<i>June, July, August, September, October</i>
Cold	<i>November, December, January</i>

Occupational Seasons	Months Included in Season
After Christmas	<i>January</i>
Ordinary Times	<i>February, March</i>
Summer Vacation	<i>April, May</i>
Start of Schools	<i>June</i>
Ordinary Times	<i>July, August, September</i>
Before Christmas	<i>October</i>
Christmas Season	<i>November, December</i>



**55<sup>th</sup> Annual Convention**

**Actuarial Society of the Philippines**

13-14 November 2014, Bellevue Resort, Bohol

# Underlying Season: Climate

Month	Principals	Dependents	Average Percentage of Claims		
			Principals	Dependents	Weather
January	9.6%	8.0%	7.9%	6.8%	Cold
February	6.5%	8.8%	8.3%	8.5%	Dry
March	8.7%	9.4%			
April	9.4%	7.5%			
May	8.5%	8.3%			
June	8.2%	6.4%	8.6%	9.1%	Rainy
July	8.0%	8.7%			
August	7.1%	11.0%			
September	9.1%	10.6%			
October	10.7%	8.8%			
November	7.9%	6.7%	7.9%	6.8%	Cold
December	6.2%	5.8%			

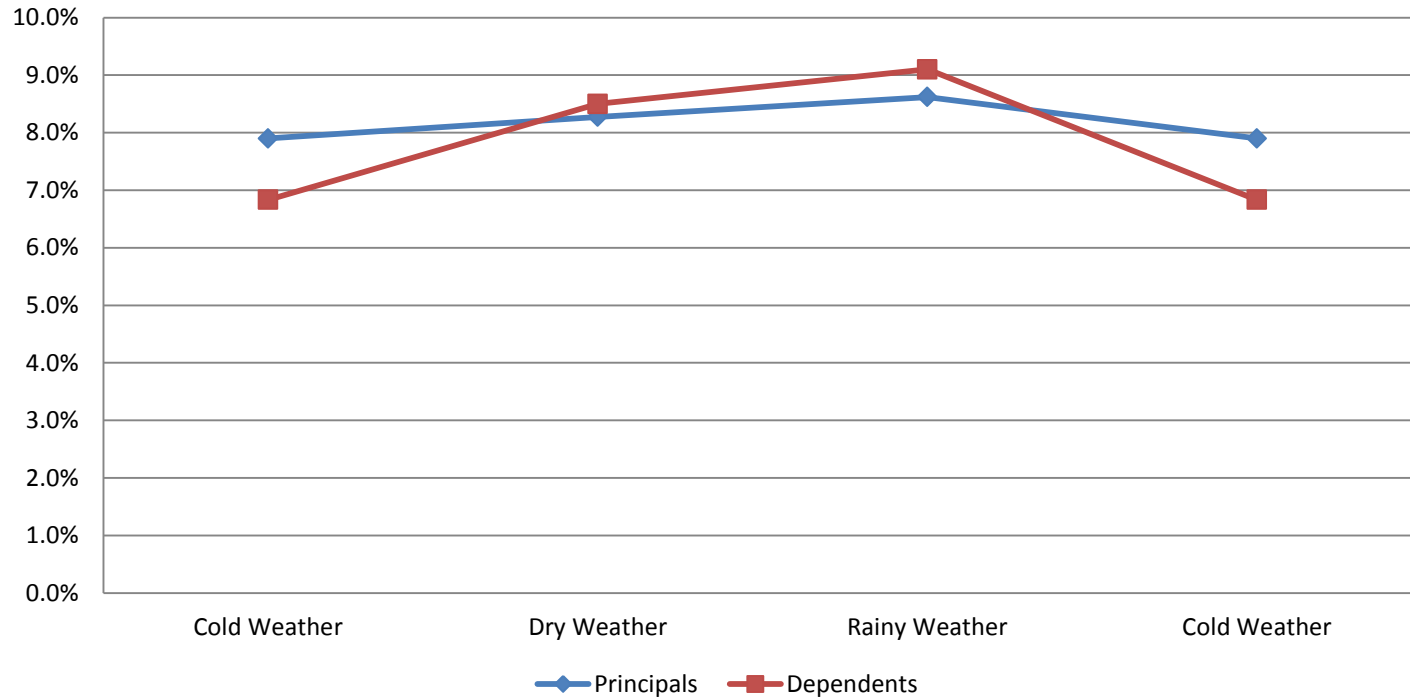


## 55<sup>th</sup> Annual Convention

Actuarial Society of the Philippines

13-14 November 2014, Bellevue Resort, Bohol

# Underlying Season: Climate



**55<sup>th</sup> Annual Convention**  
**Actuarial Society of the Philippines**  
13-14 November 2014, Bellevue Resort, Bohol

