

Forward Together

25th Anniversary Conference

Tallinn
September 27, 2024



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Public Policy and Aging Society Case for Actuarial Involvement



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RGA Re



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Tarmo Koll
Aktuaarsed Lahendused OÜ

Ideas to Mitigate the Global Pension Crisis

Abraham Hernández

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International Actuarial Association
Association Actuarielle Internationale



ESTONIAN
ACTUARIAL
SOCIETY



| OVERVIEW



Scale of the global crisis in pension funding



Causes and the role of changing demographics



Some actuarial creative ideas to address the crisis



THE PENSION CRISIS: A GLOBAL ISSUE



Estonia's statutory funded pension scheme on the way to being made voluntary


N.J. pension fund loses billions in coronavirus market chaos

Updated Mar 25, 2020, Posted Mar 25, 2020



Estonian pension reform putting system at risk?

The parliament in Tallinn is expected to approve a pension reform today. Wednesday: The so-called second pillar, the private pension back-up fund, is to be voluntary in future. Until now all employees had to pay two percent of their salary into savings accounts, with the state adding another four percent. Under the reform the money on these accounts can now be withdrawn. Tallinn's press is highly critical.



Dismantling the Estonian Pension System is not the Answer

Date: 27th October 2020
Author: BETTER FINANCE
Type: Press Releases

On Tuesday, 20 October 2020, the Supreme Court of Estonia ruled that the current government's hotly contested pensions "reform" is not unconstitutional. The reform is set to dismantle the foundation of the second (occupational) pillar of the Estonian pension system. It is worth noting that many of the judges who ruled in its favour, did admit that although the law is likely to have an overall negative effect on second pillar pensions and does violate some property rights, it does not breach the Constitution.

Estonia's low pension replacement rate could fall further in future

NEWS
Marko Tooming
10.01.2024 00:28



Restructuring of the second pillar of the funded pension

You should think about your future pension today!

- It is not necessary to do anything immediately when the changes takes effect – everyone who wants, can continue to make contributions to the second pillar in peace.
- There will be a number of additional new options: contributions can be continued on the pension investment account, membership is also open to those born before 1983.

Pension funds could implode

Õhtuleht warns of a domino effect:

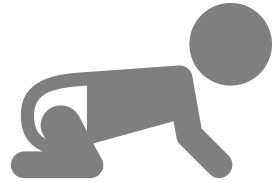
“There has been little discussion of how to protect the interests of those who want to keep their second pension pillar. To put it simply: will there be a bank run or not? In turbulent times, people have always tried to rescue their savings by withdrawing all their money from the banking system, causing the system to collapse. If money in large amounts is suddenly taken out of the second pension pillar, what will the pension funds do? To free up money for payouts, they will have to sell their investments quickly, which will reduce the value of their shares. ... The fear of losing their pension savings could also prompt people who hadn't actually planned to take their money out of the second pillar.”



| CAUSES



INCREASING
LONGEVITY



DECLINING
BIRTHRATE



FEWER PENSIONS
(UNDERFUNDED OR "GUARANTIED" BY
GOV. DEBT AS PAYG SYSTEMS)



LOW INTEREST RATE
& MKT VOLATILITY
(...YET HEROIC RETURN ASSUMPTIONS)



| CAUSES



ATYPICAL
WORKERS
(MIGRANTS, BOLT, ETC)



INFORMAL
ECONOMIES



LOW
PARTICIPATION



LACK OF
KNOWLEDGE
(INTEREST)



COMPILED OF COUNTRIES' PROPOSALS TO HELP SOLVE THE CRISIS

01. BEHAVIORAL ECONOMICS WORKING FOR PENSIONS:

- ▶ Automatic enrolment in Brazil
- ▶ Planning objectives of Canadian retirees
- ▶ Saving through consumption in Mexico
- ▶ Japanese version of "Defined Ambition"

02. MODELLING AND VALUATING PENSION SCHEMES:

- ▶ Changes in life expectancy in Finland
- ▶ Pensions under ageing societies
- ▶ Pensions and low interest rates policy
- ▶ The Chinese Pay-As-You-Go System

03. DE-RISKING:

- ▶ Risk-sharing and risk-transfer arrangements
- ▶ Stochastic optimal control
- ▶ Longevity swaps
- ▶ Life-cycle funds

04. RESPONSIBLE AND SUSTAINABLE INVESTMENTS:

- ▶ Invest. of pension funds in reforestation and forestry projects: Ecuatorian proposal
- ▶ ESG & Impact Funds

05. REFORMS TO SOCIAL SECURITY AND PENSIONS:

- ▶ Impact of 2016 pension legislative revision in Japan
- ▶ Forging a new, solid social security system for Greece
- ▶ 20 years after the Social Security Law Reform in Mexico

06. NEW FORMATS OF EMPLOYMENT:

- ▶ AI, Robots
- ▶ Bolt, UBER
- ▶ Millenials



COMPILATION OF COUNTRIES' PROPOSALS TO HELP SOLVE THE CRISIS



HELPING MIDDLE CLASS SAVING FOR RETIREMENT

Addressing pension undersaving for the middle class

- ▶ Issue: 60% of employees are not covered by occupational pension plans
- ▶ Solution: modest and fully-funded enhancement of the employment related DB public second pillar
- ▶ Additional contributions are invested on the financial market

Sources: Social Security Committee, IAA



MILES FOR RETIREMENT

The first tool to promote smart consumption

- ▶ Saving through consumption
- ▶ The general idea is “to flip behavioral challenges into behavioral solutions”
- ▶ Connects providers of financial services, retailers and consumers

Sources: Saving for Tomorrow, tomorrow; Miles for Retirement



SUSTAINABILITY FACTOR

Adverse development of old-age dep. ratio is offset by an adj. to accruing pensions

- ▶ Sustainability factor = % change to old-age dependency ratio

$$= \frac{\#of\ pensioners\ in\ year_{t-1}}{\#of\ active\ contributors\ in\ year_{t-1}} * \frac{\#of\ active\ contributors\ in\ year_t}{\#of\ pensioners\ in\ year_t}$$

Sources: Daykin, Chris. Workshop on pensions and social security. Actuarial Association of Europe



SEQUENCING DC AND SOCIAL SECURITY

Vertical Combination

- ▶ Require that first “X” years of retirement be funded from JIDC/JCDC (akin to US IRA/401k)
- ▶ Delay start of social security to year_{t+1}
- ▶ Some will die first, all will receive “X” years fewer benefits, hence social security benefit level can be sustained even as longevity and dep. ratio increase

Sources: <http://www.actuaries.org/oslo2015/papers/PBSS-Kawaguchi.pdf>



COMPILED OF COUNTRIES' PROPOSALS TO HELP SOLVE THE CRISIS



AUTOMATIC BALANCING MECHANISM

Life expectancy coefficient and automatic adj. in retirement age

- ▶ If life expectancy increases, monthly pensions are decreased and if life expectancy decreases, monthly pensions are increased
- ▶ Increase the effective retirement age and lengthen working careers by introducing also a link of the general retirement age to life expectancy.
- ▶ Then, link between life expectancy and the general retirement age was also considered.

