
Casualty Actuarial Society
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II-5: Understanding the Benefits and Quantifying the Success of a New Rating Plan

Germain Denoncourt, FCAS, FCIA

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Introduction

From description of this RPM seminar session :

- ... even less analysis has been performed to retrospectively gauge the **success of** the implemented program (**the new rating plan**). This session will discuss various **strategies and metrics** that have been **used to measure** - both prospectively and **retrospectively** - the success of a new rating plan.
- And a look on **quotes and renewals «success»** concept and measurement.

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Part 1 : Defining «**a success**»

«**A success**» could be defined by ...

- Your boss (if an actuary, or not)
- VP's, president of the insurer (private, governmental)
- Marketing department, sales reps, agents/brokers
- Consumers groups
- Regulators
- You, as the actuary
- Any other interested person ... including my uncle !

Part 1 : Defining «**a success**»

Potential defining elements

- ❑ On time ? (eg. if your boss is not an actuary ...)
- ❑ Looking good, easy to read ? (e.g. other VP's ... ?)
- ❑ Eased the sales and renewal ratio (↓ rates ...) ?
(Marketing dept, sales reps ...)
- ❑ By regulator : on time, correct format, no questions
- ❑ For ... my uncle : social criteria ?
- ❑ Logical, with stability (if not stable, try to explain !)

Part 2 : Strategies when «**a success**» or not

«**Strategies**» seen in the past when «non performant class plan» (or unprofitability) is «declared» :

- ❑ Do nothing
- ❑ Use the easiest explanation found (and wash your hands as Pontius Pilate)
- ❑ Quickly use more actuaries, or hire, internally or not
- ❑ Get rid of resources, demotions and/or move people
- ❑ Other action ... even get back to previous class plan !

(So, evaluation of success or not can be very important)

Part 3 : Tools for evaluating «a success»

Consider several non-classical measures and items :

- I. «Before and after» sets of differentials for a given rating criteria, when no rate structure change
- II. Simple retroactive tests on proportions of number and amounts of losses per KOL
- III. Gini coefficients
- IV. Other (obvious ?) factors not usually taken into account
- V. Think out of the box !

Part 3 : Tools for evaluating «a success»

I. «Before and after» sets of differentials for a given rating criteria, when no rate structure change :

- Average of absolute value changes, in %
- Coefficient of variation of absolute value changes, in %
- Skewness of absolute value changes, in %

Look at these indicators over several periods of «rate and rate differentials settings»

Part 3 : Tools for evaluating «a success» «Before and after» sets of differentials

- «Before and After» Differentials, Example real data GAA per territory
Stability table, same class plan – Whole Quebec province, Population 7.8 Millions
Coverage : DCPD Claims only – 4.2 Millions earned cars per year
Average of 190,000 DCPD claims per year

Non-overlapping periods, data 2004-2008 inclusively

Type of periods («before, after») for 21 rating territories	# of times possible	Mean of Abs.Value differentials Δ in % In Frequency	Mean of Abs.Value differentials Δ in % In Severity	Mean of Abs.Value differentials Δ in % In Loss Cost
1 year vs 1 year	4	0.031	0.052	0.058
2 years vs 2 years	1	0.021	0.030	0.034
2 years vs 1 year	3			
3 years vs 1 year	2			
3 years vs 2 years	1			
4 years vs 1 year	1			

Part 3 : Tools for evaluating «a success»

II. Retroactive tests on proportions - number and \$ of losses per Kind of Loss (KOL)

Example with real data, HO insurance per KOL – fire, wind, water damage, theft, other causes, 5 older years totals, Provincial Canadian data from IBC participating insurance companies

Quebec per year : $\approx 1,1$ M policies, 55 000 claims for 180 M\$

BC per year : $\approx 0,45$ M policies, 30 000 claims for 110 M\$

Part 3 : Tools for evaluating «a success»

II. Retroactive tests on proportions - number and \$ of losses per Kind of Loss (KOL) – Homeowners (not condos nor tenants)

	Quebec			British Columbia	
Kind of loss	Year	Nb Claims	\$ of claims	Nb Claims	\$ of claims
Fire	1992	12.7%	39.7%	7.7%	25.8%
	1993	12.0%	38.6%	8.4%	27.6%
	1994	13.5%	38.4%	8.2%	29.3%
	1995	12.5%	39.3%	7.7%	26.8%
	1996	10.6%	34.8%	7.2%	29.6%
Wind	1992	2.76%	1.55%	9.44%	6.66%
	1993	8.46%	3.99%	2.52%	1.55%
	1994	6.54%	6.75%	7.83%	7.95%
	1995	6.49%	3.52%	5.00%	2.72%
	1996	12.02%	6.36%	7.39%	4.29%
Theft	1992	51.5%	36.0%	48.3%	42.3%
	1993	47.0%	33.6%	48.9%	39.8%
	1994	37.6%	25.6%	46.6%	36.7%
	1995	41.0%	28.9%	47.8%	40.8%
	1996	34.8%	24.9%	47.1%	39.2%

Part 3 : Tools for evaluating «a success»

II. Retroactive tests on proportions - number and \$ of losses per Kind of Loss (KOL) – Homeowners (not condos nor tenants)

Kind of loss	Quebec			British Columbia	
	Year	Nb Claims	\$ of claims	Nb Claims	\$ of claims
Water	1992	13.1%	10.2%	13.4%	12.3%
	1993	13.9%	11.8%	16.9%	13.3%
	1994	19.5%	16.5%	15.3%	11.8%
	1995	14.6%	11.6%	15.8%	13.0%
	1996	18.9%	19.4%	18.0%	14.4%
Other	1992	19.9%	12.5%	21.2%	12.9%
	1993	18.6%	12.0%	23.3%	17.8%
	1994	22.8%	12.7%	22.1%	14.2%
	1995	25.4%	16.7%	23.7%	16.7%
	1996	23.6%	14.4%	20.2%	12.5%

