



Medical Expense Trend : Historical Drivers

SOA Spring Health Meeting : Session 7

Seattle, Washington

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Desired Information from Trend Modeling and Trend Model Reports

- What type of information would be of interest?
 - Sufficient prediction accuracy for a historical time interval
 - Overcome claim lag time impacts to trend modeling and reporting
 - Trend levels with attached probability/percentiles and/or trend range with associated range of probability/percentiles
 - Are trend levels rising or falling? How can you tell with all that noise?
 - Trend broken down by type of service
 - Trend driver Contributions: Claim Frequency and Claim Severity for each type of service
 - If possible, some sense of impact to trend and/or trend driver components due to:
 - Demographics
 - Service mix
 - Technology
 - Intensity
 - Cost-shifting
 -



Stochastic Trend Model

Description

Methodology incorporates and applies in a new way advanced proven mathematical and statistical techniques healthcare insurance.

Generates historical and/or future trend level probability distributions.

We'll concern ourselves with internal data only version of the stochastic trend model oriented to reporting on trend as of December 2006 for Group – PPO line of business (LOB). In the predictive trend session, we'll use the model to predict 2007 with selected probability intervals.

Advantages

Pure PMPM Trend percentile distribution reports generated at 1% change intervals

Once business risk rules specified for LOB, automatic generation of reports once data is available

Develop trend percentile distribution reports for pure pmpm trend, and depending on data availability/quality for claim frequency trend and claim severity trend

Provides accurate, consistent, timely and standardized trend information for use by insurer/HMO departments

Aids in improving pricing trend, valuation trend and forecast trend accuracy, consistency and timeliness



Methodology/Results

Results from current trend modeling methodologies are “subsets (in some sense)” of stochastic trend model reports.

Stochastic Predictive Model – Sample Results

STOCHASTIC ACTUARIAL TOOLSET (STANDARDIZED) - Payments

Percentile	Current Measurement Date		Stochastic Monthly Pure Premiums Trend Jun-07	Stochastic Monthly Pure Premiums Jul-07	Stochastic Monthly Pure Premiums Trend Jul-07	Stochastic Monthly Pure Premiums Aug-07	Stochastic Monthly Pure Premiums Trend Aug-07
	Stochastic Monthly Pure Premiums May-07	Stochastic Monthly Pure Premiums Jun-07					
100%	\$ 156.95	\$ 160.15	11.44%	\$ 156.24	16.55%	\$ 160.63	16.08%
90%	\$ 154.99	\$ 158.15	3.77%	\$ 154.29	4.44%	\$ 158.62	4.32%
80%	\$ 150.92	\$ 154.00	2.31%	\$ 150.24	2.72%	\$ 154.46	2.65%
70%	\$ 143.08	\$ 146.00	1.30%	\$ 142.44	1.62%	\$ 146.44	1.56%
65%	\$ 136.59	\$ 139.38	0.87%	\$ 135.98	1.10%	\$ 139.80	1.06%
60%	\$ 134.14	\$ 136.88	0.44%	\$ 133.54	0.65%	\$ 137.29	0.59%
55%	\$ 132.79	\$ 135.50	0.21%	\$ 132.20	0.37%	\$ 135.91	0.31%
50%	\$ 132.34	\$ 135.04	0.07%	\$ 131.75	0.18%	\$ 135.45	0.13%
45%	\$ 130.62	\$ 133.29	-0.02%	\$ 130.04	0.08%	\$ 133.69	0.04%

 business rule for trend
 business rule for pmpm's

Stochastic Predictive Model Claim Frequency Distributions-Sample Results

STOCHASTIC ACTUARIAL TOOLSET (STANDARDIZED) - Claim Frequency

Percentile	Current Measurement Date		Stochastic Monthly Claim Count/enc Trend		Stochastic Monthly Claim Count/enc Trend		Stochastic Monthly Claim Count/enc Trend	
	Stochastic Monthly Claim Count/enc May-07	Stochastic Monthly Claim Count/enc Jun-07	Stochastic Monthly Claim Count/enc Trend Jun-07	Stochastic Monthly Claim Count/enc Jul-07	Stochastic Monthly Claim Count/enc Trend Jul-07	Stochastic Monthly Claim Count/enc Aug-07	Stochastic Monthly Claim Count/enc Trend Aug-07	
100%	0.0314	0.0320	11.32%	0.0312	16.39%	0.0321	15.92%	
90%	0.0310	0.0316	3.66%	0.0309	4.31%	0.0317	4.19%	
80%	0.0302	0.0308	2.33%	0.0300	2.75%	0.0309	2.68%	
70%	0.0286	0.0292	1.30%	0.0285	1.62%	0.0293	1.56%	
65%	0.0273	0.0279	0.85%	0.0272	1.08%	0.0280	1.04%	
60%	0.0268	0.0274	0.42%	0.0267	0.63%	0.0275	0.57%	
55%	0.0266	0.0271	0.21%	0.0264	0.37%	0.0272	0.32%	
50%	0.0265	0.0270	0.07%	0.0263	0.19%	0.0271	0.14%	
45%	0.0261	0.0267	-0.02%	0.0260	0.08%	0.0267	0.04%	






business rule for trend
business rule for claim count

Stochastic Predictive Model Claim Severity Analysis – Sample Results

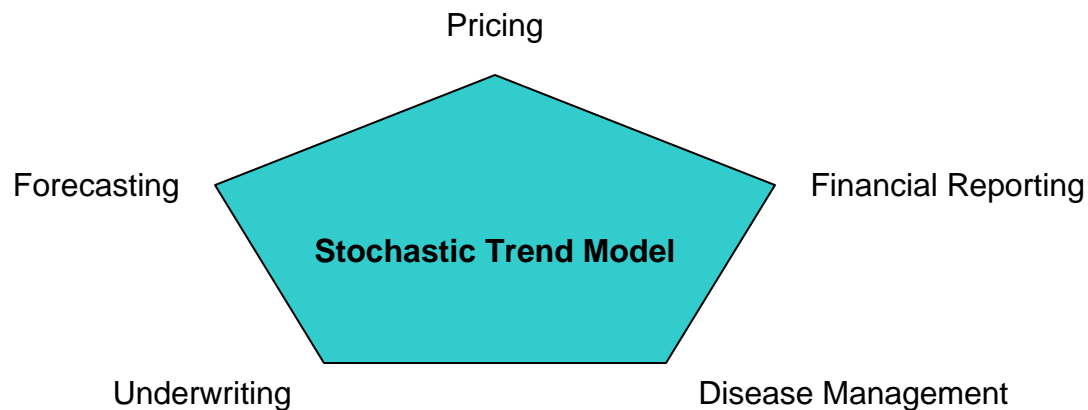
STOCHASTIC ACTUARIAL TOOLSET (STANDARDIZED) - Claim Severity

