sbäctuaries

CLOSING THE FINANCIAL GAP IN COLOMBIA'S HEALTH SECTOR.

New methodology for calculating UPC.

ESdRAS Project.

ESdRAS Project | Strategic Partners

La salud es de todos
Minsalud

United Healthcare

sbä

ANIF Centro de Estudios Económicos

About the speakers

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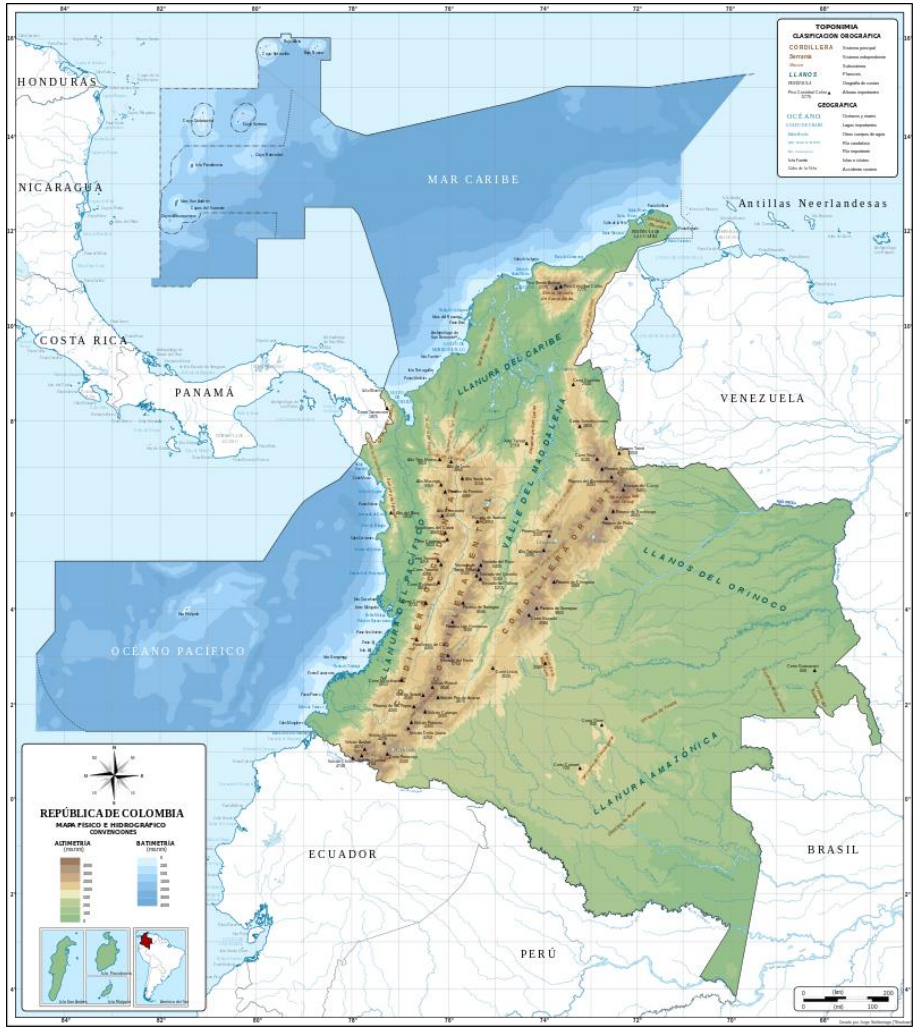
- Adjunct Professor, Dept. of Statistics & Applied Probability, University of California Santa Barbara.
- B.Phil (Balliol College, Oxford) PhD (Heriot-Watt University, Edinburgh)
- Health Actuary (40 years)/Consulting Actuary (30 years)
- Author, "*Healthcare Risk Adjustment and Predictive Modeling*" (2nd ed.) (Actex Publications) and "*Managing and Evaluating Healthcare Intervention Programs*" (2nd ed.) (Actex Publications)
- President, Santa Barbara Actuaries Inc. and Nvoyance LLC.