Diagnostics : for example, if class plan is not rating per KOL, uses discounts for theft alarm systems, fire detectors, surcharges for higher liability limits ... shifts in proportions impacts stability of class plan

Part 3 : Tools for evaluating «a success»

III. Gini Coefficients

From Wikipedia picture,

$$\text{Gini} = A/(A+B) \text{ (between 0 and 1)}$$

ex. For loss prevention, apply principle to :

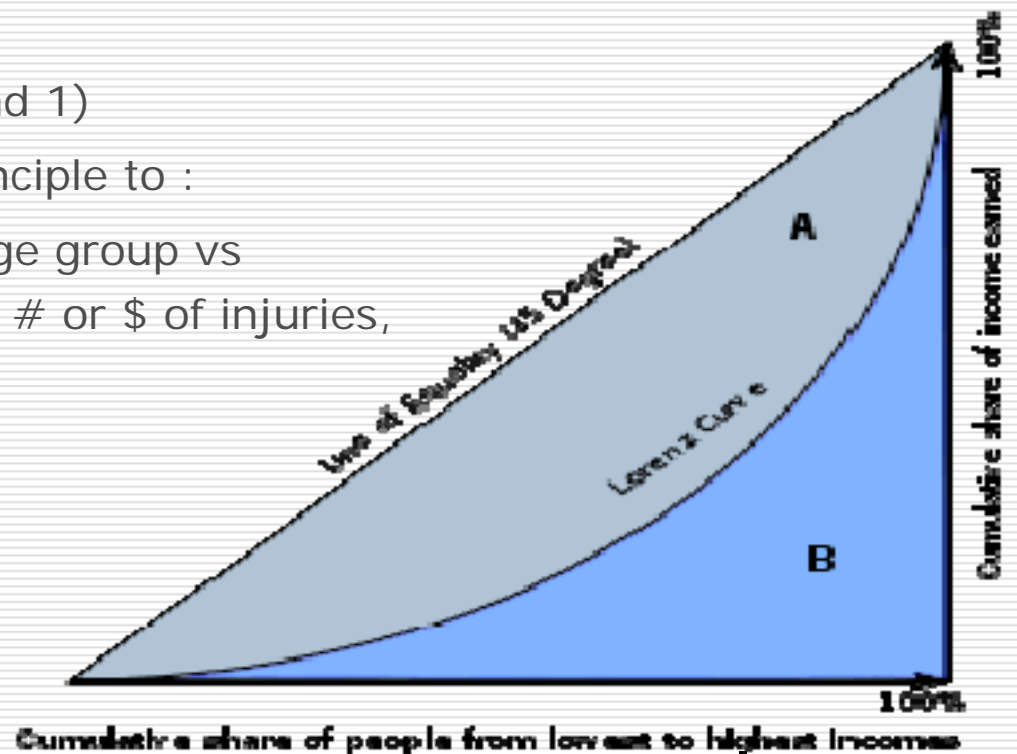
Cumulative share of people per age group vs

cumulative share of incurred # or \$ of injuries,

and compare Ginis per period;

should act to lower

Gini closer to min = 0



Part 3 : Tools for evaluating «**a success**»

IV. Other factors not usually taken into account

Pyramid of ages: any impact on claim frequency
(and on severity) ? Possible effects on :

- Automobile – BI, PIP and other coverages
- HO theft
- Workers Compensation
- Others

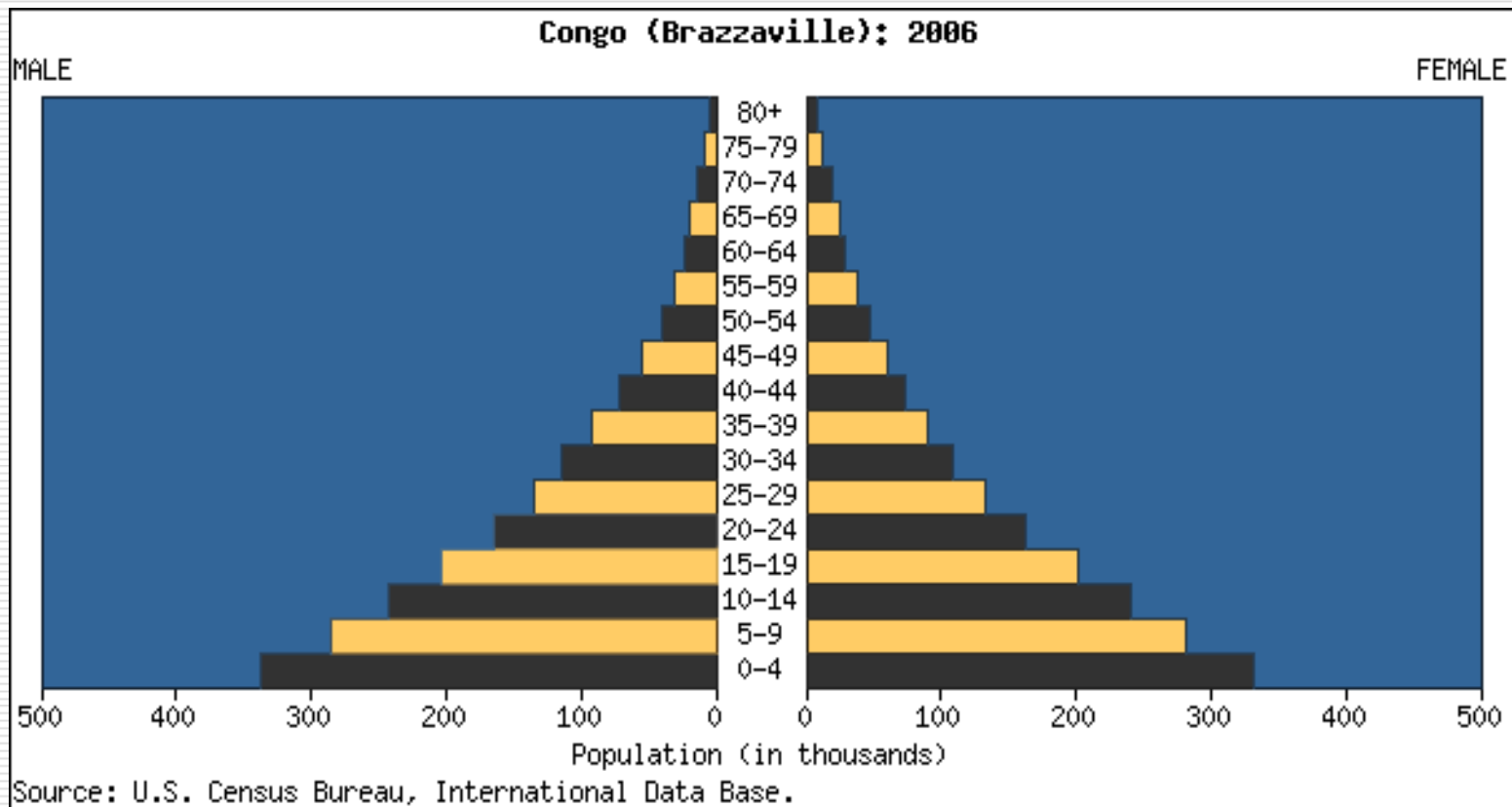
Part 3 : Tools for evaluating «a success»