Percentile	Current Measurement Date		Stochastic Monthly Claim Severity Trend Jun-07	Stochastic Monthly Claim Severity Jul-07	Stochastic Monthly Claim Severity Trend Jul-07	Stochastic Monthly Claim Severity Aug-07	Stochastic Monthly Claim Severity Trend Aug-07
	Stochastic Monthly Claim Severity May-07	Stochastic Monthly Claim Severity Jun-07					
100%	\$ 7,350.00	\$ 7,500.00	10.76%	\$ 7,317.07	15.57%	\$ 7,522.50	15.13%
90%	\$ 6,860.00	\$ 7,000.00	3.58%	\$ 6,829.27	4.22%	\$ 7,021.00	4.11%
80%	\$ 6,076.00	\$ 6,200.00	2.38%	\$ 6,048.78	2.80%	\$ 6,218.60	2.73%
70%	\$ 5,880.00	\$ 6,000.00	1.31%	\$ 5,853.66	1.63%	\$ 6,018.00	1.57%
65%	\$ 5,096.00	\$ 5,200.00	0.82%	\$ 5,073.17	1.04%	\$ 5,215.60	1.00%
60%	\$ 5,047.00	\$ 5,150.00	0.40%	\$ 5,024.39	0.59%	\$ 5,165.45	0.54%
55%	\$ 4,900.00	\$ 5,000.00	0.22%	\$ 4,878.05	0.38%	\$ 5,015.00	0.32%
50%	\$ 4,851.00	\$ 4,950.00	0.07%	\$ 4,829.27	0.20%	\$ 4,964.85	0.15%
45%	\$ 4,826.50	\$ 4,925.00	-0.02%	\$ 4,804.88	0.09%	\$ 4,939.78	0.04%

 business rule for trend
 business rule for claim count



Stochastic Trend Model Provides Common Trend Percentile Distribution Reports to Insurance Departments that Simplify and Integrate Functions



Common tool/framework to address trend modeling and reporting that serves various departments

Valuation – pure premium trend for reserve development purposes

Pricing – as starting point in development of pricing trends

Forecasting – as starting point on same basis as pricing and valuation for forecast development

Underwriting – as basis for renewal trend pricing component

Disease/Medical Management – as basis to measure impact of interventions or preventative policies



Background and Preview of Coming Graphs

Background

This presentation is from the healthcare insurer/HMO viewpoint with respect to trend modeling business requirements and reporting.

We'll focus at the line of business level, specifically underwritten Group – PPO.

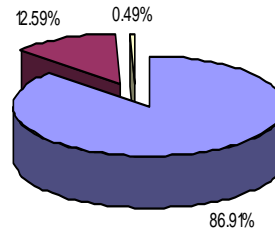
Trend report and graphs is based on incurred and paid data through December 2006.

Trend Graphs and Trend Driver Contribution

- Aggregate Pure Premium (PMPM) Trend at Selected Percentiles
- Trend Driver Contribution Weight
- PMPM Trend by Type of Service at Selected Percentiles for
 - Hospital Inpatient
 - Hospital Outpatient
 - Professional
 - Pharmacy
- Trend Driver Components: Claim Frequency and Claim Severity at Selected Percentiles for
 - Hospital Inpatient
 - Hospital Outpatient
 - Professional
 - Pharmacy

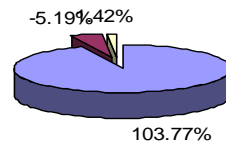
Trend Driver Contribution at Selected Percentiles

Trend Components for PMPM @ 50th Percentile of \$145 and PMPM Trend of 10.73%



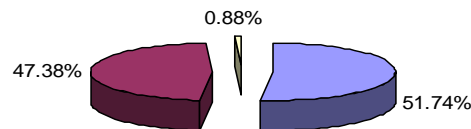
- Claim Frequency Trend@50%
- Claim Severity Trend@50%
- Other@50%

Upper Bound Trend Components @60th Percentile with PMPM of \$ 150 and PMPM Trend of 12.24%



- Claim Frequency Trend@60%
- Claim Severity Trend@60%
- Other@60%

Lower Bound Trend Components @40th Percentile with PMPM of \$ 140 and PMPM Trend of 9.19%



- Claim Frequency Trend@40%
- Claim Severity Trend@40%
- Other@40%

Main point:

Measured relative to 50th percentile, the probability interval from [40%, 60%] is associated with a pure pmpm trend range of [9.19%, 12.24%]. Additionally, trend driver contributions are reported.