Sources: http://actuaries.org/cancun2017/Papers/27.%20Mikko%20Sankala_Paper.pdf



INVESTING PENSION FUNDS IN FORESTRY

Reforestation and forestry

- ▶ Mitigating Social Security crisis through reforestation and forestry investment programs
- ▶ The project is based on financing plantations of Teak, Bamboo and Pine Radiata; depending on the retirement time horizon

Sources: Ibarra, Rodrigo. Investment of Pension Funds in Reforestation and Forestry Projects: The Ecuadorian Case. PBSS Cancun Colloquium 2017



VOLUNTARY TAX FREE AND DIGITAL SAVINGS

Mbao Pension Scheme and Mobile Phone saving systems

- ▶ Mbao Pension Plan is a voluntarily saving plan which matures at the time of retirement either from a formal or an informal employment. If a member continue saving up to the age of 65 years, no tax is levied on the saving
- ▶ Kenya is considering introducing mobile-based pension schemes to boost the country's retirement coverage. The digital pensions schemes will allow for use of mobile payment to make monthly contributions toward retirement

Sources: Retirement Benefits Authority (RBA); http://www.xinhuanet.com/english/2019-03/01/c_137861241.html.



TONUITY: A NOVEL-INDIVIDUAL ORIENTED RETIREMENT PLAN

ANNUITY

Longevity protection.

?

Solvency II: Annuity products get more expensive (more risk capital needed).

?

Insurance company takes the systematic mortality risk.

?

High cost of risk capital provision.

?

TONTINE

Popular 17th century (FR, GB), today “Le Conservateur” (FR).

?

Not good longevity protection.

?

Low risk capital required.

?

Leads to a volatile payoff at old ages.

?

UNSYSTEMATIC MORTALITY RISK

Individual’s lifetime is uncertain

?

It may be diversified by pool size

?

SYSTEMATIC MORTALITY RISK

The true underlying mortality law cannot be determined with certainty (e.g. unexpected medical progress or change in life style)

?

It cannot be diversified by pool size

?

TONUITY

Better risk-sharing between the insurance companies and the policyholders

Longevity protection

Low risk capital required

Volatile tontine payoff at old ages is replaced by a secure annuity payoff

TONUITY PAYOFF

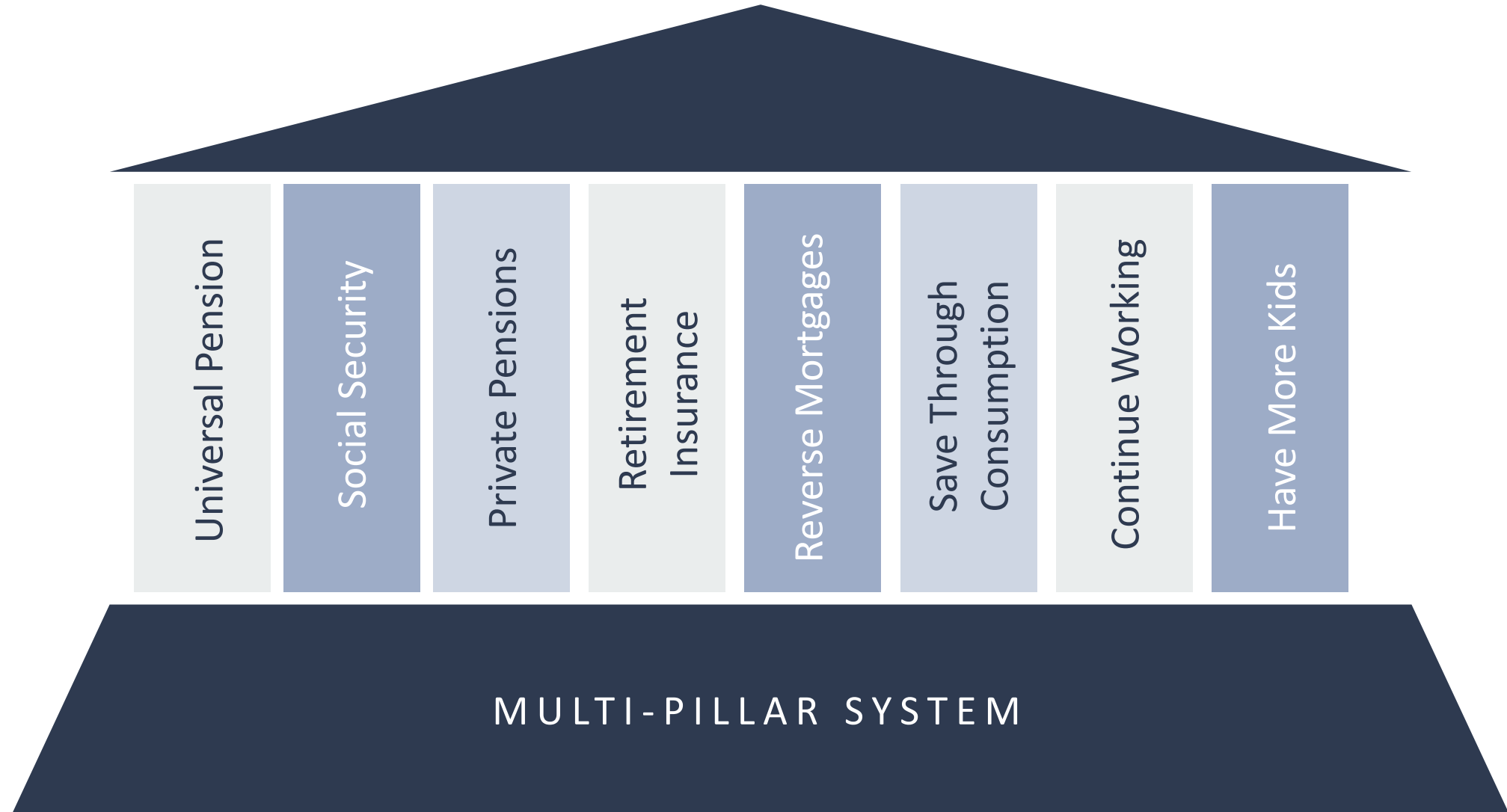
$$b_{[x]}(t) = 1_{\{0 \leq t < \min\{\tau, \varsigma\}\}} \frac{nd_{[x]}(t)}{N(t)} + 1_{\{\tau \leq t < \varsigma\}} C_{[x]}(t)$$