# Underlying Seasons: Occupational

Month	Principals	Dependents	Average Percentage Claims		
			Principals	Dependents	Event
January	9.6%	8.0%	9.6%	8.0%	After Christmas
February	6.5%	8.8%	7.9%	9.7%	Ordinary Times
March	8.7%	9.4%			
April	9.4%	7.5%	9.0%	7.9%	Summer Vacation
May	8.5%	8.3%			
June	8.2%	6.4%	8.2%	6.4%	Start of Schools
July	8.0%	8.7%	7.9%	9.7%	Ordinary Times
August	7.1%	11.0%			
September	9.1%	10.6%			
October	10.7%	8.8%	10.7%	8.8%	Before Christmas
November	7.9%	6.7%	7.1%	6.3%	Christmas Season
December	6.2%	5.8%			

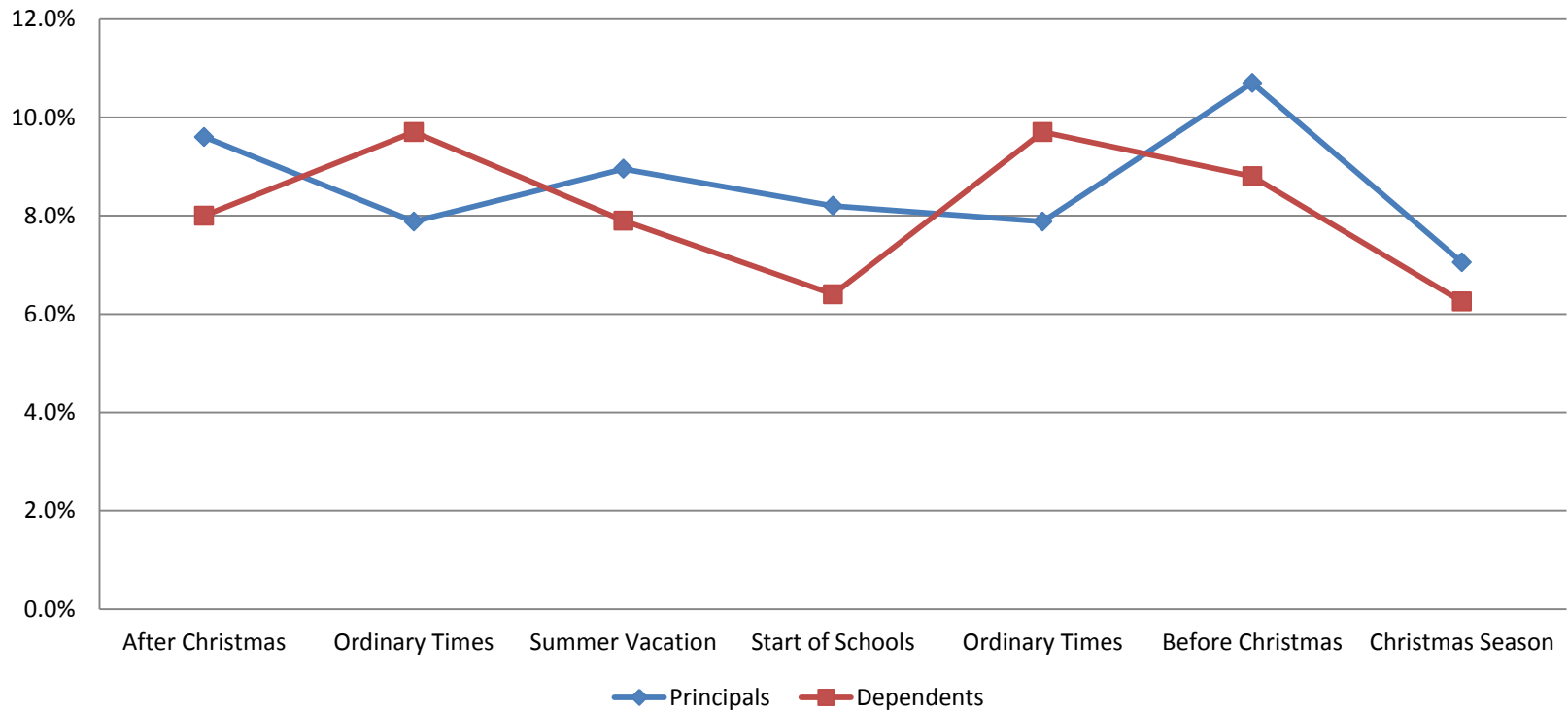


## 55<sup>th</sup> Annual Convention

Actuarial Society of the Philippines

13-14 November 2014, Bellevue Resort, Bohol

# Underlying Seasons: Occupations



**55<sup>th</sup> Annual Convention**  
**Actuarial Society of the Philippines**  
13-14 November 2014, Bellevue Resort, Bohol

# Conclusions

1. Underlying seasons affirm the seasonality of medical claims
2. Dependents' claims are highly affected by both climatic and occupational seasons
3. Principals' claims are influenced more by occupational seasons
4. Knowing the underlying seasons is important as “seasons change”
  - Climate change
  - Change in school year



**55<sup>th</sup> Annual Convention**

**Actuarial Society of the Philippines**

**13-14 November 2014, Bellevue Resort, Bohol**

# Applications

1. Applications
  - Pricing
  - Reserving
  - IBNR determination
2. Comparison of results vs. “simple-average method”
3. Is the difference significant?