Juan Diego Mejia Becerra MS

- PhD candidate in the Dept. of Statistics & Applied Probability at the University of California Santa Barbara and an intern at Santa Barbara Actuaries Inc.
- Masters degree from National University, Colombia.

- Context.
- Problem Description.
- Contributions.

ESdRAS Project | Context



- Unitary Presidential Constitutional Republic.
- Population: 50M.
- GDP: $828B (31st, PPP), $343 (38th, Nominal),
- High Gini .
- High HDI.
- Member of: UN, WTO, OECD, OAS, Andean Community.

- Healthcare is a right.
- Two regimes: Contributory/Subsidized.
- All affiliates have a choice of insurer (EPS).
- Formal employees contribute x% of pay.

SGSSS (97.01%)

- Contributory (44.9%).
- Subsidized (47.7%).
- Other Regimes (4.41%).

Publicly Funded

- 68% of the healthcare expenditure.
- 4.9% GDP; uncontrolled budget.

Insurers

- *Entidades Promotoras de Salud (EPSs).*
- Age/Sex and Territory Prospective Risk-adjustment System.

Benefits Plan

- PBS Services.
- Non-PBS Services (a.k.a. *Recobros*).

Statutory Law of 2015

Law 1955 of 2019

ESdRAS Project 2020 - 2021

PBS Services Risk-adjustment System

Territory Type	Differential (Cost Structure)
Cities	1.0986
Areas difficult to access	1.1000
San Andrés, Providencia and Santa Catalina	1.3790
Other territories	1.0000

Age/Sex	Differential (Cost Structure)
People less than one year	2.9679
People between 1 to 4 years old	0.9530
People between 5 to 14 years old	0.3329
Women between 15 to 18 years old	0.5014
Men between 15 to 18 years old	0.3173
Women between 19 to 44 years old	1.0475
Men between 19 to 44 years old	0.5646
People between 45 to 49 years old	1.0361
People between 50 to 54 years old	1.3215
People between 55 to 59 years old	1.6154
People between 60 to 64 years old	2.0790
People between 65 to 69 years old	2.5861
People between 70 to 74 years old	3.1033
People older than 75	3.8997

Base Rate 2021:

- $938,826 COP/year (CR).
- $872,946 COP/year (SR).

ESdRAS Project | Problem Description

Non-PBS Distribution System

- Implemented in 2020.
- Involves IBNR Calculations.
- Distribution incorporates historical Patterns.

Specific payments

Add point here about how Colombian system is a mix of prospective risk-adjustment and retrospective specific reimbursements.