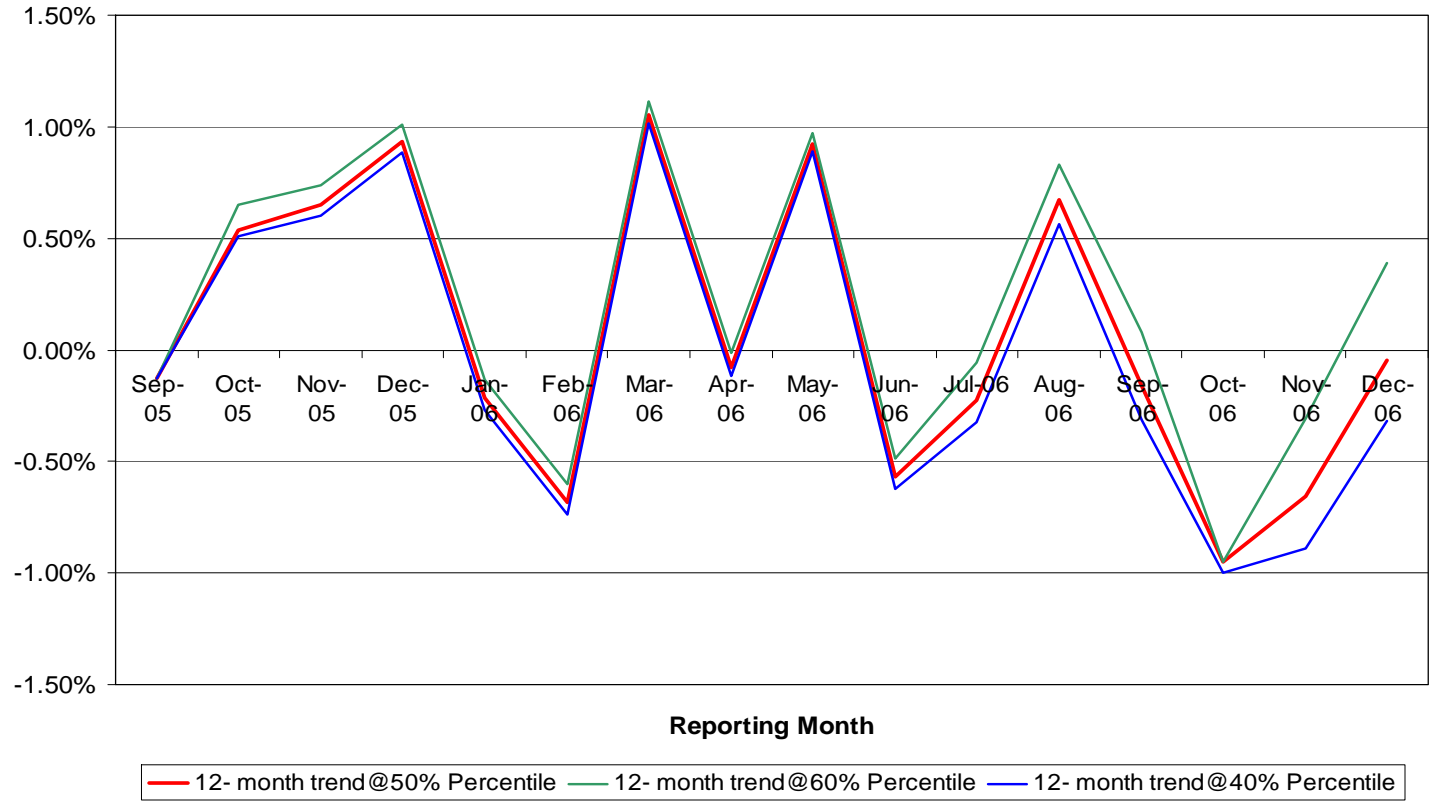


Pure PMPM Trends by Type of Service with Upper and Lower Percentile Boundaries

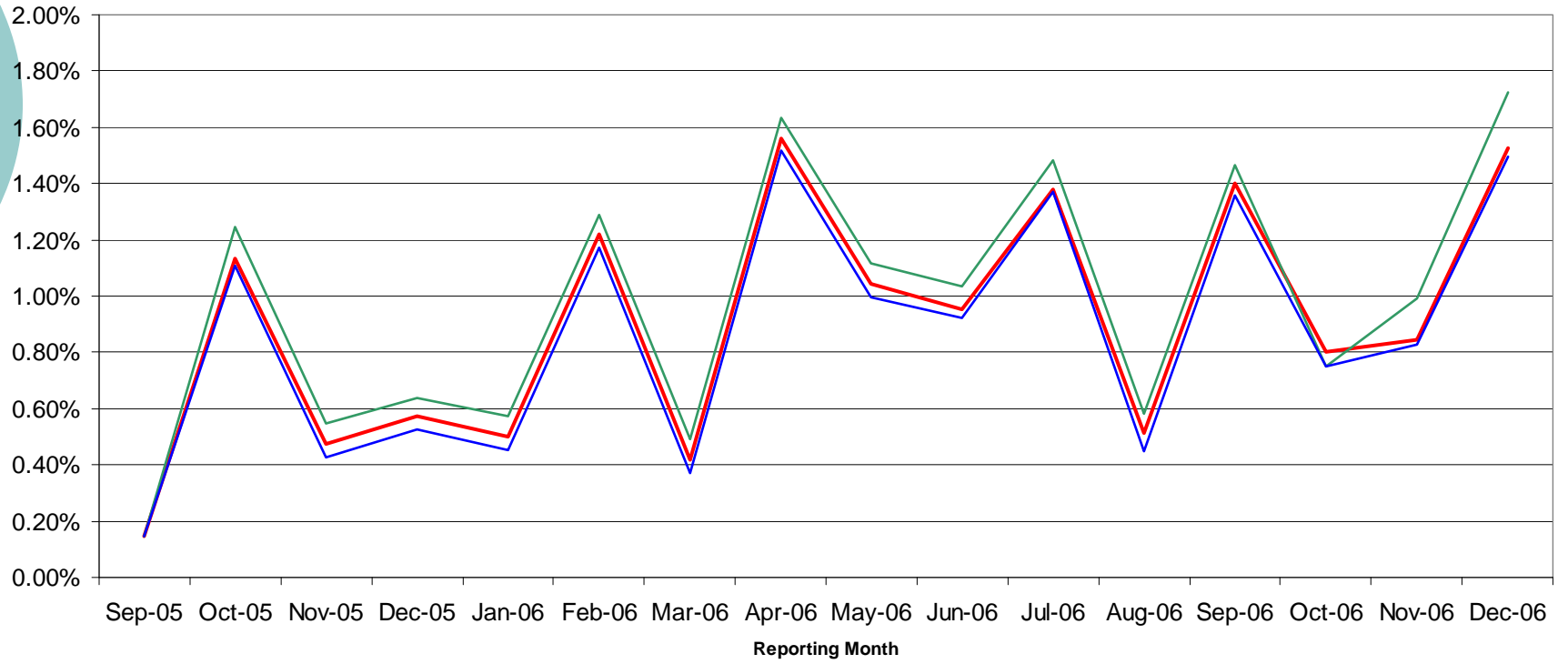
- Hospital Inpatient
- Hospital Outpatient
- Professional
- Pharmacy



Hospital Inpatient Pure Premium Trend at Selected Percentiles



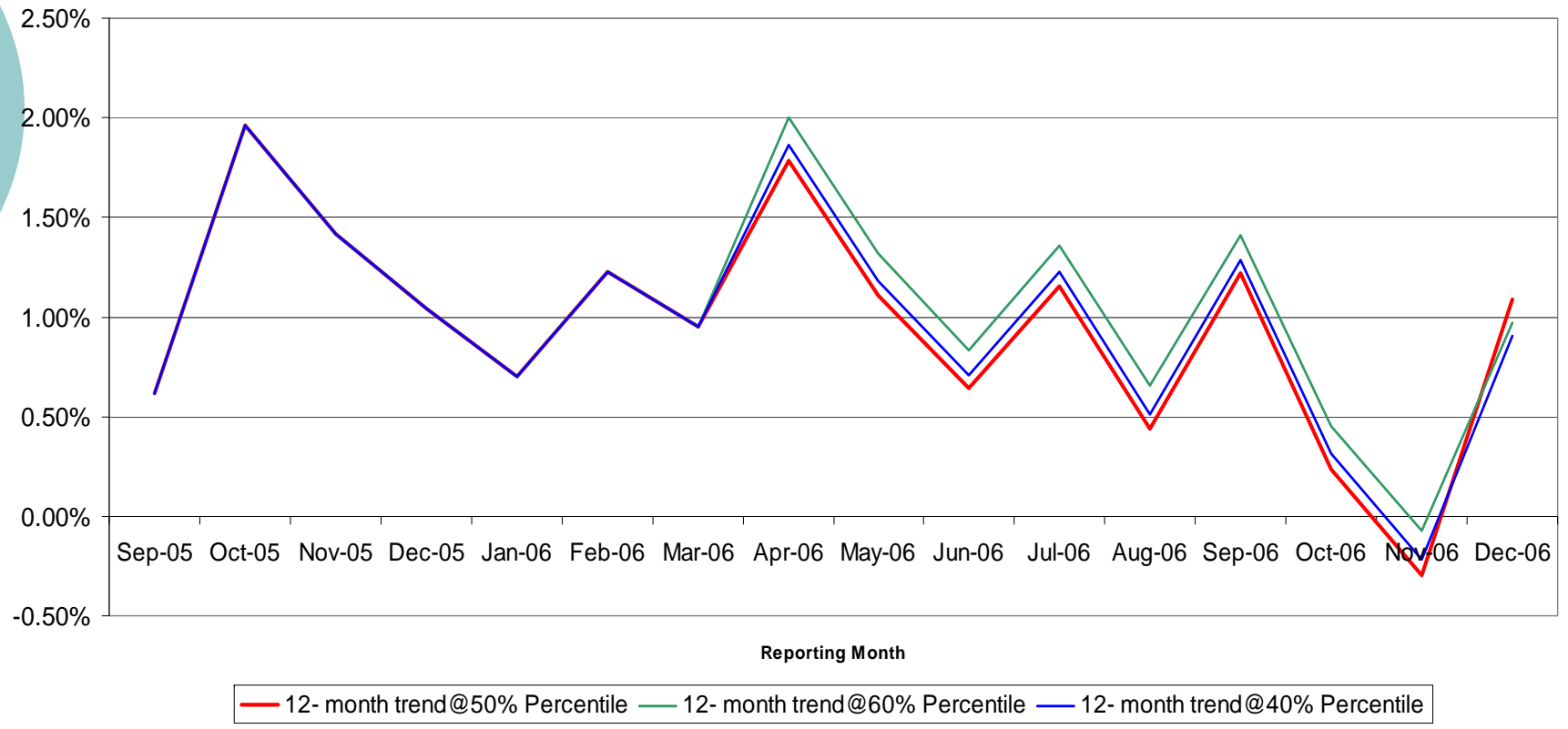
Hospital Outpatient Pure Premium Trend at Selected Percentiles



