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The Financial Immune System

A health-economics model of insurance, human capital and lifetime wealth. Why a health shock is a balance-sheet shock.

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EXECUTIVE SUMMARY

A health shock is a balance-sheet shock

When New Zealanders think about serious illness or injury, they picture a medical event: a diagnosis, a treatment, a hospital. The economics tells a wider story. A health shock is also a financial event, and for most households it is one of the largest of their lives.

The reason is simple. For a working-age family, the single biggest asset on the balance sheet is not the house or the KiwiSaver account. It is the present value of everything the household will earn over the rest of its working life, its **human capital** (Becker, 1964). Health is the durable capital good that produces that earning power (Grossman, 1972). Damage health and you do not just incur medical bills; you impair the asset that pays for everything else. This paper draws on Grossman's health-capital theory, Becker's human capital, Arrow's (1963) economics of insurance under uncertainty, and modern evidence on what happens to households after a serious health event (Dobkin et al., 2018). From it we build one framework, the **Health-to-Wealth Transmission Mechanism**, and show where each protection tool breaks the chain.

The New Zealand setting sharpens the point. ACC replaces 80 per cent of earnings, but only after an *accident*. It pays nothing for the illnesses, cancer, stroke, mental-health and musculoskeletal conditions, that cause most long-term inability to work. For illness, the state fallback is the means-tested Supported Living Payment of $424.60 net a week (Work and Income, April 2026), a fraction of a professional salary. The country's largest asset is, for its most common threat, almost entirely uninsured by the state.

SMITHS FINDING 03

"The economic purpose of insurance is not simply to pay a claim. It is to protect the household's future earning power, liquidity and long-term wealth trajectory."

largest

human capital is the biggest asset most working households own (Becker, 1964)

persistent

earnings losses and out-of-pocket costs follow a serious health shock for years (Dobkin et al., 2018)

11%

of New Zealanders hold income protection, the tool that defends the largest asset (FSC, 2022)

The chapters that follow set out the theory behind this claim, the framework that traces the shock through the balance sheet, a mapping of each protection tool to the link it breaks, two New Zealand case studies, and the national under-insurance gap that leaves the country's largest asset exposed.

A household does not choose whether it carries the risk of a health shock. It only chooses whether that risk is insured, or paid for out of its own future.

THE ECONOMIC PROBLEM

The asset no statement records

A household balance sheet, as usually drawn, lists the house, the KiwiSaver balance, the managed funds, the car, and the mortgage against them. It is a tidy picture, and it is missing the most valuable line of all.

1. Human capital dwarfs the visible balance sheet

A couple in their thirties earning a combined $180,000, with thirty working years ahead, command a stream of future earnings whose present value runs into the millions. That stream is an asset in exactly the sense Becker described, yet for most of working life it is larger than the house and the retirement savings combined.

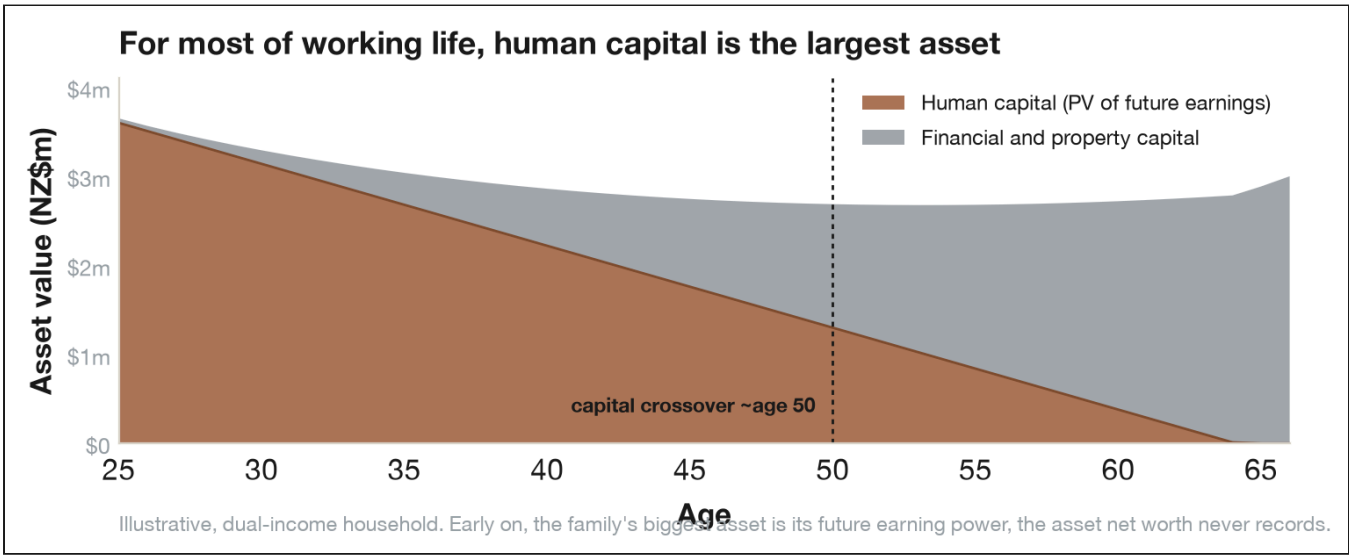
2. Health is the capital that produces it