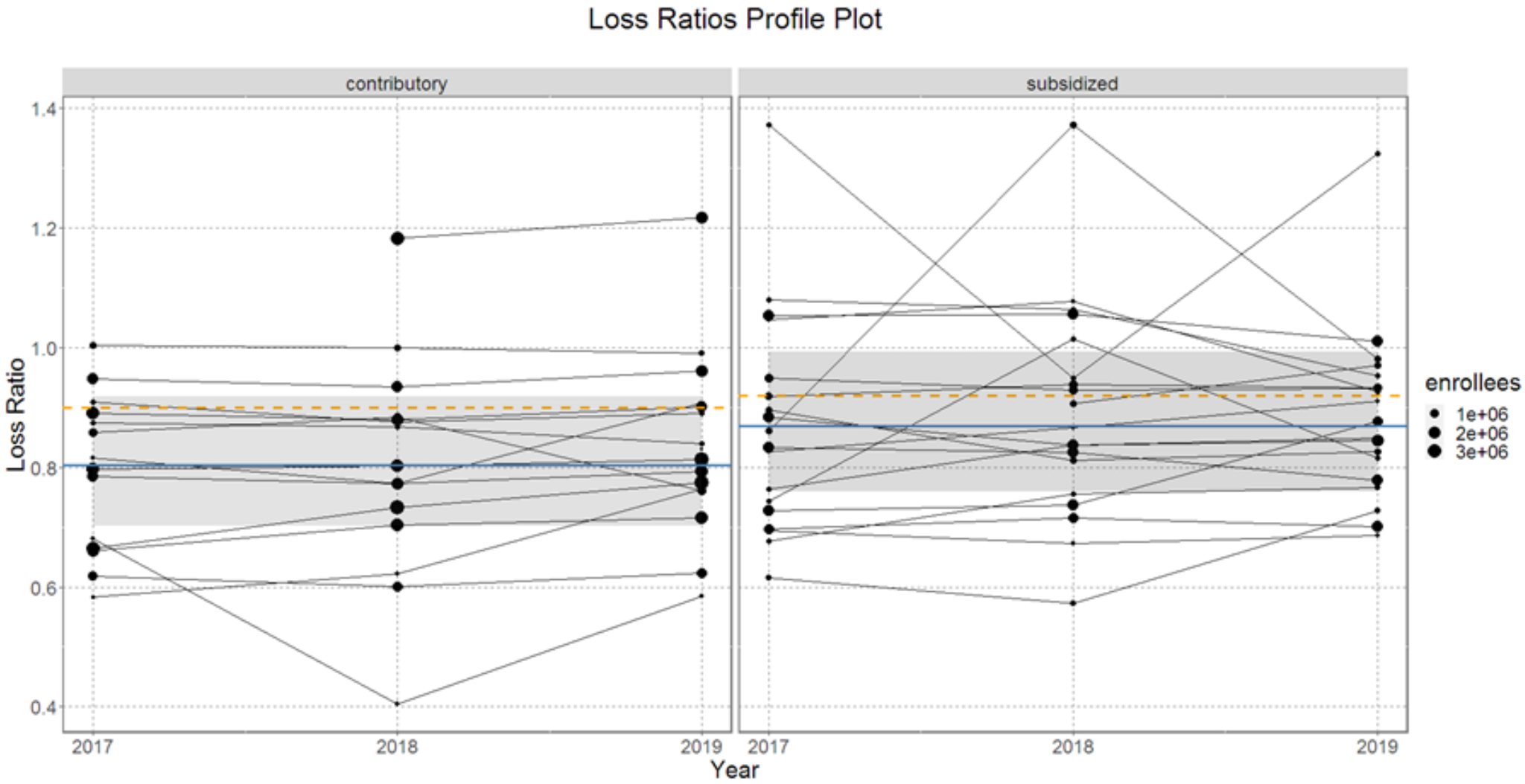
Further Adjustments

- Agreement 026 of 2011,
- High-Cost Fund (*Cuenta de Alto Costo*).
- Reimbursement for cost of certain conditions (HIV; some cancers; Hemophilia)

ESdRAS Project | Contributions

- Evaluate the current system (budget projections; payment accuracy).
- Recommendations for enhancement:
  - Budget projection methodology.
  - Condition-based risk adjustment system.
  - Quality management program.
  - Fraud and abuse monitoring system, and
  - Mitigation of insurers' risk.

ESdRAS Project | Evaluation of the Current System



ESdRAS Project | Budget Projection

Regime	Year	N	Total Claims	Premium	Regime Loss Ratio	Mean Loss Ratio	S.D. Loss Ratio
contributory	2017	14	$ 13,008,406,653.36	$ 16,822,806,639.80	77.33%	79.19%	13.12%
contributory	2018	15	$ 17,962,337,631.46	$ 21,598,226,971.63	83.17%	80.23%	18.33%
contributory	2019	16	$ 19,537,803,618.18	$ 23,317,712,631.74	83.79%	83.54%	14.98%
subsidized	2017	18	$ 7,866,965,239.70	$ 9,315,355,530.43	84.45%	86.87%	18.53%
subsidized	2018	19	$ 10,813,723,593.28	$ 12,562,188,859.00	86.08%	89.14%	18.00%
subsidized	2019	19	$ 12,957,637,135.77	$ 15,026,303,917.70	86.23%	88.49%	14.37%

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Steps Followed:

- Data Collection,
- Development of Dx Categories,
- Feature Extraction,
- Calibration of the Model, and
- Accuracy Testing.