— 12- month trend@50% Percentile — 12- month trend@60% Percentile — 12- month trend@40% Percentile

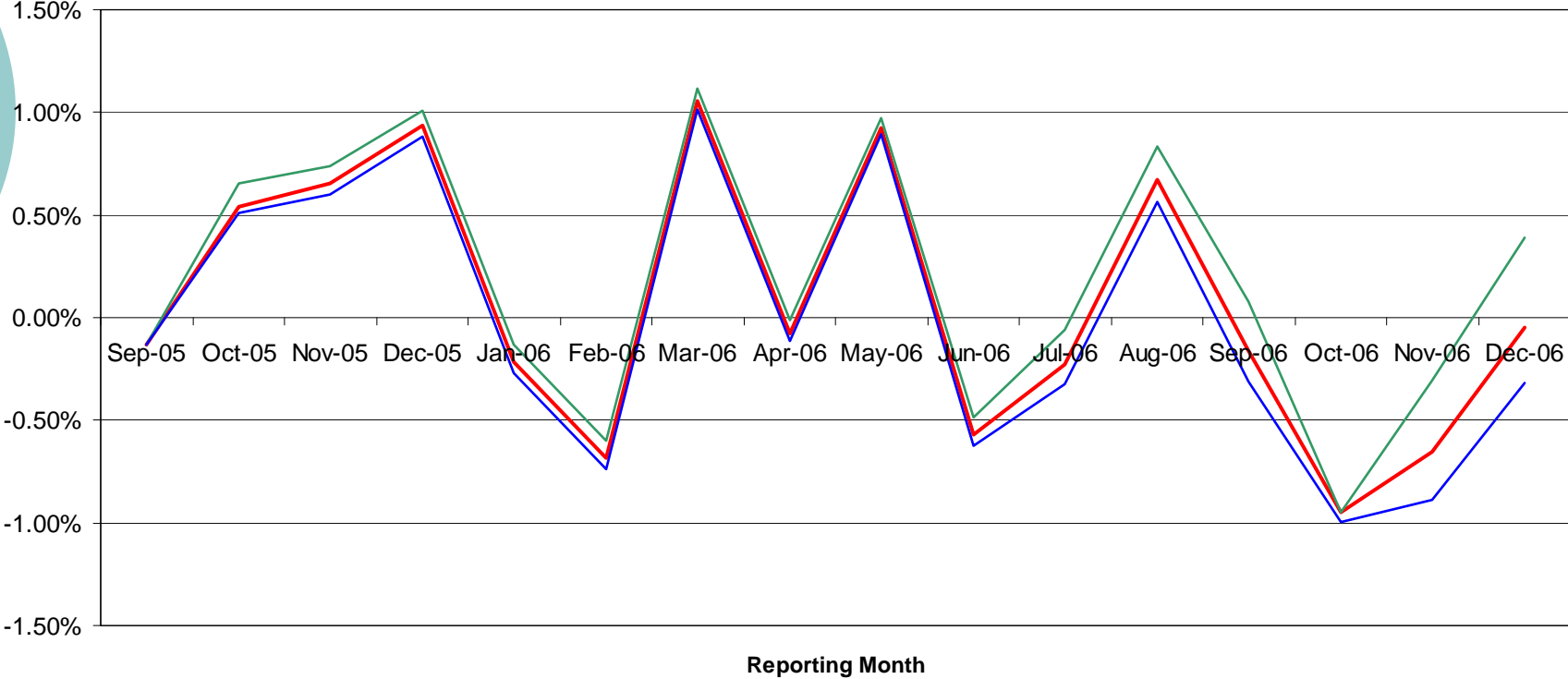


Professional Pure Premium Trend at Selected Percentiles

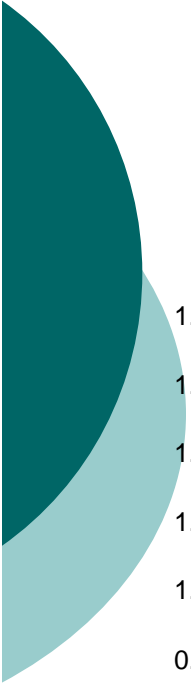




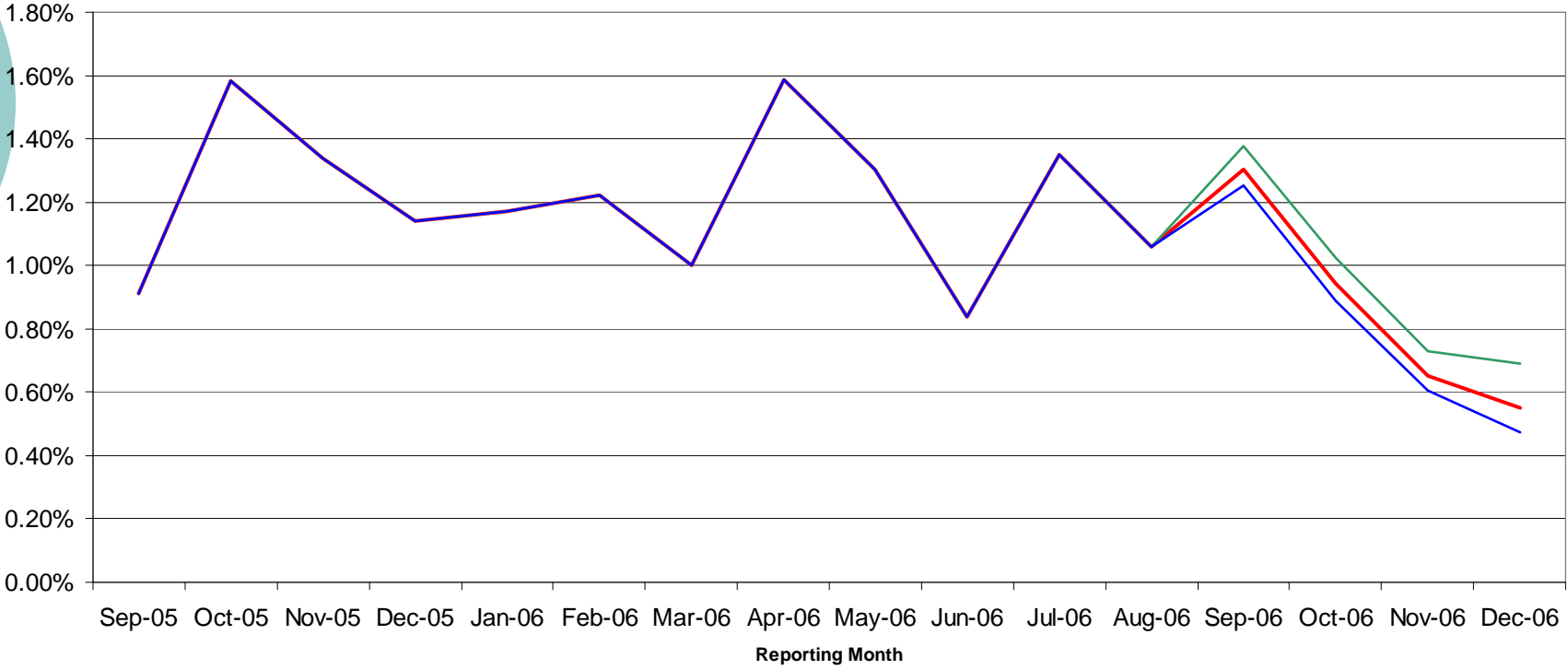
Hospital Inpatient Pure Premium Trend at Selected Percentiles