Examples - Possible pyramids of ages effect on :

- ❑ Declining HO theft frequency in Quebec province
- ❑ Increasing PIP (AB) costs in Ontario automobile insurance
(a pyramid of ages forecast ... could it be included in a prior approval rate filing as in Ontario ?)
- ❑ Death rates and injury rates on roads in Quebec province
- ❑ Better retention ratio of customers at renewal for insurer X

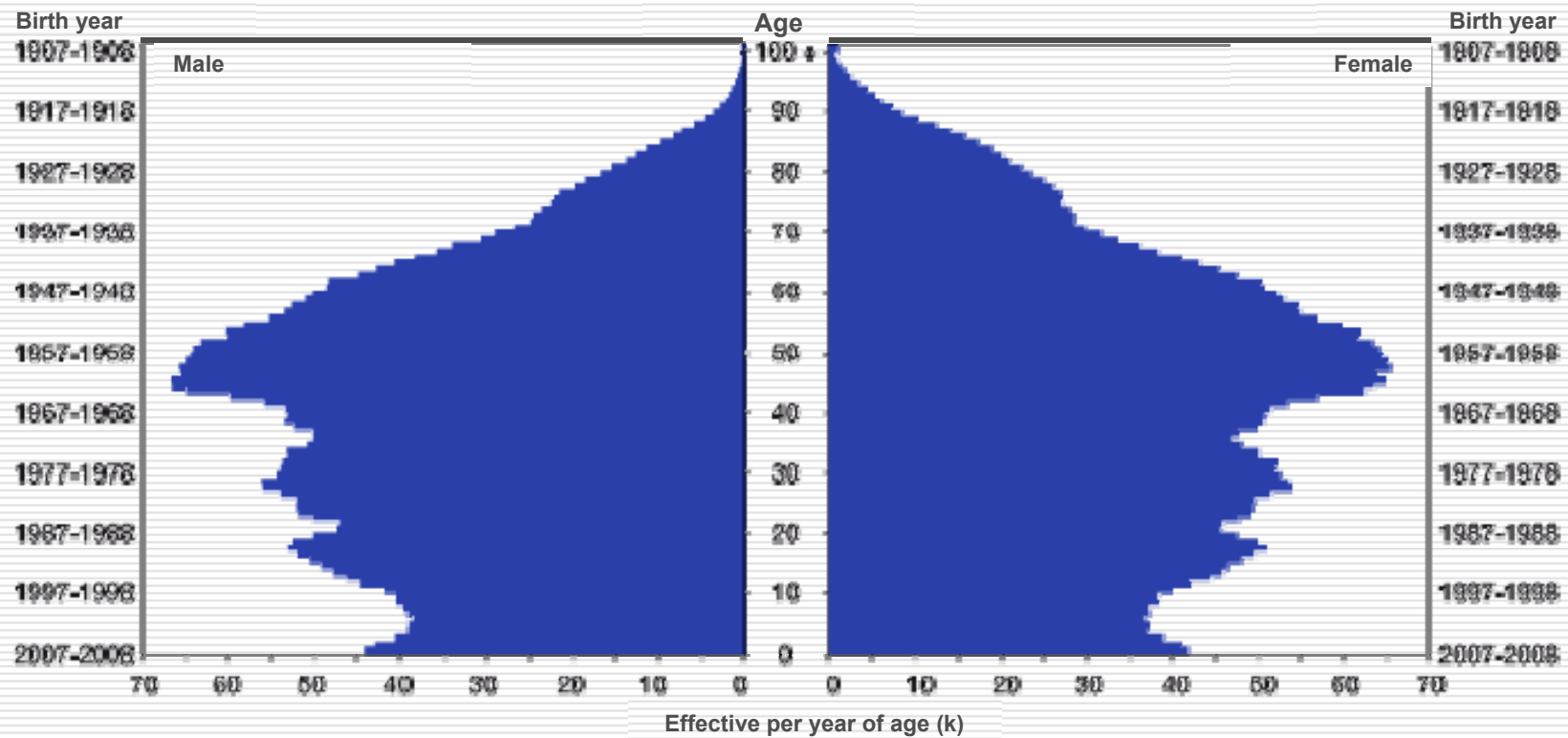
But first, let's take a look at some age pyramids, then come back