**55<sup>th</sup> Annual Convention**  
Actuarial Society of the Philippines  
13-14 November 2014, Bellevue Resort, Bohol



# Pricing

Assuming:

- 2 months prior policy anniversary
- 1 month reporting lag

Using simple average method, projected claim for the remaining period:

- 25% of annual expected claim
- 33.3% of claims incurred & reported during the policy year

## Projected Claim based on Claim Seasonality

Month	Principal %Total	Dependent %Total	Principal %Reported	Dependent % Reported
January	23.7%	<b>20.5%</b>	31.1%	<b>25.8%</b>
February	<b>22.3%</b>	22.6%	<b>28.7%</b>	29.2%
March	24.8%	26.2%	33.0%	35.5%
April	24.6%	25.7%	32.6%	34.6%
May	26.6%	25.2%	36.2%	33.7%
June	26.1%	22.2%	35.3%	28.5%
July	24.7%	23.4%	32.8%	30.5%
August	23.3%	26.1%	30.4%	35.3%
September	24.2%	30.3%	31.9%	43.5%
October	26.9%	<b>30.4%</b>	36.8%	<b>43.7%</b>
November	<b>27.7%</b>	26.1%	<b>38.3%</b>	35.3%
December	24.8%	21.3%	33.0%	27.1%



55<sup>th</sup> Annual Convention

Actuarial Society of the Philippines

13-14 November 2014, Bellevue Resort, Bohol

# Reserving

## Unearned Premium Reserves (Dec. 31): Claim Seasonality vs. Simple Average

Month	Unearned Premium	Seasonality-based Reserve	
		Principal	Dependents
January	0.0%	0.0%	0.0%
February	8.3%	9.6%	8.0%
March	16.7%	16.1%	16.8%
April	25.0%	24.8%	26.2%
May	33.3%	34.2%	33.7%
June	41.7%	42.7%	42.0%
July	50.0%	50.9%	48.4%
August	58.3%	58.9%	57.1%
September	66.7%	66.0%	68.1%
October	75.0%	75.1%	78.7%
November	83.3%	85.8%	87.5%
December	91.7%	93.7%	94.2%
<b>Average</b>	<b>45.8%</b>	<b>46.5%</b>	<b>46.7%</b>



55<sup>th</sup> Annual Convention

Actuarial Society of the Philippines

13-14 November 2014, Bellevue Resort, Bohol

# IBNR Determination

1. Aggregate IBNR may be best estimated using **completion ratios**
2. Simple average method provides easy determination of IBNR
  - Monthly reporting
  - IBNR per account
3. Applying claims seasonality would make the estimate more reliable without producing multiple completion ratio tables



55<sup>th</sup> Annual Convention

Actuarial Society of the Philippines

13-14 November 2014, Bellevue Resort, Bohol

# IBNR Determination

Assuming:

- 2-month reporting delay
- IBNR determined as of policy anniversary date

Using simple average method, IBNR is:

- 16.7% of annual expected claim
- 20.0% of reported claim

## IBNR Estimates based on Claim Seasonality

Anniversary Month	Principal %Total	Dependent %Total	Principal %Reported	Dependent % Reported
January	15.8%	13.8%	18.8%	16.0%
February	16.1%	16.8%	19.2%	20.2%
March	15.2%	18.2%	17.9%	22.2%
April	18.1%	16.9%	22.1%	20.3%
May	17.9%	15.8%	21.8%	18.8%
June	16.7%	14.7%	20.0%	17.2%
July	16.2%	15.1%	19.3%	17.8%
August	15.1%	19.7%	17.8%	24.5%
September	16.2%	<b>21.6%</b>	19.3%	<b>27.6%</b>
October	<b>19.8%</b>	19.4%	<b>24.7%</b>	24.1%
November	18.6%	15.5%	22.9%	18.3%
December	<b>14.1%</b>	<b>12.5%</b>	<b>16.4%</b>	<b>14.3%</b>



55<sup>th</sup> Annual Convention

Actuarial Society of the Philippines

13-14 November 2014, Bellevue Resort, Bohol

# OTHER USES

## 1. Cash flow analyses

- monthly liquidity requirements
- pricing - if interest is imputed in the pricing though given the low-interest environment, this may not be significant currently

## 2. Utilization Management

- Utilization control measures best implemented prior to or during high-claim season
- Knowledge of underlying seasons could help HMOs come up with effective measures



**55<sup>th</sup> Annual Convention**

**Actuarial Society of the Philippines**

**13-14 November 2014, Bellevue Resort, Bohol**

# REMINDER / DISCLAIMER

Tables presented are not meant to be used as standard tables:

- Claim seasonality may vary between HMOs depending on their practices
- Hospitalization (reimbursement) claims of life insurers may show different seasonality patterns



**55<sup>th</sup> Annual Convention**

**Actuarial Society of the Philippines**

**13-14 November 2014, Bellevue Resort, Bohol**

# THANK YOU!

## Have a healthy Holiday Season!



**55<sup>th</sup> Annual Convention**  
Actuarial Society of the Philippines  
13-14 November 2014, Bellevue Resort, Bohol