A tontine with switching time $\tau=0$ is an annuity

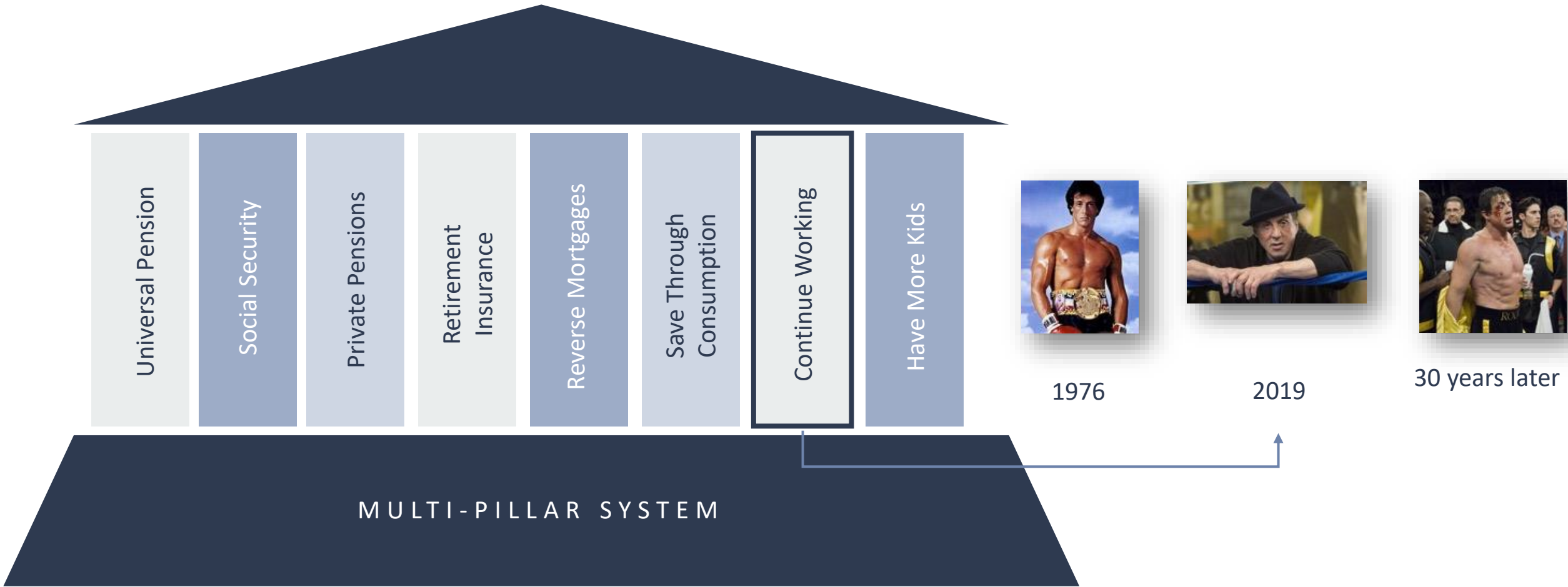
A tontine with switching time $\tau=\infty$ is an tontine