ESdRAS Project | Risk Adjustment Model

Projected costs:

- Regression model based on demographics and condition categories.

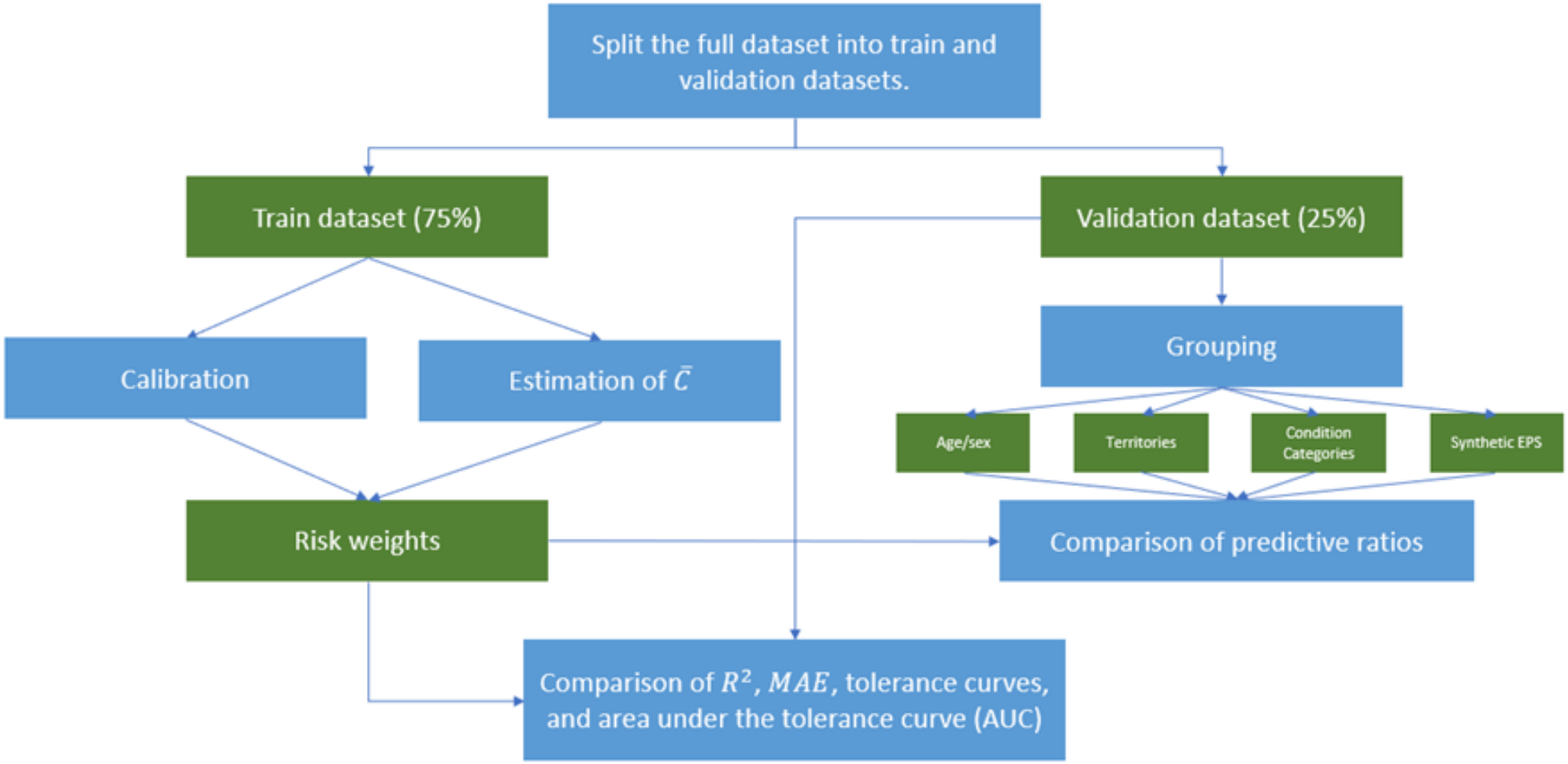
Condition Categories

- SBA mapping of WHO ICD-10 codes.