Classical pyramid of ages



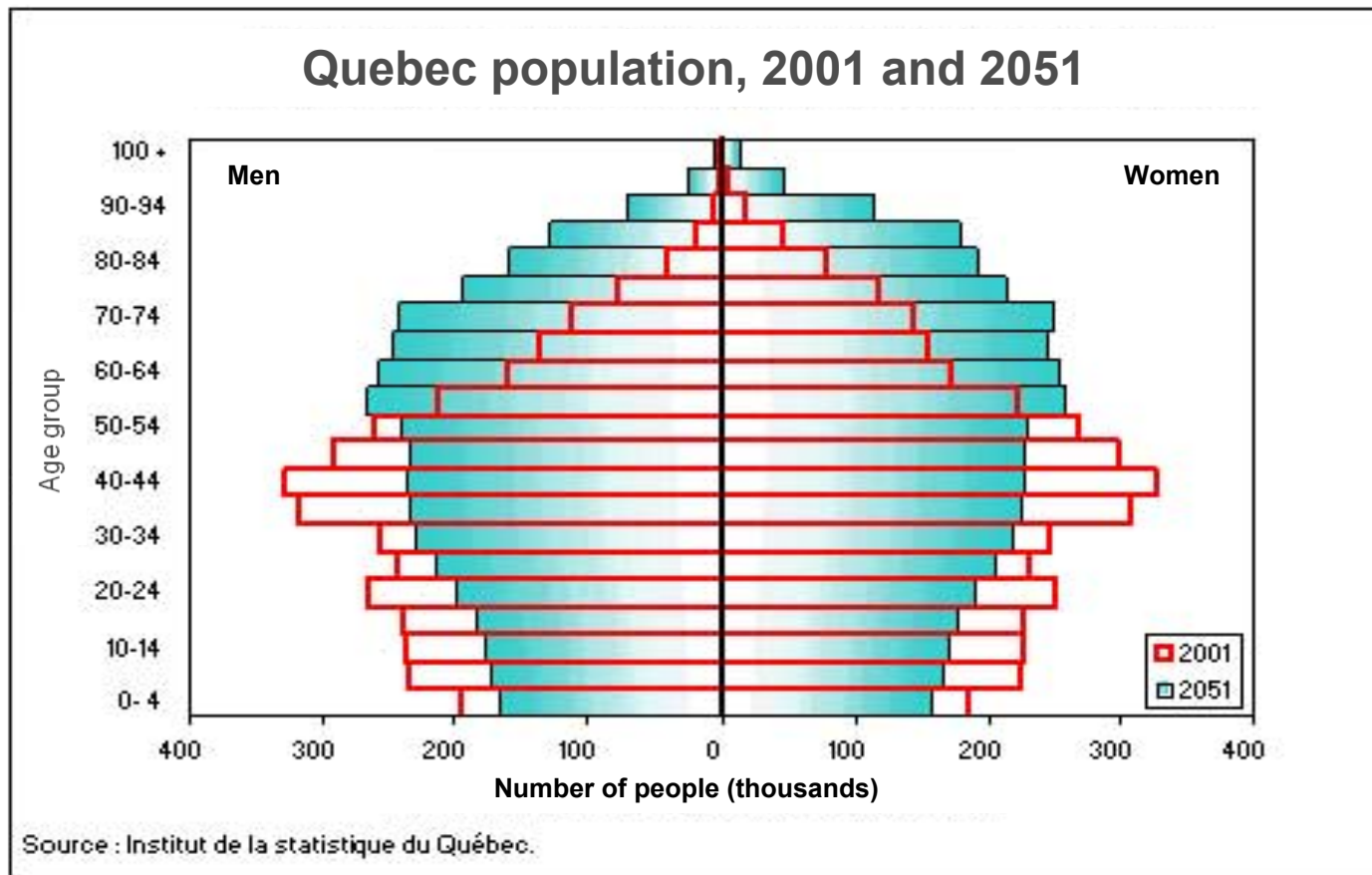
Less classical pyramid of ages

Pyramid of ages, Québec, July 1st, 2008

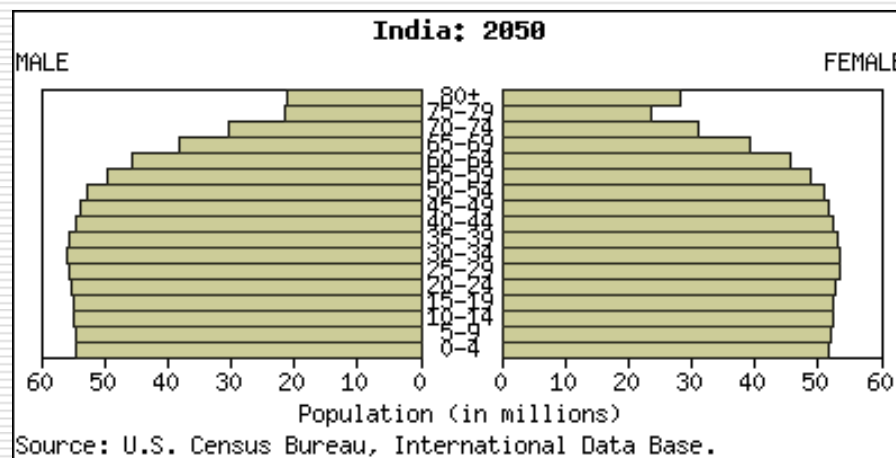
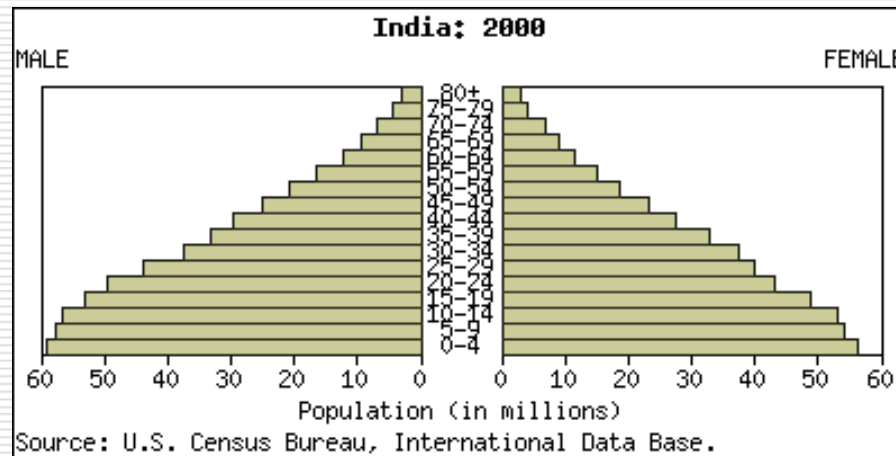