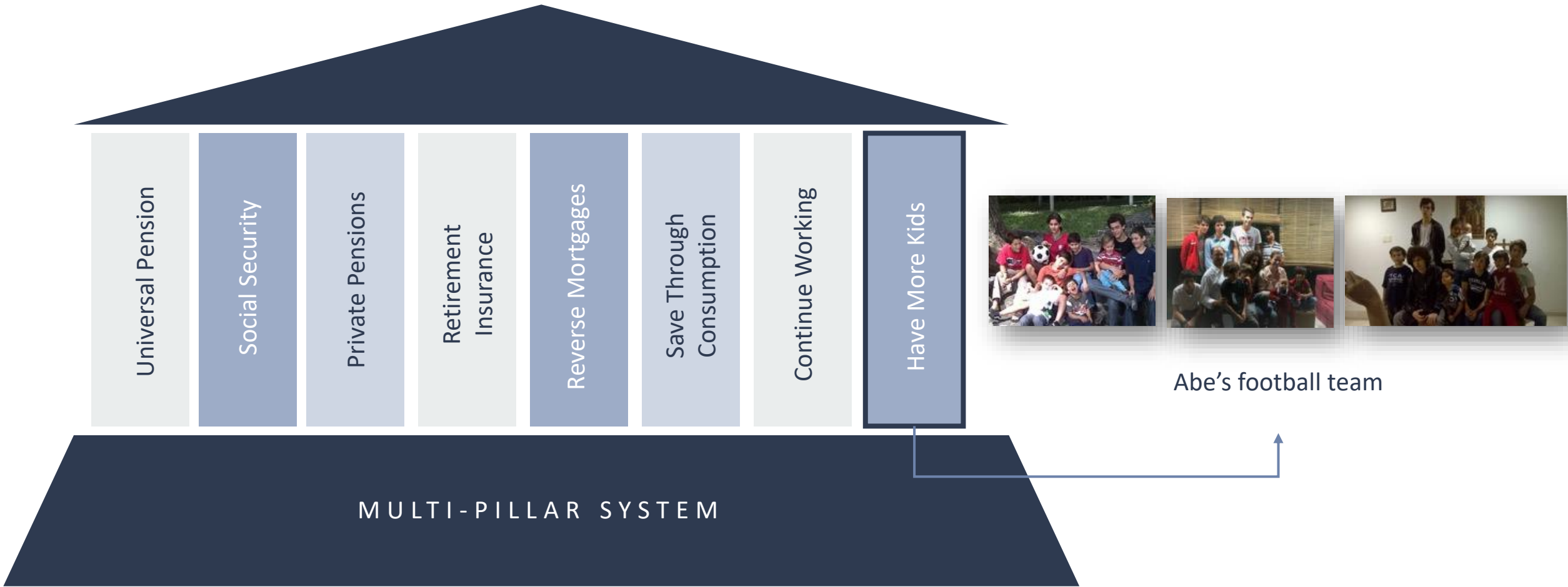
| FROM A 3-PILLAR TO A MULTI-PILLAR SYSTEM



FROM A 3-PILLAR TO A MULTI-PILLAR SYSTEM



FROM A 3-PILLAR TO A MULTI-PILLAR SYSTEM



Thank you for your attention

CONTACT DETAILS

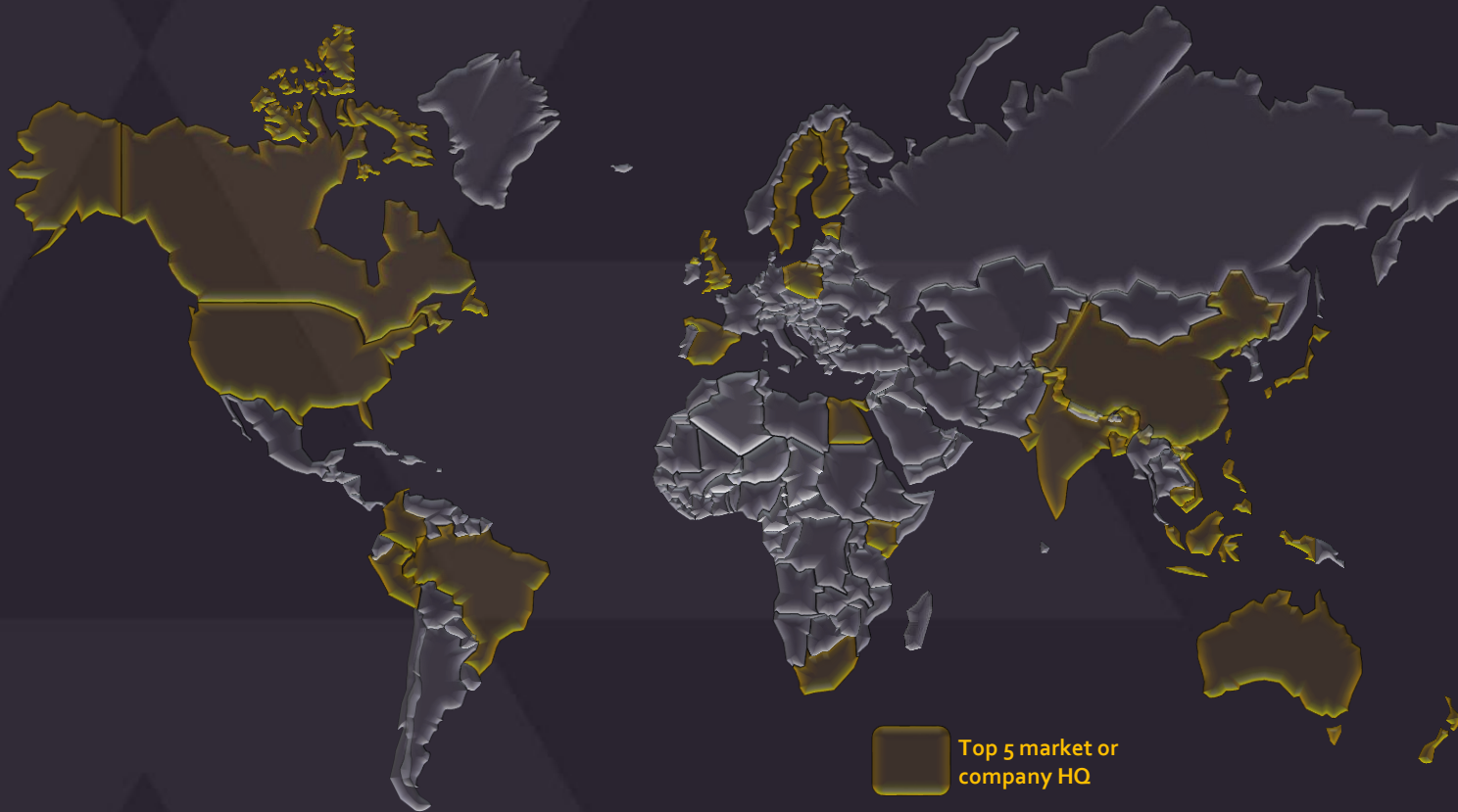
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Campo Grande 20, 8ºC
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About Verge Healthtech Fund

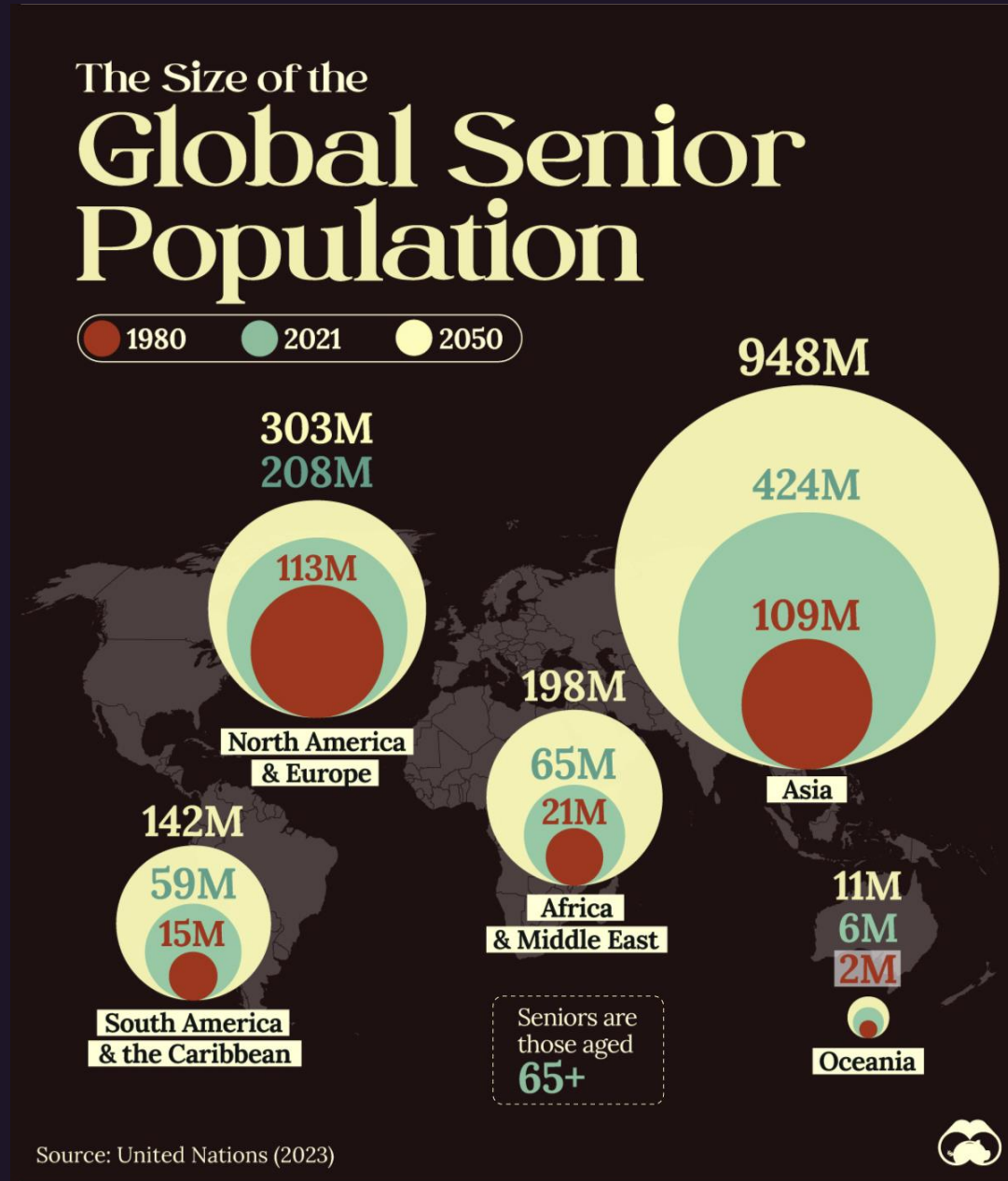
Early stage VC investing globally in impactful healthtech



5 Partners invested in
52 startups across
5 continents with
67 M+ lives touched

// WE'RE AGING FAST

1980: 260 million
Today: 762 million
2050: 1.6 billion



// CONSTRAINED SUPPLY

Revealed: NHS trusts tell patients they can go private and jump hospital queues

Observer investigation finds a 'two-tier' health system emerging in England, with rapid access available to those able to pay



Private patient units are owned and operated by NHS trusts and typically located within hospitals or in separate buildings on hospital premises. Photograph: Curtseyes/Alamy

NHS trusts with record waiting lists are promoting “quick and easy” private healthcare services at their own hospitals, offering patients the chance to jump year-long queues, the *Observer* can reveal.