— 12- month trend@50% Percentile — 12- month trend@60% Percentile — 12- month trend@40% Percentile



Pharmacy Pure Premium Trend at Selected Percentiles



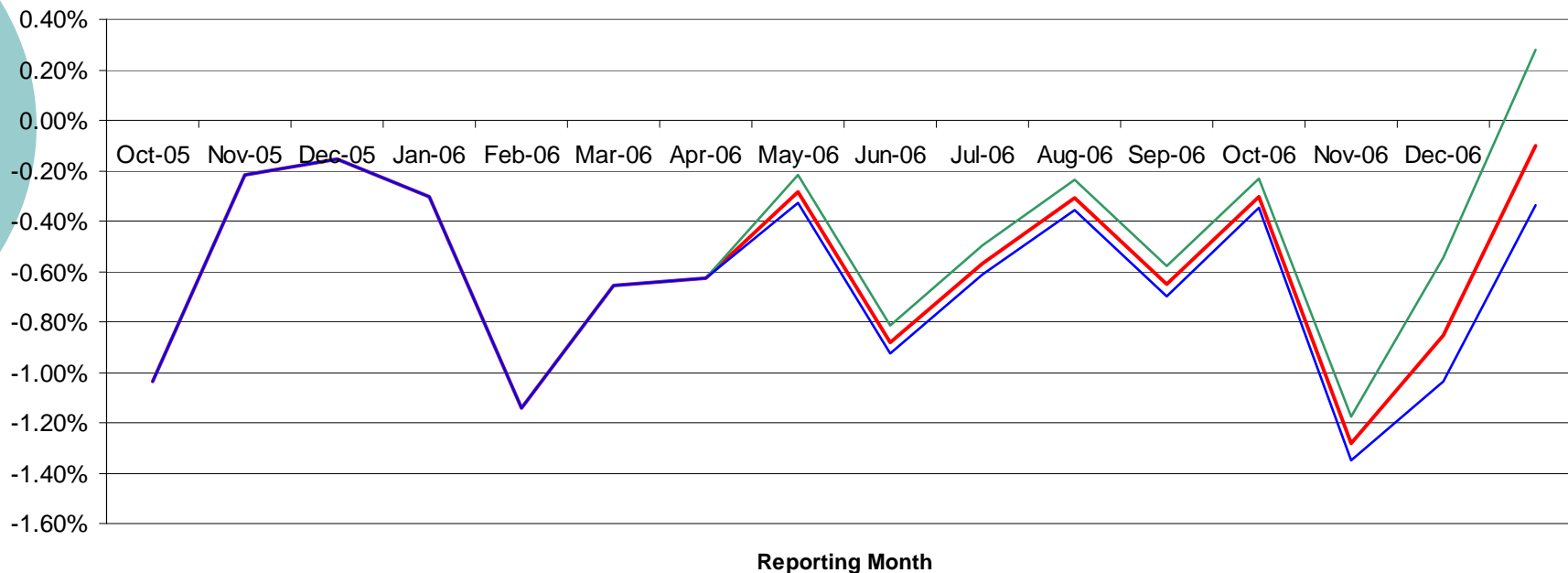
12-month trend@50% Percentile 12-month trend@60% Percentile 12-month trend@40% Percentile



Claim Frequency Trends by Type of Service with Upper and Lower Percentile Boundaries

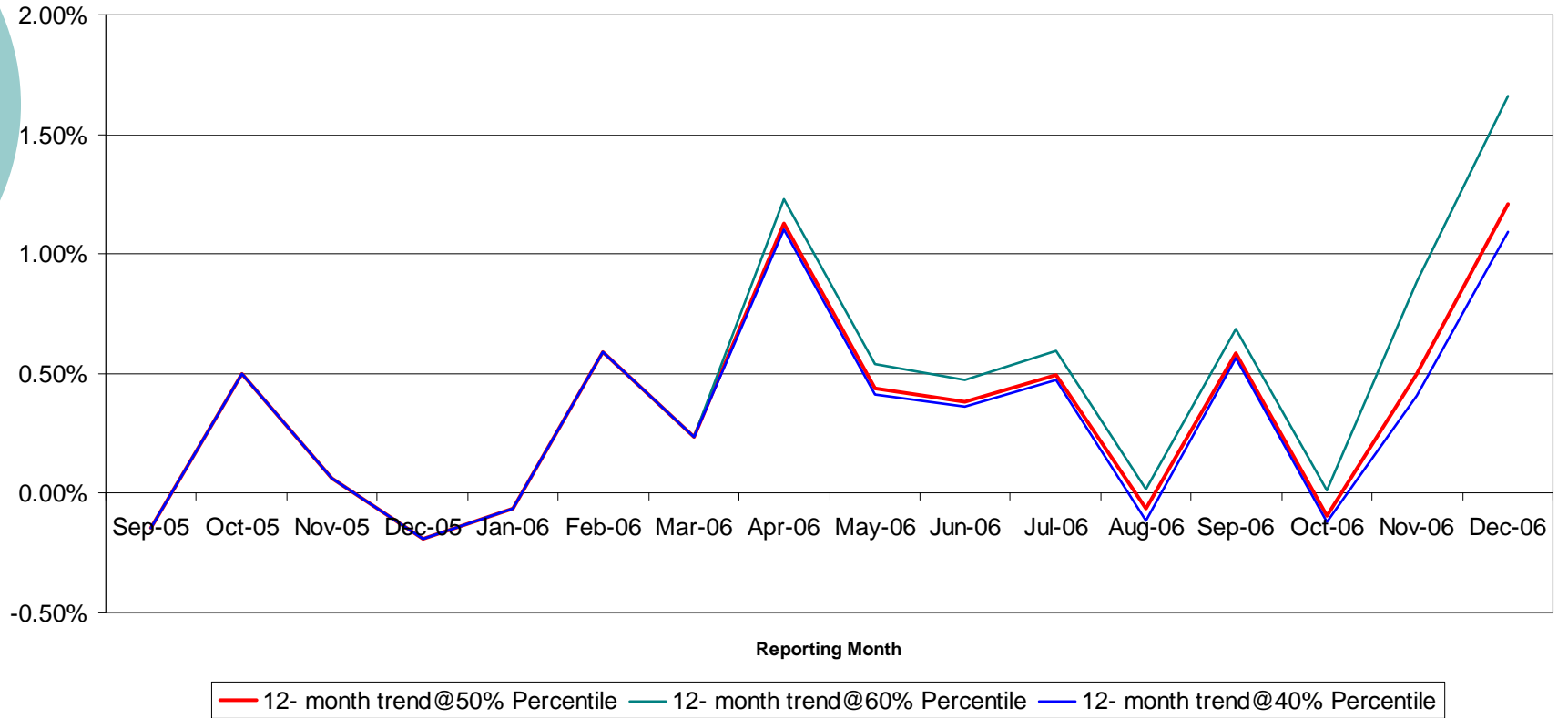
- Hospital Inpatient
- Hospital Outpatient
- Professional
- Pharmacy