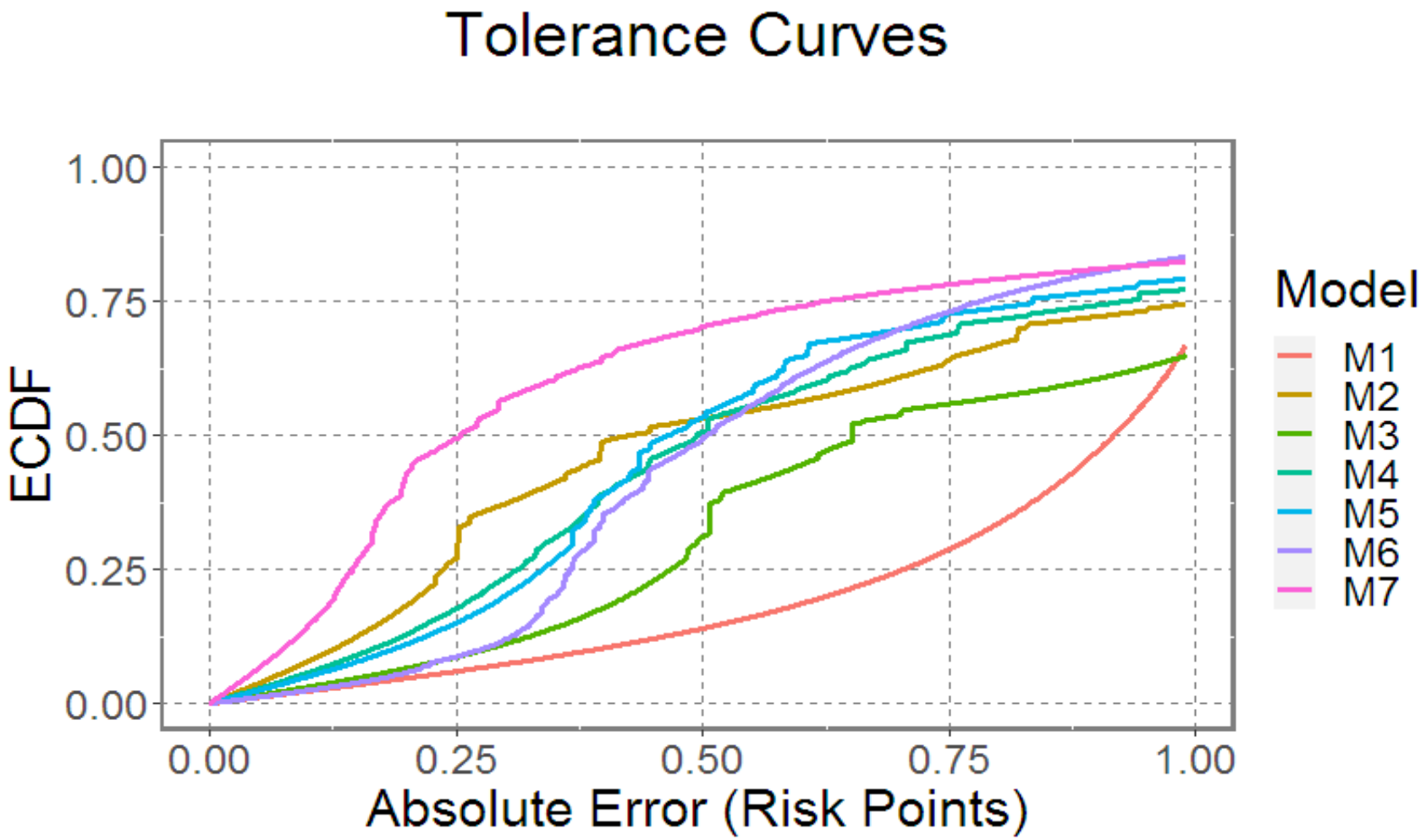
ESdRAS Project | Risk Adjustment Model: testing