Hospitals are offering hip replacements from £10,000, cataract surgery for £2,200 and hernia repairs for £2,500. MRI scans are offered for between £300

In the US, by 2026:

- 6.5 million HCPs will leave
- 1.9 million HCPs will join
- 42% of physicians are over 55

In the UK, in 2024:

- 38% of UK GPs over 50
- 59 is the average age of retirement



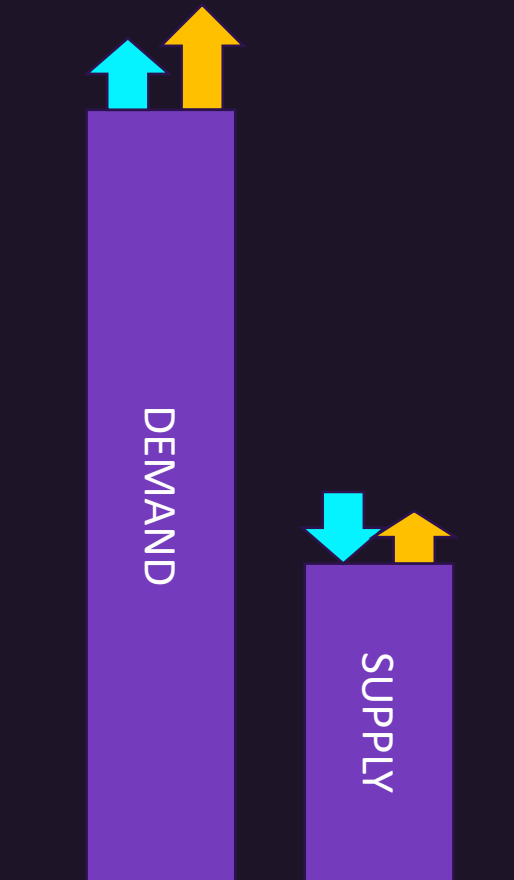
// CRITICAL MISMATCH OF SUPPLY AND DEMAND

Developed

- Aging / NCDs
- Poor lifestyle

LMICs

- Aging / NCDs
- Poor lifestyle



Developed

- Human capital limitations
- Infrastructural constraints
- Underfunding of healthcare

LMICs

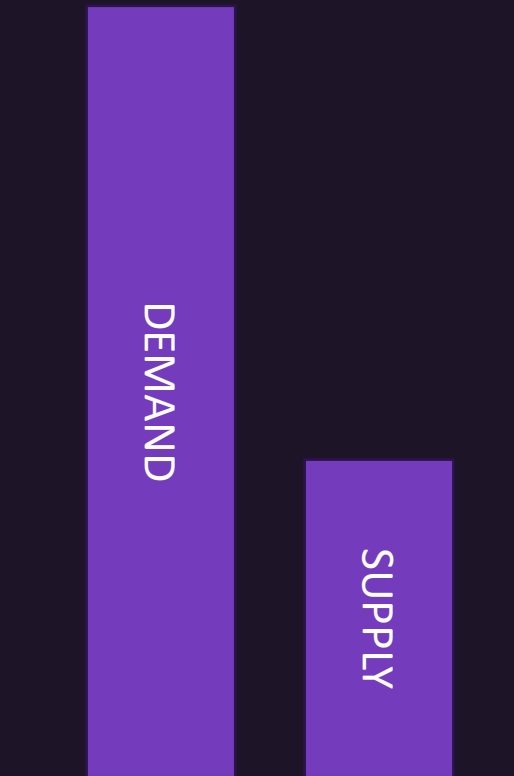
- Human capital limitations
- Infrastructural constraints
- Underfunding of healthcare



// WILL MORE OF THE SAME FIX THIS?

Life Sciences

- Avg. cost of bringing new drug to market:
\$1.3 billion
- Avg. annual price of newly approved cancer drug:
\$196,000



Health Services

- Avg. time to build a new British hospital:
17 years
- Avg. cost to train an NHS specialist:
£584,000

We need to reduce demand and make supply more efficient



A misty forest with a wooden boardwalk path leading through tall trees. The scene is bathed in a soft, golden light, suggesting early morning or late afternoon. The path is made of wooden planks and steps, winding through the forest. The trees are tall and thin, with their trunks visible in the foreground and background. The ground is covered in grass and low-lying plants.

The role of demography and ageing in health system financing and projections

Pille Banhard

Estonian Health Insurance Fund

49,3%!!