Hospital Inpatient Claim Frequency Trend at Selected Percentiles



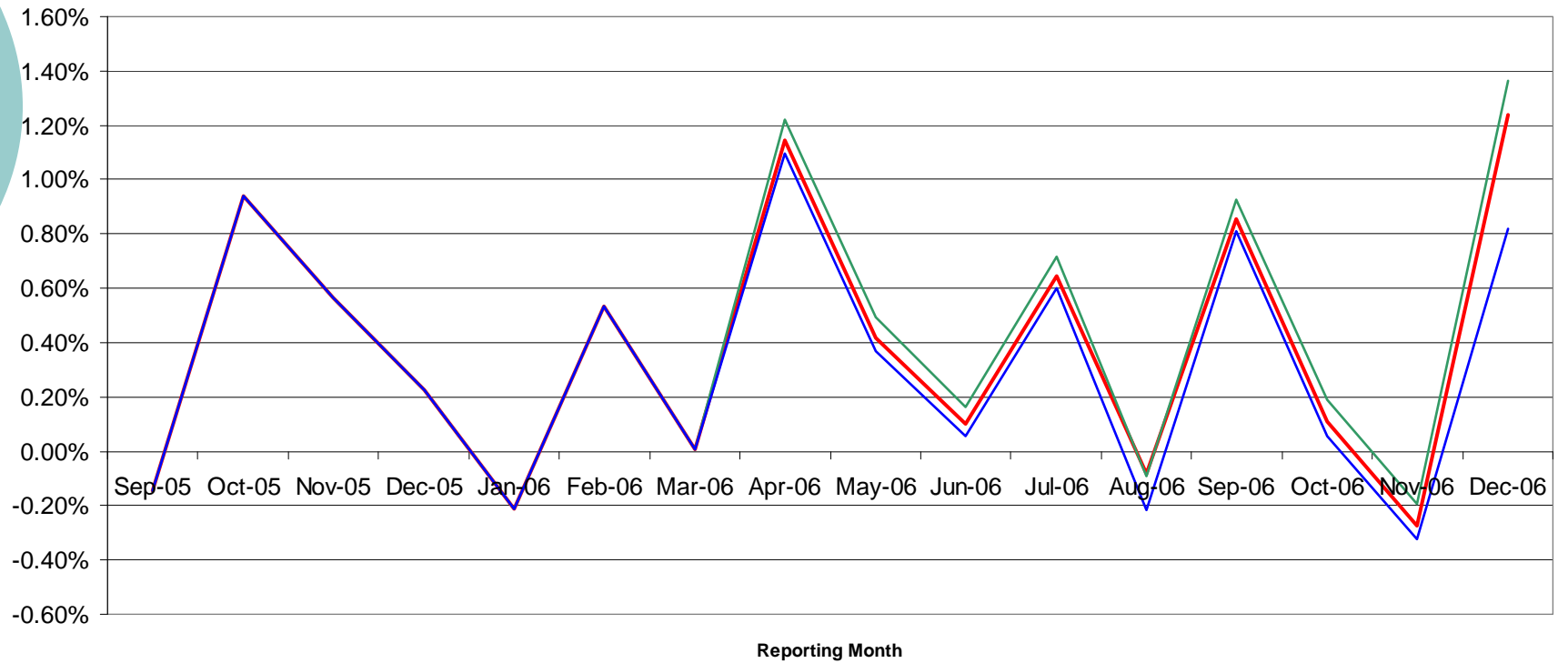


Hospital Outpatient Claim Frequency Trend at Selected Percentiles





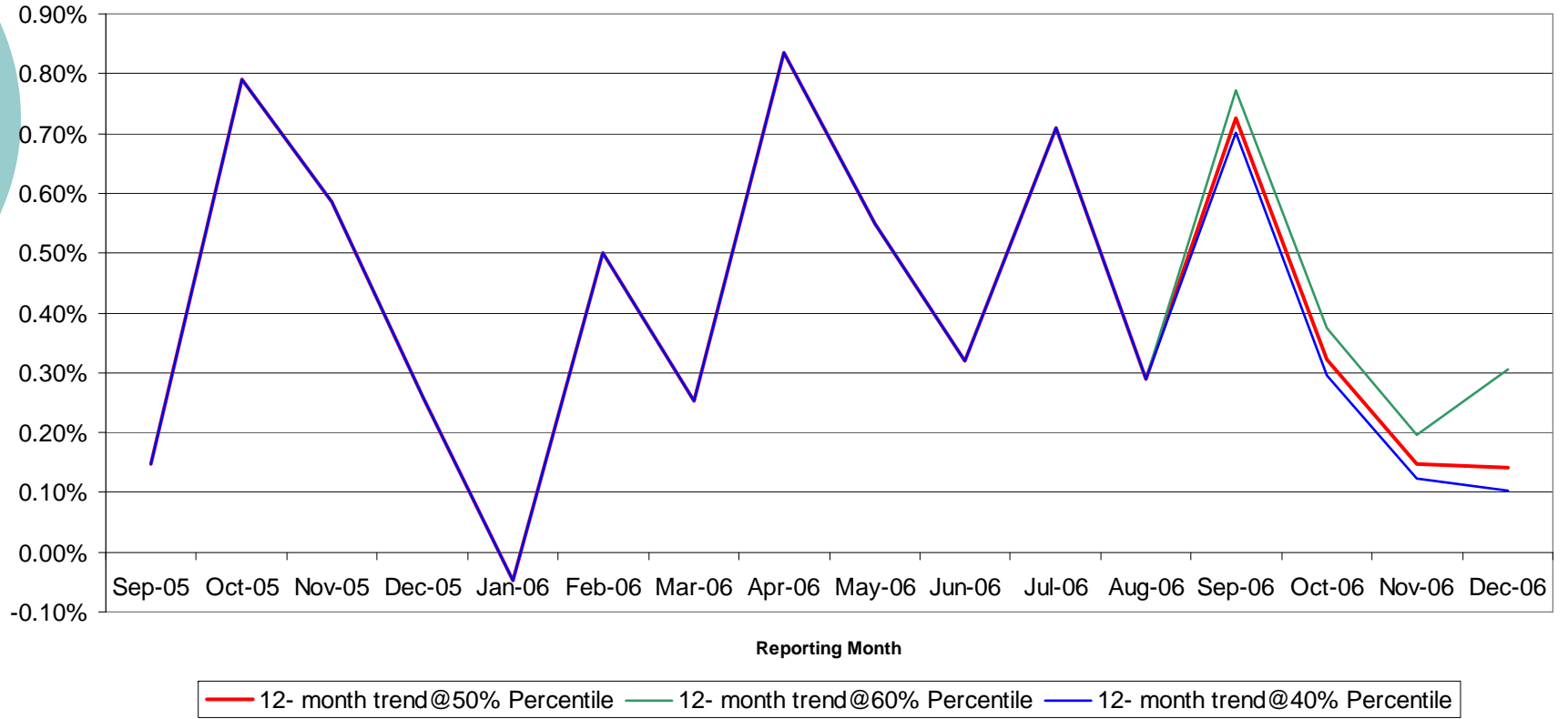
Professional Claim Frequency Trend at Selected Percentiles