Model	Description
M1	Assigns a risk score of 1.0 to all the individuals.
M2	Current Colombian risk-adjustment system, adding recoveries (non-PBS) costs in an individual fashion.
M3	Current Colombian risk-adjustment system, adding the mean of the recoveries.
M4	Age, sex, territory model (see appendix D) calibrated on a 75% training sample of the full experience year dataset.
M5	Age, sex, territory, and the following conditions: Diabetes, hypertension, CKD, HIV, cancers, and coagulation and hemorrhagic disorders (see appendix E).
M6	Condition-based risk-adjustment model calibrated setting c at the 0.975 percentile.
M7	Developed condition-based risk-adjustment model presented in the previous subsections.

ESdRAS Project | Risk Adjustment Model



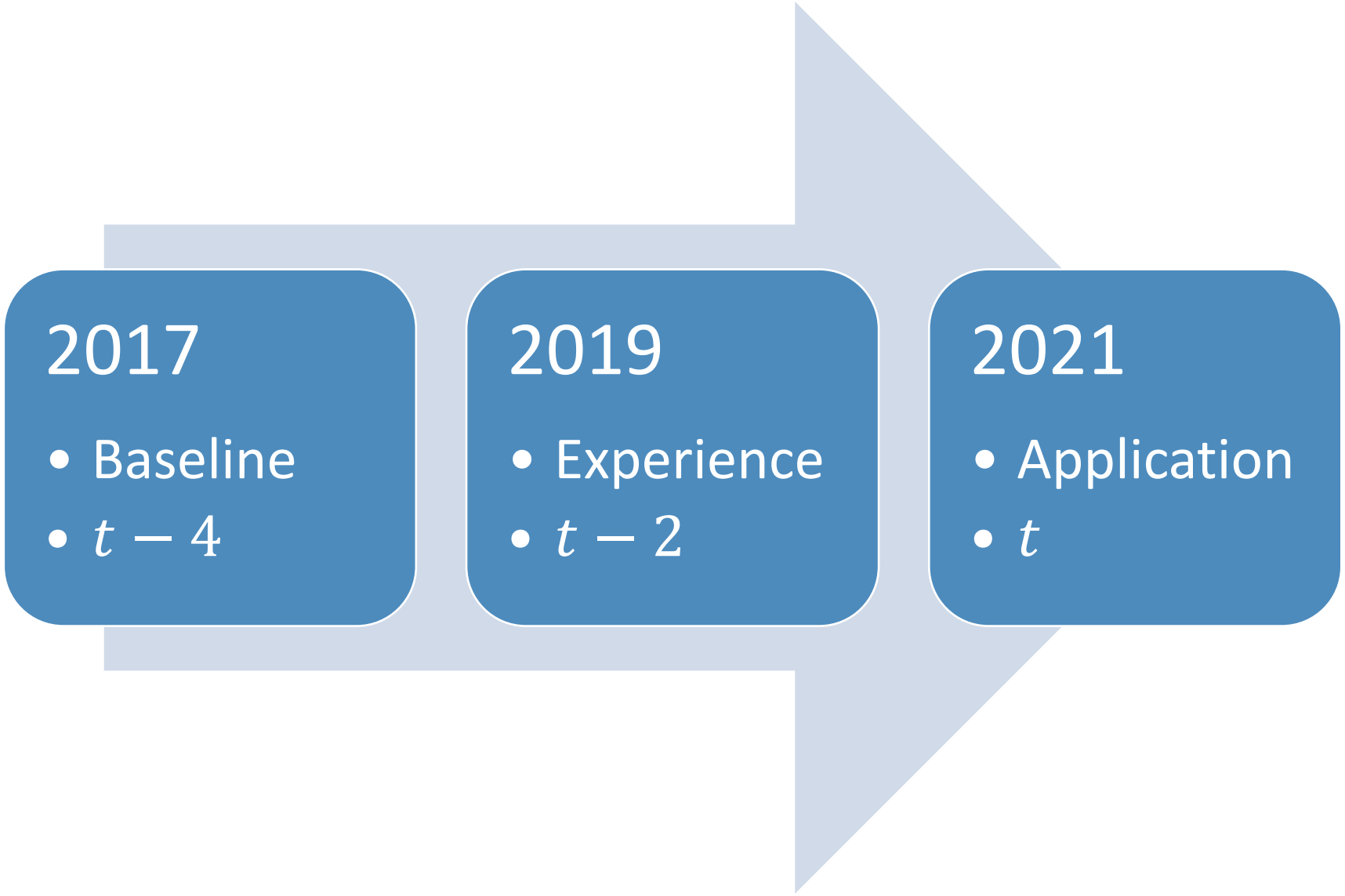
ESdRAS Project | Risk Adjustment Model



ESdRAS Project | Risk Adjustment Model

Model	R^2	MAE	AUC (1.0 Cutoff)	AUC (3.0 Cutoff)
M1	0.00%	1.38	19.51%	69.24%
M2	71.22%	1.01	45.93%	74.83%
M3	0.82%	1.38	32.06%	68.50%
M4	0.91%	1.22	44.19%	74.27%
M5	4.35%	1.19	45.34%	75.17%
M6	4.92%	1.09	43.28%	76.73%
M7	8.62%	1.02	60.03%	79.99%

ESdRAS Project | Budget Projection Methodology



$$1)\ \hat{B}^{(reg)}{}_t = \widehat{MM}^{(reg)}{}_t \times \hat{\bar{C}}^{(reg)}{}_t,$$

$$2)\ \hat{\bar{C}}^{(reg)}{}_t = \hat{\bar{C}}^{(reg)}{}_{t-2} \times \left(1 + r^{(reg)}\right) \times (1 + f) \times (1 + \tau),$$

$$3)\ \hat{\bar{C}}^{(reg)}{}_{t-2} = \hat{\bar{C}}^{(PBS,\,reg)}{}_{t-2} + \hat{\bar{C}}^{(No\ PBS)}{}_{t-2},$$