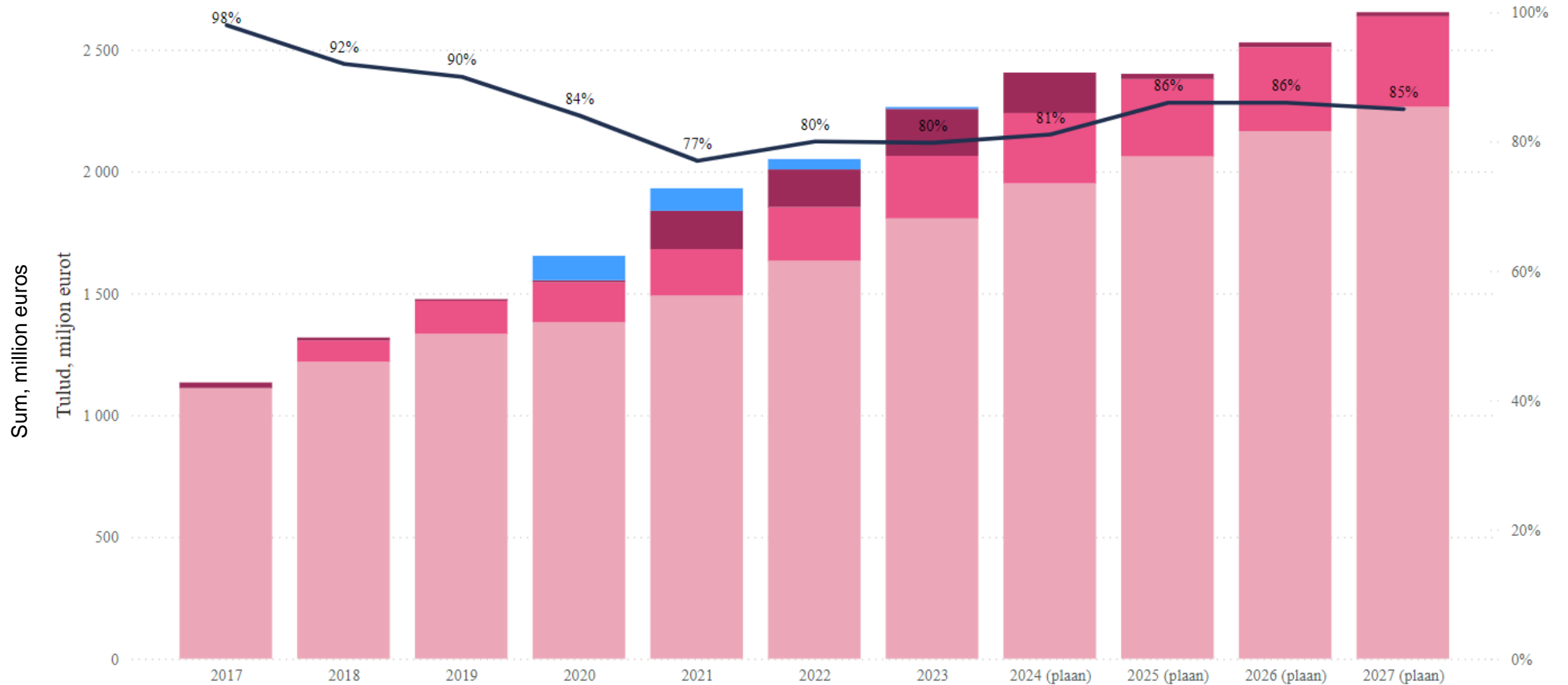


Working people who
pay the 13% tax for
health insurance

Working people + children (up to 19y),
college students, pregnant women and
maternity/paternity leave, pensioners etc

Revenues of Estonian Health Insurance Fund

Social tax (SHI) contribution, transfer on behalf of pensioners, ohter income, COVID-19, SHI contributions share of revenues (%)

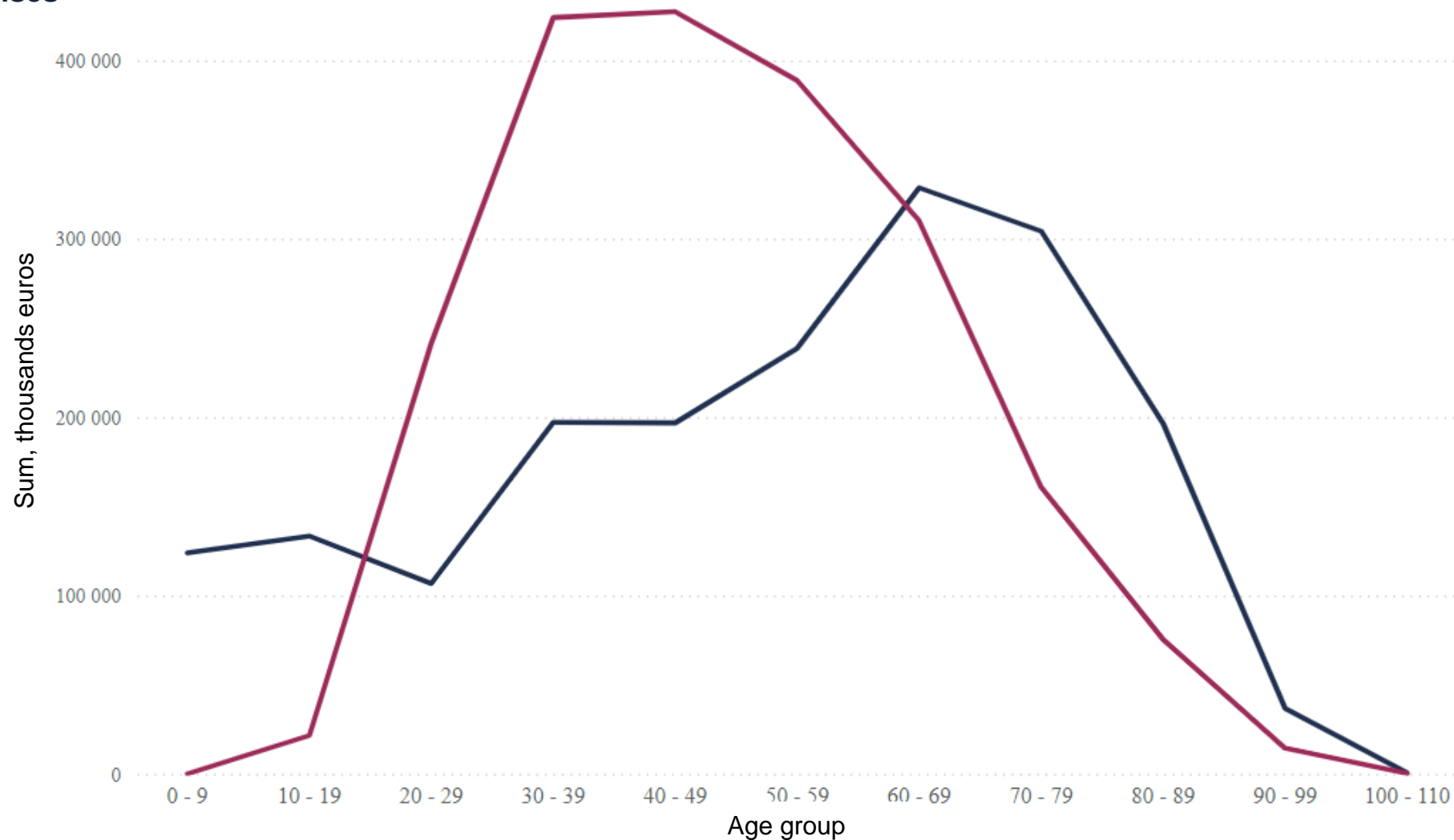


Revenues and health expenses according to the age groups

- 2021
- 2022
- 2023

Revenues (social tax contribution,
transfer on behalf of pensioners)