— 12- month trend@50% Percentile — 12- month trend@60% Percentile — 12- month trend@40% Percentile



Pharmacy Claim Frequency Trend at Selected Percentiles



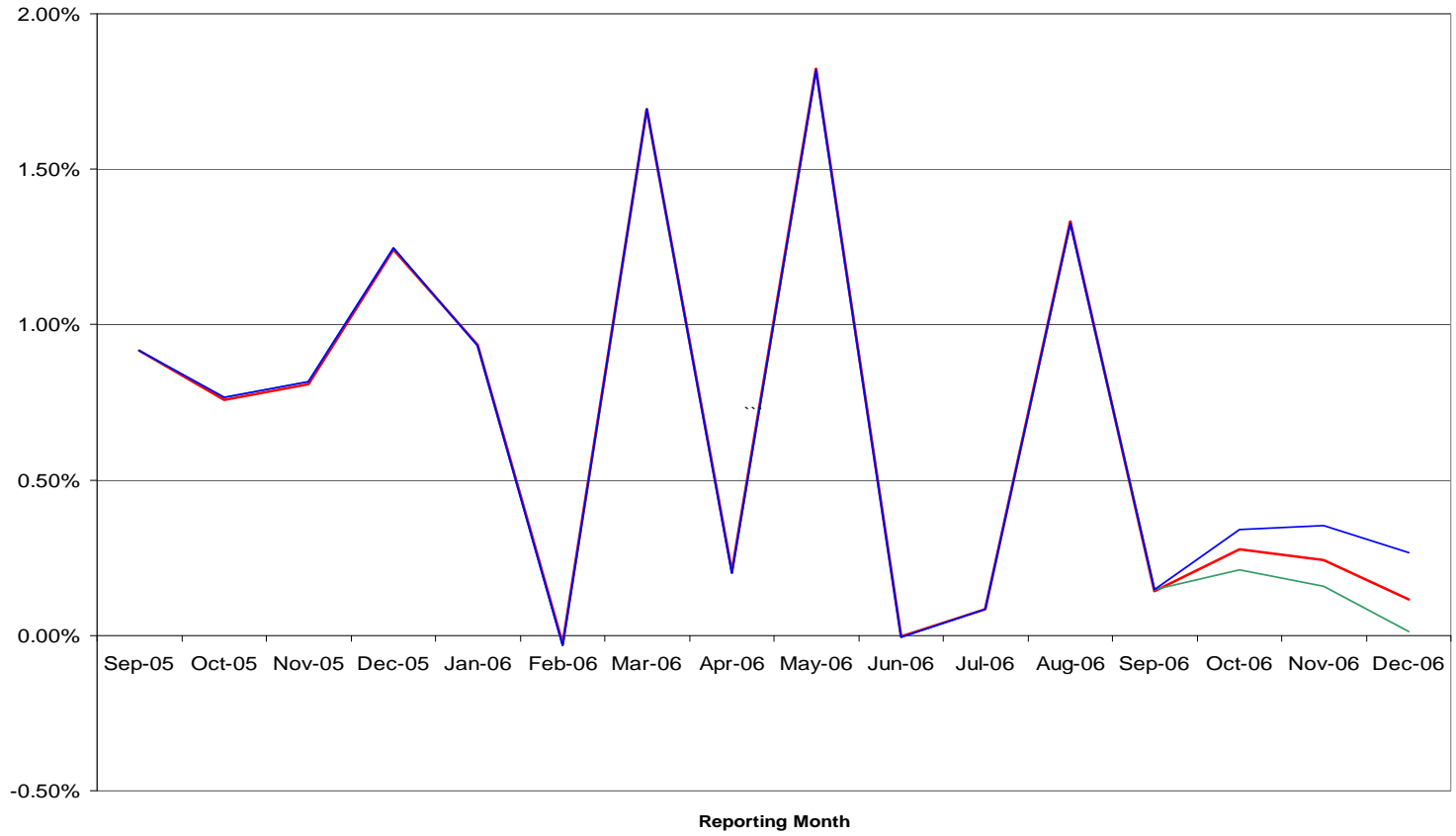


Claim Severity Trends by Type of Service with Upper and Lower Percentile Boundaries

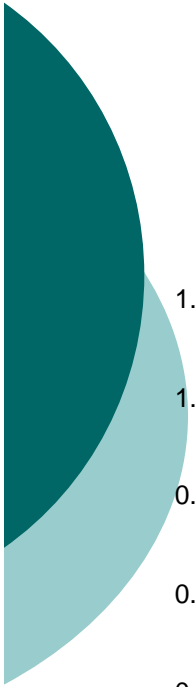
- Hospital Inpatient
- Hospital Outpatient
- Professional
- Pharmacy



Hospital Inpatient Severity Trend st Selected Percentiles



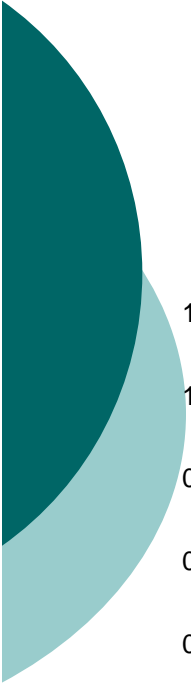
— 12- month trend@50% Percentile — 12- month trend@60% Percentile — 12- month trend@40% Percentile