Source : Statistique Canada, Estimations démographiques.
Dernière mise à jour : 15 janvier 2009.

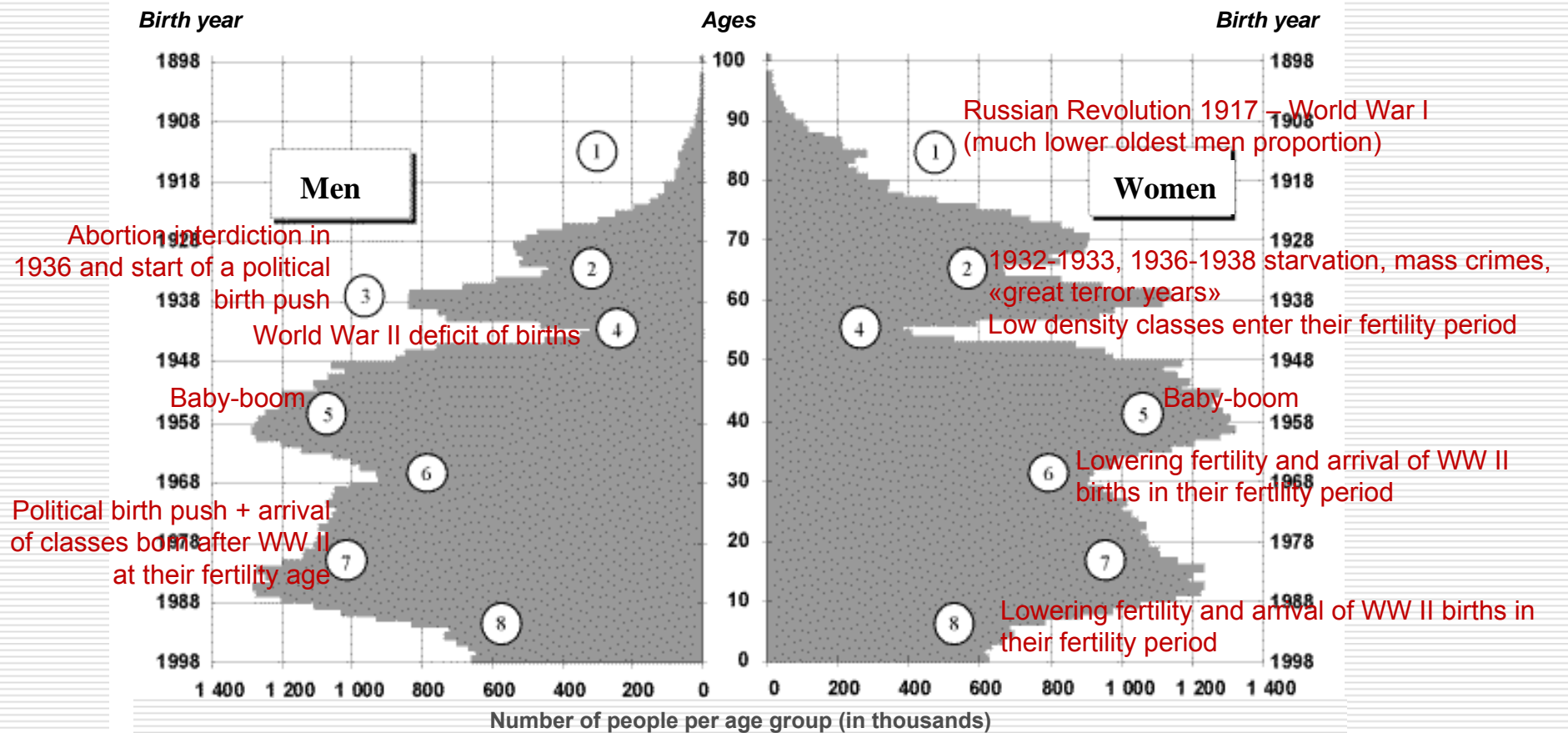
Forecast pyramid of ages (Quebec)?



Forecast pyramid of ages (India) ?