$$4)\ \hat{\bar{C}}^{(PBS,\,reg)}{}_{t-2} = \frac{Developed\ PBS\ Costs\ for\ the\ Experience\ Period}{\widetilde{MM}^{(reg)}{}_{t-2}},$$

$$5)\ \hat{\bar{C}}^{(No\ PBS)}{}_{t-2} = \frac{\sum_{i \in GR} C_i \times P_i}{\widehat{MM}_{t-2}}.$$

ESdRAS Project | Budget Projection Methodology

Member Months Estimation for the Application Period

$$\hat{B}^{(reg)}{}_t = \widehat{MM}^{(reg)}{}_t \times \hat{\bar{C}}^{(reg)}{}_t,$$

Budget for the Application Period

Estimated PMPM for the Application Period

ESdRAS Project | Budget Projection Methodology

Estimated PMPM for the Experience Year

Relative Increment in the frequency usage

$$\widehat{\bar{C}}^{(reg)}{}_t = \hat{\bar{C}}^{(reg)}{}_{t-2} \times \left(1 + r^{(reg)}\right) \times (1 + f) \times (1 + \tau),$$

Estimated PMPM for the Application Period

Relative Increment in the Risk-Score

Economic Inflation Trending Factor

ESdRAS Project | Budget Projection Methodology

$$\hat{\bar{C}}^{(reg)}{}_{t-2} = \hat{\bar{C}}^{(PBS,reg)}{}_{t-2} + \hat{\bar{C}}^{(Non-PBS)}{}_{t-2}$$

ESdRAS Project | Contributions

- Evaluation of the current system,
- Enhancement of the budget projection techniques accounting for both PBS and non-PBS services,
- Development of a condition based risk-adjustment system that enhances the accuracy of the existing one.

ESdRAS Project | Contributions

- Recommendations on a quality management program, fraud and abuse monitoring recommendations, and addressing EPSs risk.

Ajuste de Riesgos | Contactos

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