Health expenses



70,0%

Increase in inflation and prices of health expenses in Estonia

60,0%

50,0%

40,0%

30,0%

20,0%

10,0%

0,0%

Cumulative growth change, %

2014

2015

2016

2017

2018

2019

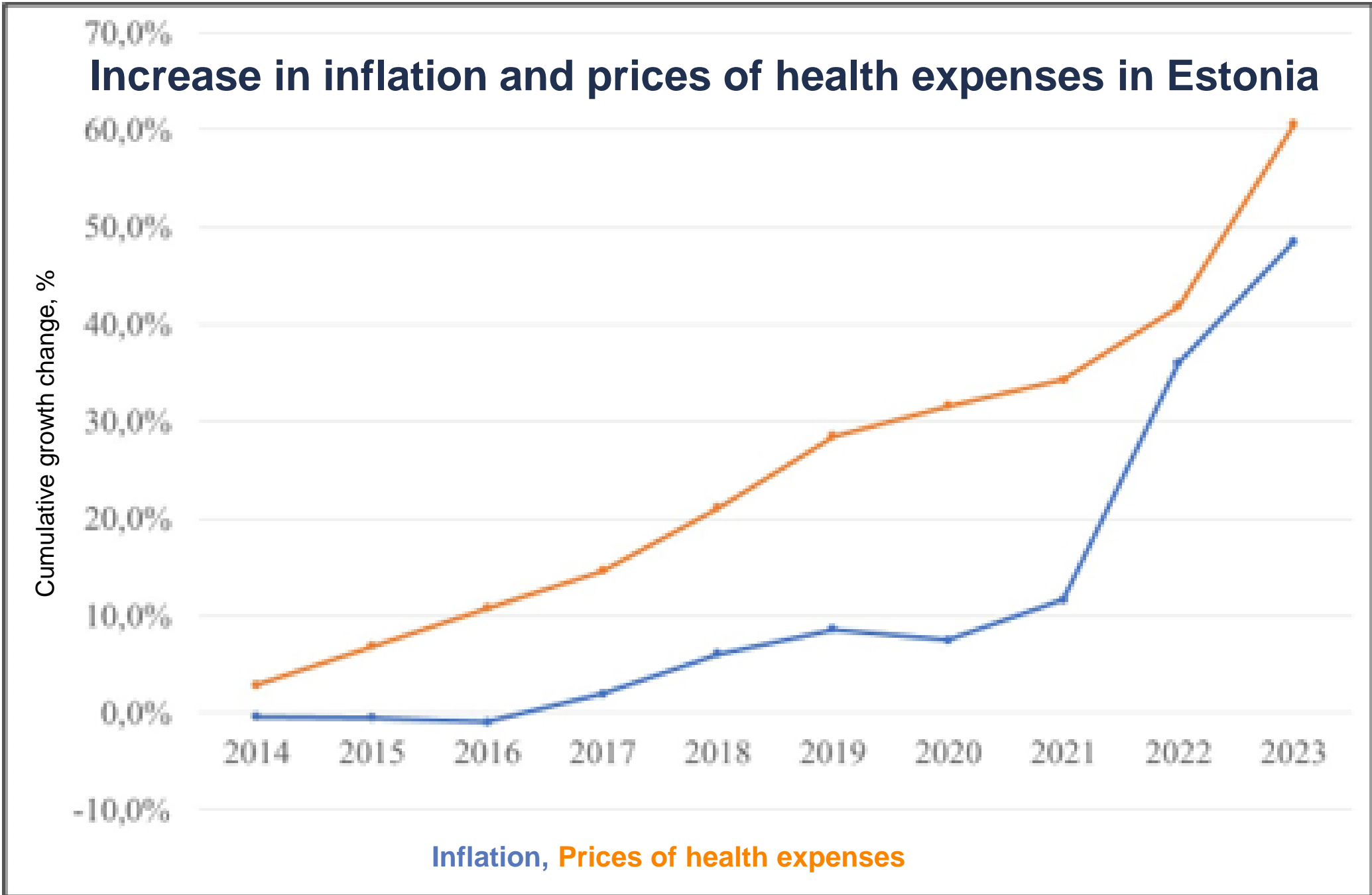
2020

2021

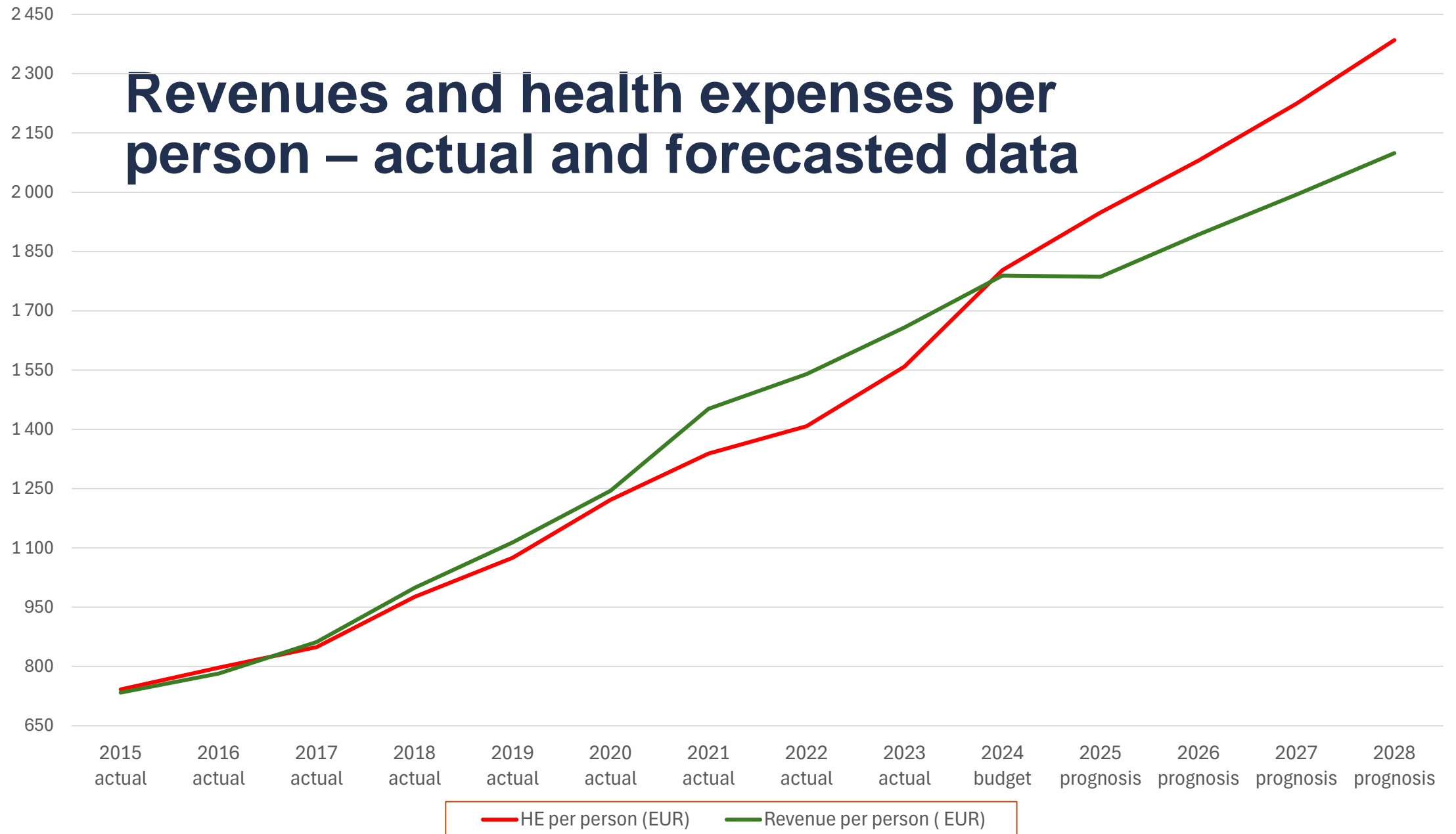
2022

2023

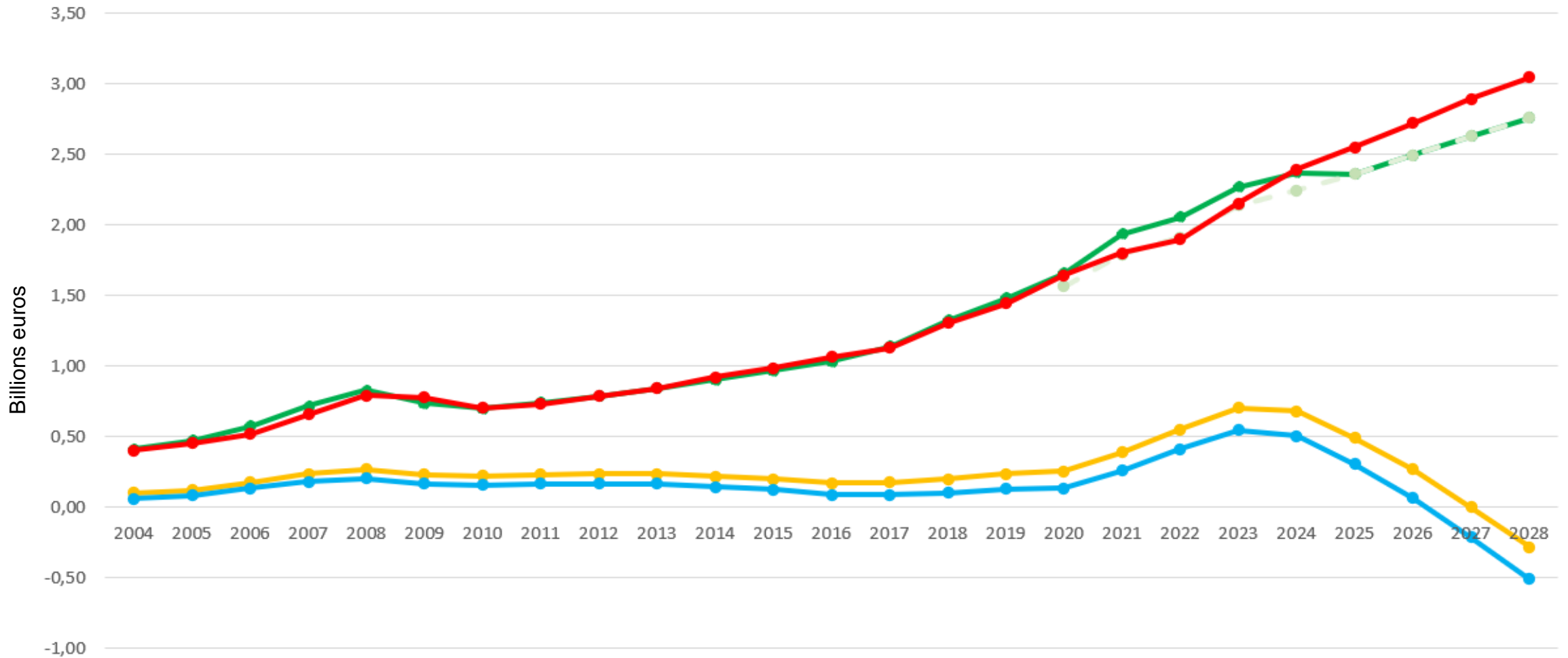
Inflation, Prices of health expenses



Revenues and health expenses per person – actual and forecasted data



Revenues, health expenses and reserves of EHIF 2004-2028



Revenues; Revenues without the transfers from state budget;

Health expenses;

Retained earnings from previous periods; Reserves in total (incl the retained earnings)

Public Health Actuaries for the Public Good

Terry Narine

Chairperson Health Forum of the IAA

terrynarine@actuwit.com

The Challenge

- ▶ Health Care costs are out of control
 - ▶ Increasing percentage of national GDP (Fraser study)
- ▶ Medical inflation is exceeding global inflation - supply chain issues
- ▶ Developed nation populations are ageing
 - ▶ Fertility rates are falling
 - ▶ People are living longer
 - ▶ Medical care is keeping people alive longer
 - ▶ But with increased medical costs
- ▶ Labor and resource shortages in the medical field are increasing
 - ▶ Doctor shortage
 - ▶ Less nurses and other medical workers
- ▶ Climate change is introducing new diseases
- ▶ Ill equipped for Super Bugs, or the next pandemic

A Possible Solution

- ▶ What can the Actuary do to model all these factors?
- ▶ Is there an interest in getting into this work?
- ▶ Create a National Health Actuary role within governments