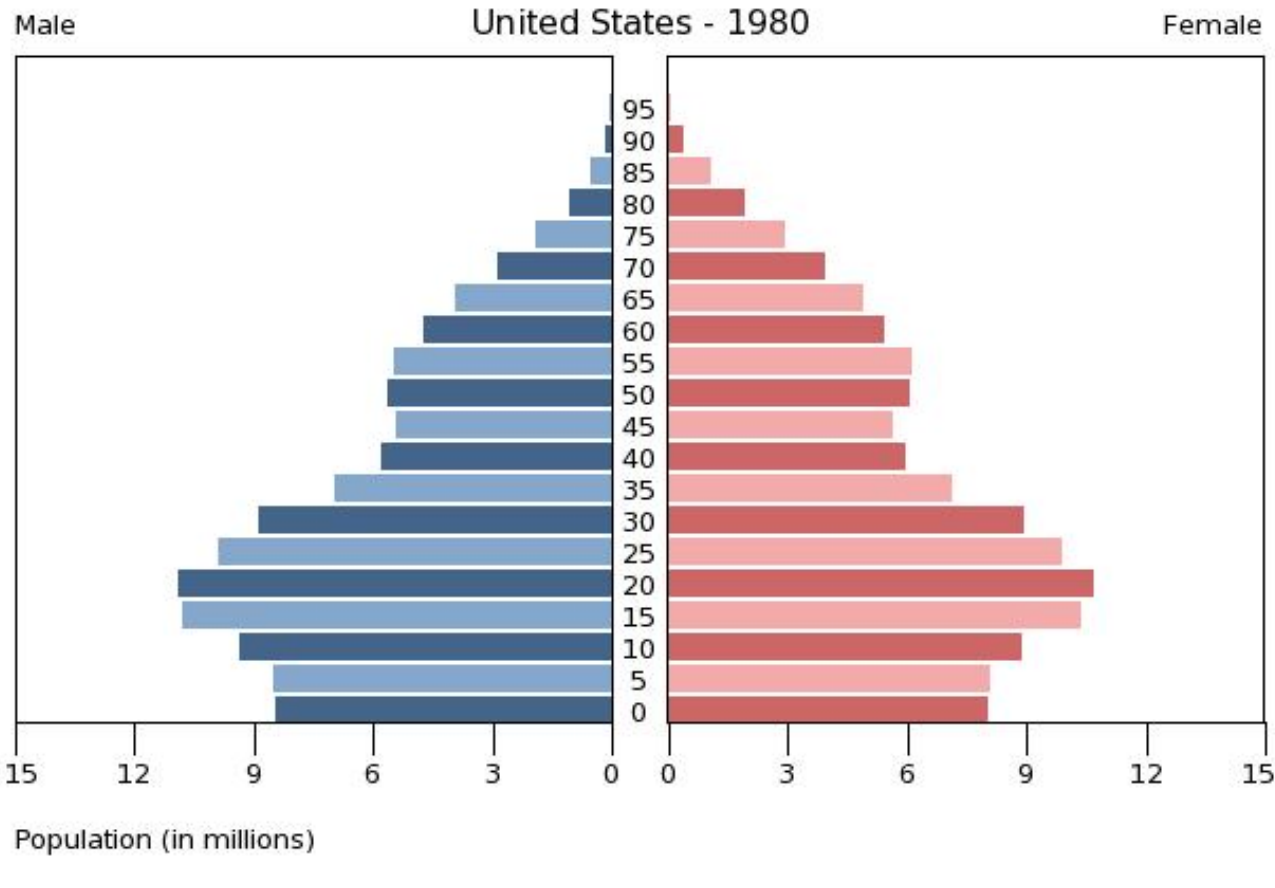


Much less classical pyramid ? (Russia 1998)