Grossman modelled health itself as a durable capital stock. It depreciates with age and can be damaged by a shock. It produces *healthy time*, the input that lets human capital earn, so a health shock is a sudden depreciation in this capital good, and the loss flows straight through to earnings.

3. The risk is uninsured by default

Most households insure the house and the car, the assets they can see. The largest asset, future earnings, is usually left exposed. Arrow (1963) showed why insurance exists: to transfer resources from the good states of the world to the bad ones. A family whose wealth is mostly uninsured human capital holds an enormous unhedged position.

> **The right question is not "can we afford the medical bills?" It is "what happens to the asset that pays for everything, the moment one earner cannot work?"**



Human capital is the largest asset a household owns for most of working life, and the one most exposed to a health shock.

THE THEORY BEHIND IT

Sixty years of economics, in one idea

The claim that a health shock is an economic shock is not an opinion. It rests on a deep and well-established body of economic theory and evidence.

Health as capital, and the shock as a jump in δ

Grossman models health as a durable capital stock H that depreciates at a rate δ which rises with age, and is replenished by gross investment through medical care and the person's own time. The demand for health is *derived* from the demand for healthy time, the input that lets human capital earn. In equilibrium the marginal efficiency of health capital equals its user cost, $r + \delta$ less any change in the relative price of health. A serious diagnosis is precisely a sudden jump in δ: the stock depreciates faster, healthy time falls, and earnings fall with it. We run this relation in Appendix A.1; it is the engine under everything that follows.

Grossman, M. (1972). On the Concept of Health Capital and the Demand for Health. Journal of Political Economy, 80(2), 223–255.

Human capital is the household's largest asset

Becker formalises human capital as the present value of future earnings generated by investment in education, training and health. For a working household it usually exceeds the house and the retirement account combined, and it is the asset a health shock attacks first.

Becker, G. S. (1964). Human Capital: A Theoretical and Empirical Analysis. Columbia University Press for the NBER.

Human capital is risky, and for the young it is equity-like

A subtle point with a sharp edge. Discounting future earnings as if they were safe overstates their value; human capital is not riskless. Benzoni, Collin-Dufresne and Goldstein show that the stock and labour markets are cointegrated, so a young worker's human capital is effectively *stock-like*, it co-moves with equities over a career. That cuts against the standard lifecycle-fund glidepath, which loads the young into maximum equity on the premise that their human capital is bond-like and safe. If it is closer to equity, the young are already long the market through their earnings, and the case for piling on still more financial equity is weaker than the glidepath assumes. We return to this in Appendix A.1.

Benzoni, L., Collin-Dufresne, P. & Goldstein, R. S. (2007). Portfolio Choice over the Life-Cycle when the Stock and Labor Markets Are Cointegrated. Journal of Finance, 62(5), 2123–2167.

Insurance, uncertainty and state-contingent claims

Arrow showed that insurance moves resources across states of the world, paying out in the bad state (illness, disability, death) so consumption need not collapse. In the Arrow-Debreu framework, state-contingent claims let households insure against states such as illness; real insurance products approximate them.

Arrow, K. J. (1963). Uncertainty and the Welfare Economics of Medical Care. American Economic Review, 53(5). Debreu, G. (1959). Theory of Value.

Why the market fails the people who need it most

Insurance markets are shaped by information. Akerlof (1970) and Rothschild and Stiglitz (1976) show how adverse selection can unravel coverage when buyers know more than insurers; Pauly (1968) shows how moral hazard arises once cover lowers the cost of a claimable event. Hendren sharpens the consequence: because applicants know their own risk better than insurers, a no-trade result emerges, and the disability, long-term-care and life markets partially *unravel* exactly where need is highest. The applicants most likely to claim are declined or priced out. So under-insurance is not only a behavioural failure to buy; for a meaningful group it is a market that will not sell. Waiting periods, exclusions and underwriting are how the industry manages, but does not eliminate, this.

Hendren, N. (2013). Private Information and Insurance Rejections. Econometrica, 81(5), 1713–1762. Akerlof (1970), QJE; Rothschild & Stiglitz (1976), QJE 90(4); Pauly (1968), AER 58(3).