 - ▶ Embed actuaries in government health departments
 - ▶ Some precedent for actuaries in government
 - ▶ Chief Health Actuary in Medicaid in the US
 - ▶ Actuaries that work in the Treasury department in the UK
 - ▶ Chief Actuary in Canada for pensions
- ▶ Engage Supra-Nationals (OECD, WHO) to assist with the mandate
- ▶ Leverage relationships with insurance regulators
- ▶ Further define the role that actuaries can play in this emerging risk

POLICY RECOMMENDATIONS

- ▶ Is there a Global view of the issue?
- ▶ Can we make a promise to the future and future generations?
- ▶ Develop models to address sharing of limited health care resources equitably amongst different populations
- ▶ Encourage funding models to support more geriatric doctor and nurses
- ▶ Less obstetricians
- ▶ Consider models to promote equity to disadvantaged groups
- ▶ Health care is changing - actuaries need to play a role
- ▶ Expand role of the actuary
- ▶ Predictive analytics and regression analysis skills
- ▶ AI? Algorithms?

// THE CATALYSTS OF CHANGE ARE HERE, TODAY, AND EVERYWHERE

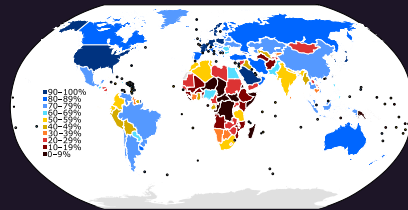
Personal Computing Power



IBM PC
0.7 x 10⁶ FLOPS | 20 kg
(1980)

iPhone 15
2 x 10¹² FLOPS | 0.2 kg
(2023)

Global Access to Information



5 billion people online today

Cheap, Smart Diagnostics & IoTs



1.1 billion wearables sold in 2022

COVID-19 *(aka Chief Digitisation Officer)*



Proof that much of healthcare can be delivered and financed remotely

This enables healthtech – connected technologies that enhance any aspect of health