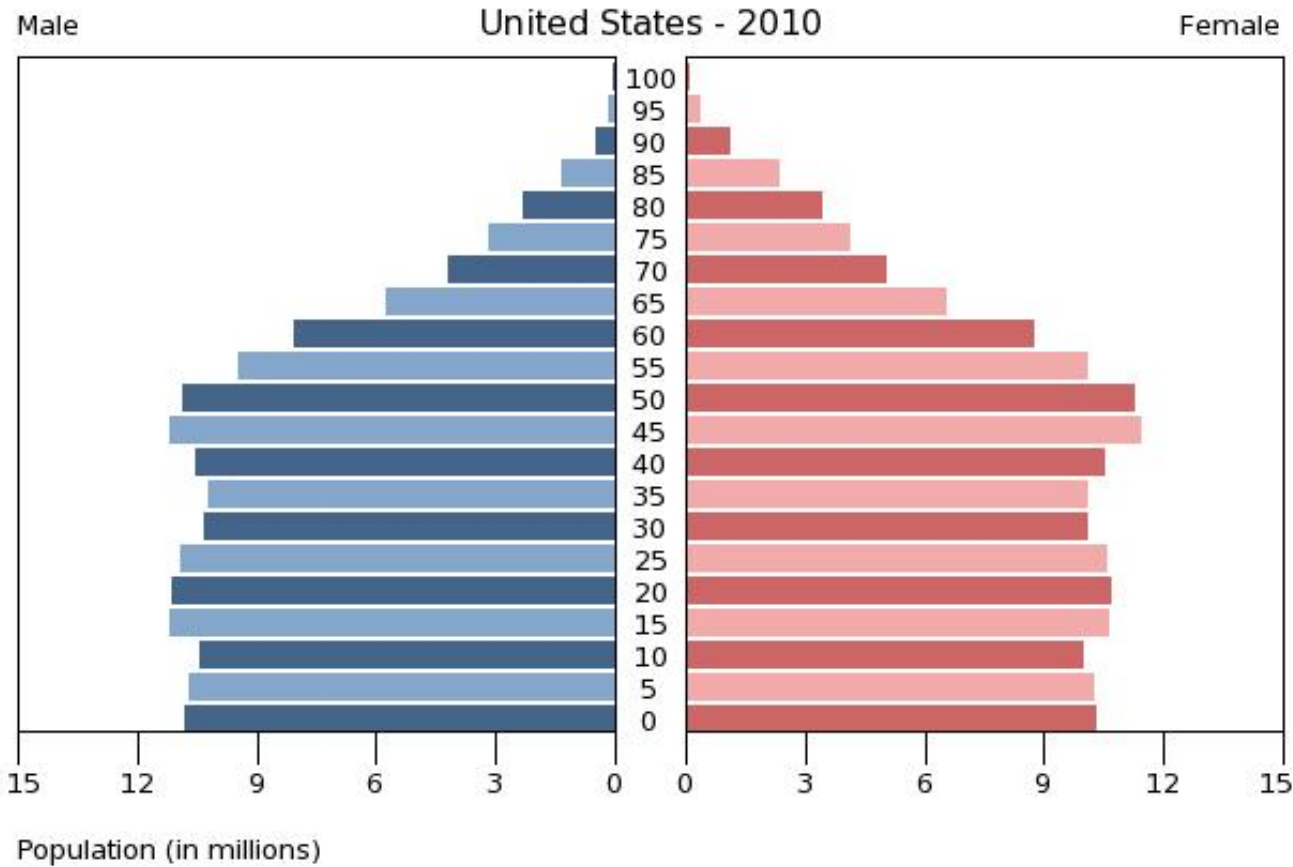


Source : KADOUCHKA (association franco-russe) : <http://www.kadouchka.com/russie/demographie.htm>

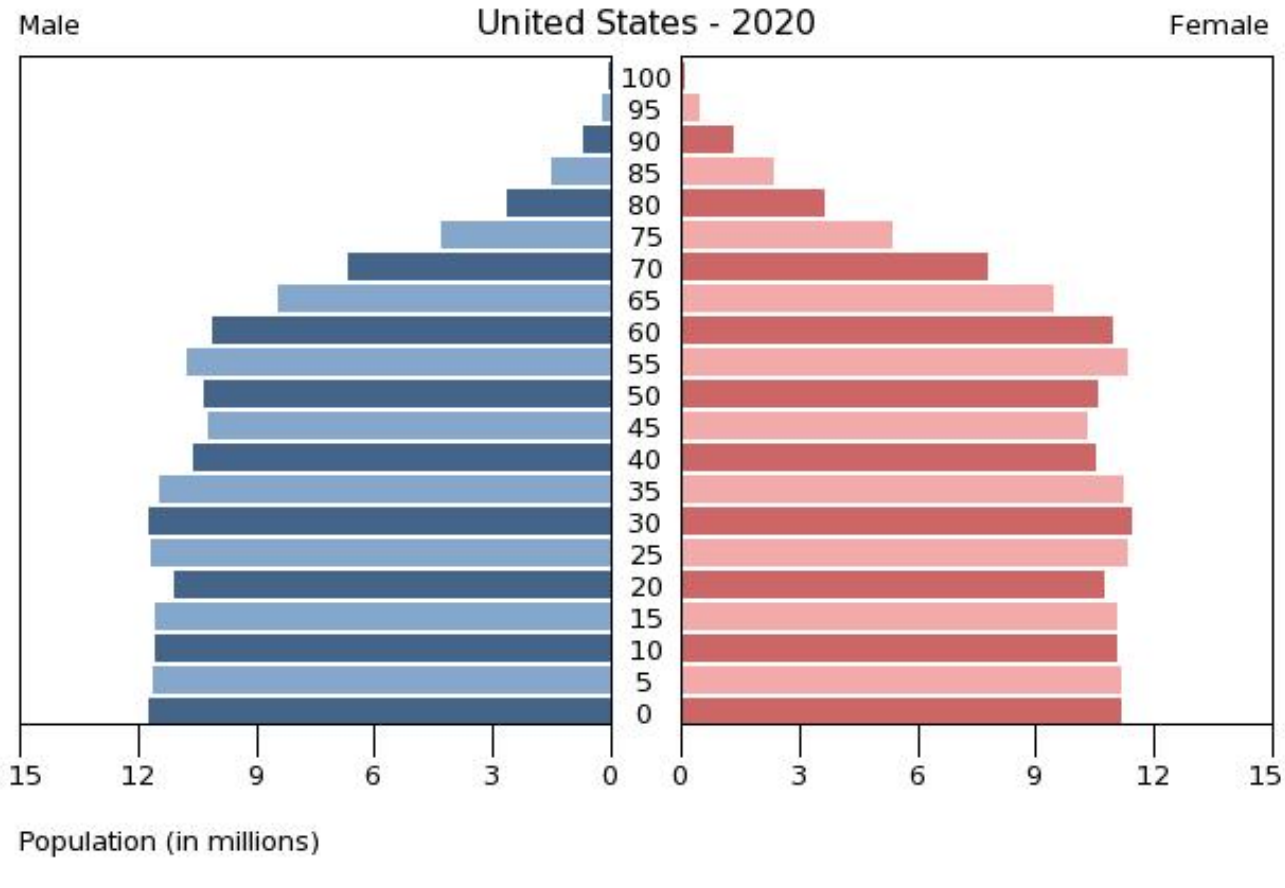
Use retro pyramid of ages (USA 1980) ?