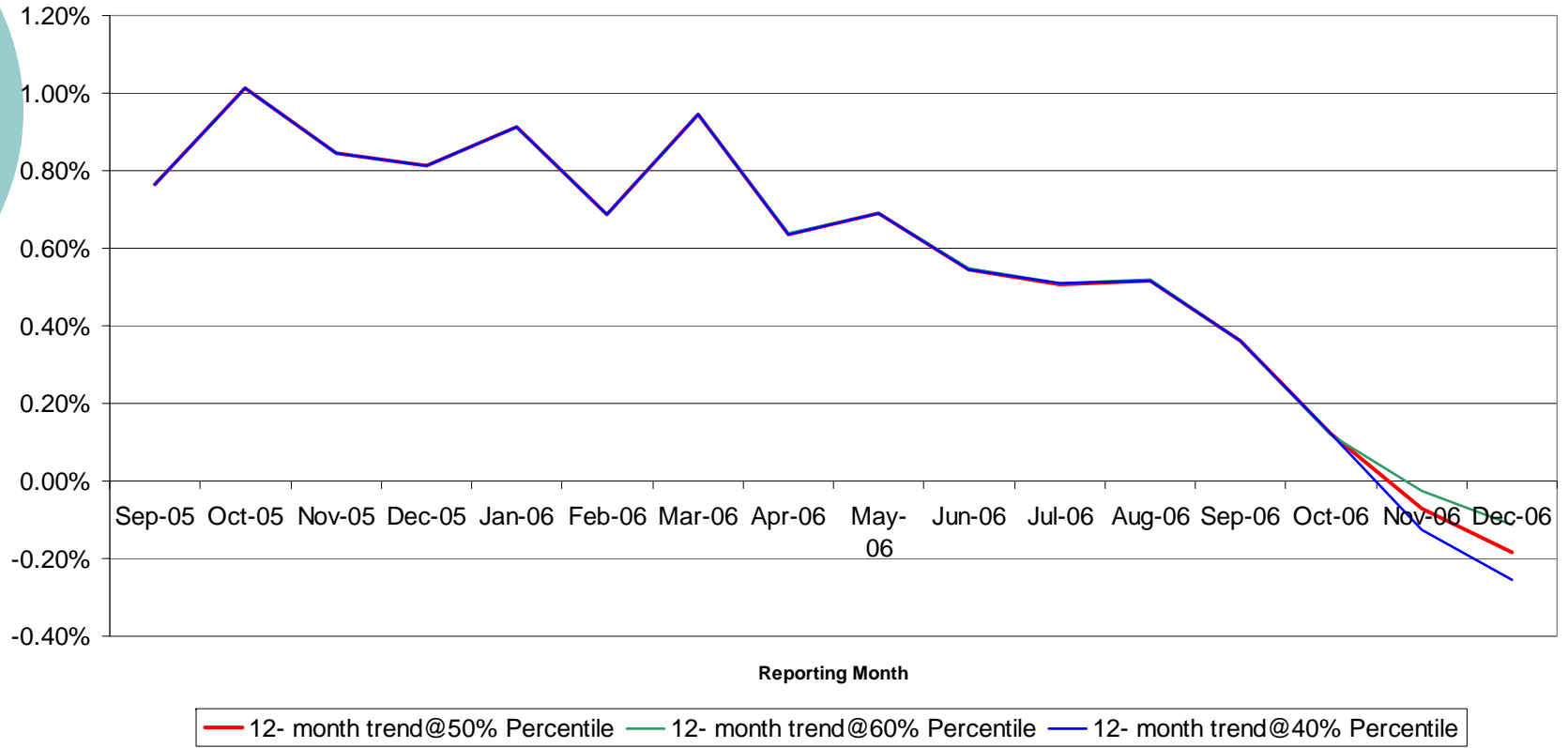
Hospital Outpatient Claim Severity Trend at Selected Percentiles

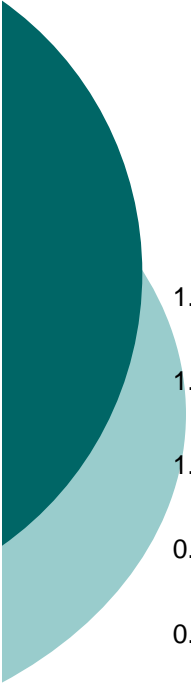


— 12- month trend@50% Percentile — 12- month trend@60% Percentile — 12- month trend@40% Percentile

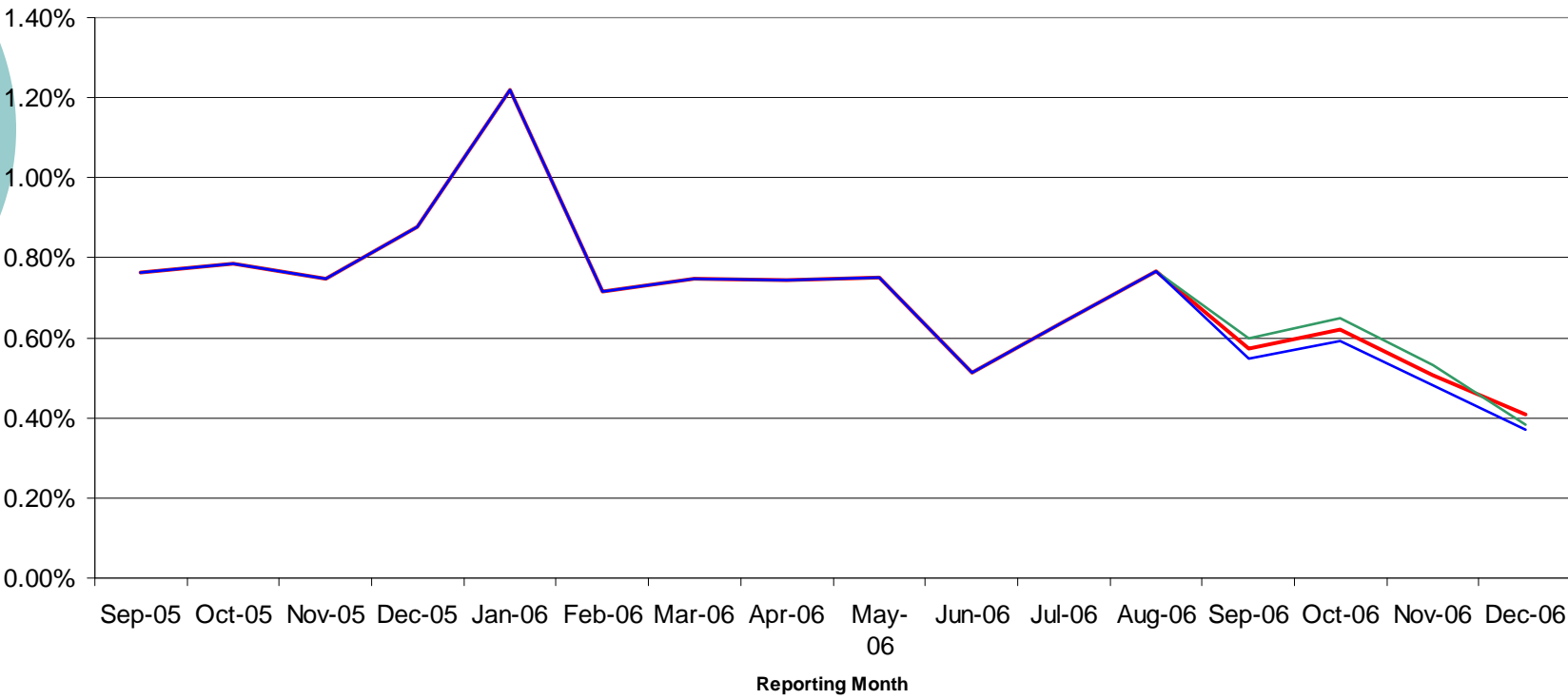


Professional Claim Severity Trend at Selected Percentiles





Pharmacy Claim Severity Trend at Selected Percentiles



— 12- month trend@50% Percentile — 12- month trend@60% Percentile — 12- month trend@40% Percentile



Take Home Message

- Stochastic trend modeling and reporting solution is a reality
- Provides accurate, consistent, timely and standardized trend information for use by insurer/HMO departments – resulting starting trends are mathematically derived
- Business rules specify desired percentiles corresponding to business risk
- Pure PMPM or allowed PMPM trend reports with associated probabilities provide common “backbone” framework as starting point for pricing, financial reporting, forecasting, underwriting and disease management/trend.
- Error detection and mitigation is earliest possible