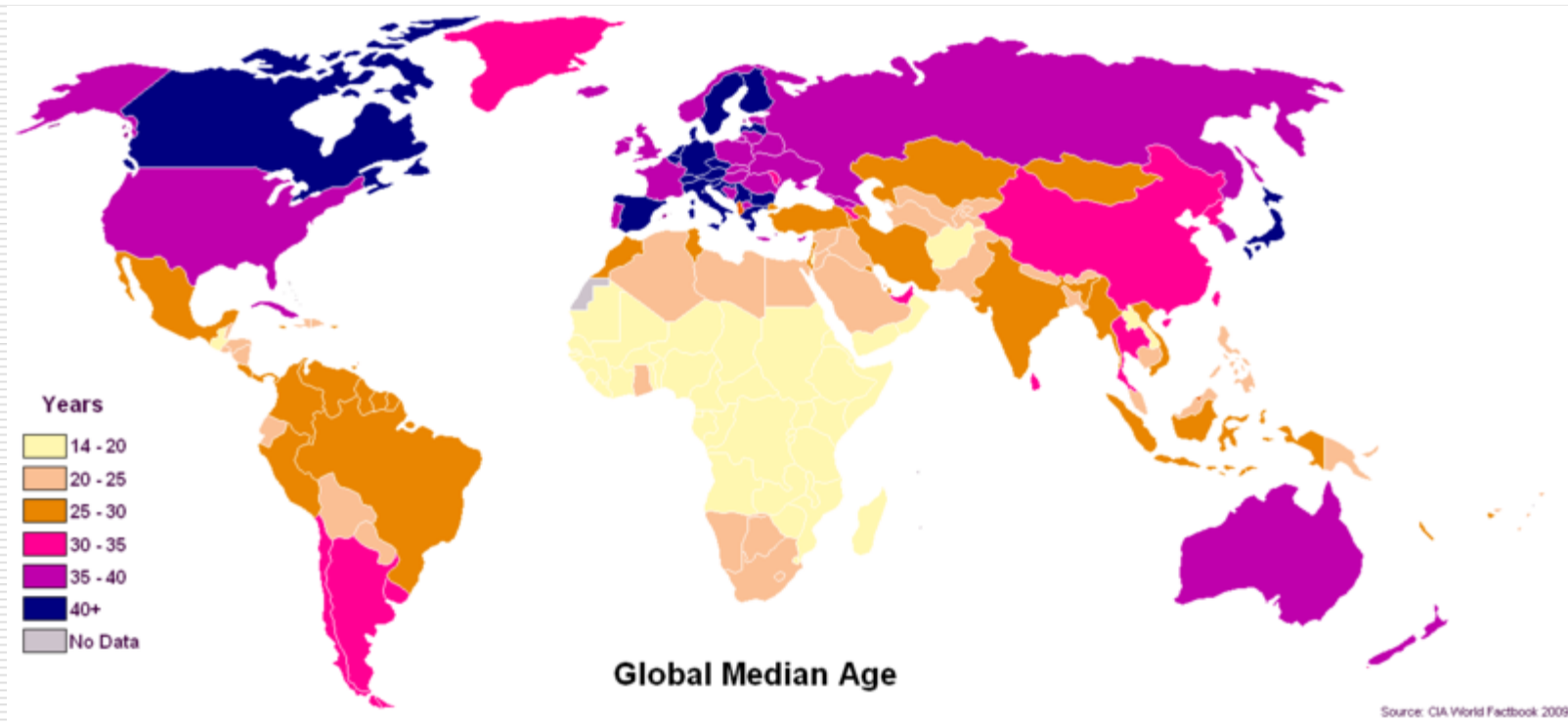
Use today pyramid of ages (USA 2010) ?



Forecast pyramid of ages (USA 2020) ?



Compare with others ?



Part 3 : Example - province of Quebec

- Population (July 2008): 7,751,000
- "Gauvin Report" 1974: tort system with high premiums, accessibility problems, uninsured vehicles, slow claim payments
- 1978 Creation of «Société de l'Assurance Automobile du Québec» (SAAQ) - Injuries covered by No-Fault government insurer
- Private Insurers: No-Fault PD if not-at-fault – Direct Compensation Property damage ; few lawsuits remain
- Private Insurers: Optional coverages «own damage» Collision and Comprehensive (theft, hail, animal hits, vandalism ...)
- «Different» regime, stable since 1978, mature data for actuaries

Part 3 : Province of Quebec example – Deaths on the roads

SAAQ – Death rates

Year	Registered vehicles	Deaths	Death rate per 100 000 vehi.	Ratio 1973 vs year
2008	5,665,272	557	9.80	9.9
2007	5,539,013	608	10.98	8.9
2006	5,402,353	721	13.35	7.3
2005	5,306,534	707	13.32	7.3
2004	5,203,491	644	12.38	7.9
2003	5,063,449	623	12.30	7.9
2002	4,881,265	704	14.42	6.8
1973 Max	2,265,471	2,209	97.50	1.0

Part 3 : Province of Quebec (continued)

SAAQ : 25 years of death rate decrease – main probable reasons (a very nice job ...) :

- ❑ Stricter laws against drinking and driving
- ❑ 3 points seatbelts mandatory (and enforced)
- ❑ Improved vehicle design, better protection of occupants, air bags on the rise
- ❑ Other good safety measures ...

Tricky question: retrospectively, did pyramid shift lowered frequency of deaths claims, but increased frequency and severity of non-death claims (ceteris paribus) ?

Part 3 : Example with province of Ontario

- Population (July 2008): 12,929,000
- Private insurers only
- Injuries occurring in Ontario : No-Fault PIP type but can sue at fault driver if over treshold
- Physical Damage Not-at-Fault: (DCPD) Direct Compensation Property Damage
- Optional coverages : Collision, Comprehensive similar to Quebec and USA (UM and UDM exist too)

Part 3 : Ontario (continued, data seen end 2008)

	Population July (‘000)	% Var.	Written vehicles PPA	% Var.	Written vehicles per capita	% Var.	Loss ratios GISA
2008	12,929	1.1%	6,484,302	1.5%	0.502	0.4%	80%
2007	12,794	1.0%	6,389,890	1.9%	0.499	0.9%	80%
2006	12,665	1.1%	6,271,367	2.3%	0.495	1.2%	72%
2005	12,529	1.1%	6,131,844	2.6%	0.489	1.5%	67%
2004	12,391		5,973,604		0.482		62%
5 years			31,251,007				72%

Part 3 : Ontario (continued)

Possible pyramid of ages effect ?

- On claims ? (generous first party PIP type for injury coverage, and aging population)
- On insurer's growth (more cars per capita ?)

Conclusion

- ❑ Assessing «**a success**» of class plan could depend on definition
- ❑ Some unusual tools can help
- ❑ Think out of the box ?

Thank you !