What actually happens after a health shock

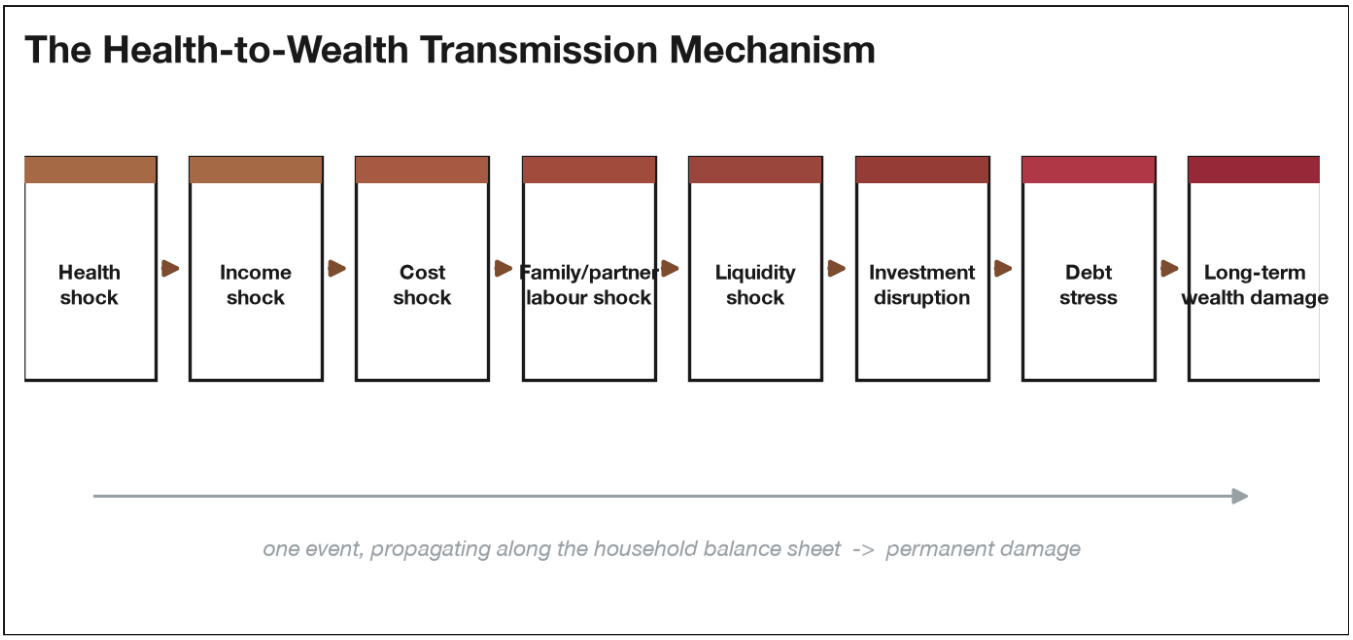
Modern event-study evidence is unambiguous. Dobkin and colleagues find large, persistent earnings losses, rising out-of-pocket costs and higher bankruptcy after an unexpected hospital admission. Spouses adjust their labour supply (Coile, 2004). Chetty's decomposition is the key to product design: about **60 per cent** of the value of insurance comes not from consumption-smoothing in the textbook sense but from the *liquidity* it provides at the bad moment, relaxing a binding borrowing constraint just when the household would otherwise be forced to sell assets or default. This is the precise reason a trauma lump sum can beat simply holding more life cover: its worth is the cash in the worst week, not the eventual cheque.

Chetty, R. (2008). Moral Hazard versus Liquidity and Optimal Unemployment Insurance. JPE 116(2), 173–234. Dobkin et al. (2018), AER 108(2); Coile (2004), JOLE 22(3).

THE SMITHS FRAMEWORK

The Health-to-Wealth Transmission Mechanism

A health shock does not stay in the clinic. It travels through the household balance sheet along a predictable chain, and at each link it can either be broken or allowed to run on to the next.



One health event propagates along the household balance sheet, link by link, until it reaches long-term wealth. Each link can be broken, or left to run on to the next.

Each link follows from the one before. A serious diagnosis or injury stops or reduces an earner's ability to work, producing an **income shock**, while treatment and care drive a **cost shock**. A partner often cuts back paid work to provide care, the **family labour shock**, deepening the loss. With less coming in and more going out, the cash buffer drains: a **liquidity shock**.

That is the point at which a medical event becomes a wealth event. To meet the gap, the household sells growth assets and stops saving, an **investment disruption**, often locking in losses. Repayments become hard to service, the **debt stress** link. The end of the chain is **long-term wealth damage**: a permanently lower trajectory, because assets sold in a crisis and contributions never made do not come back when health recovers.

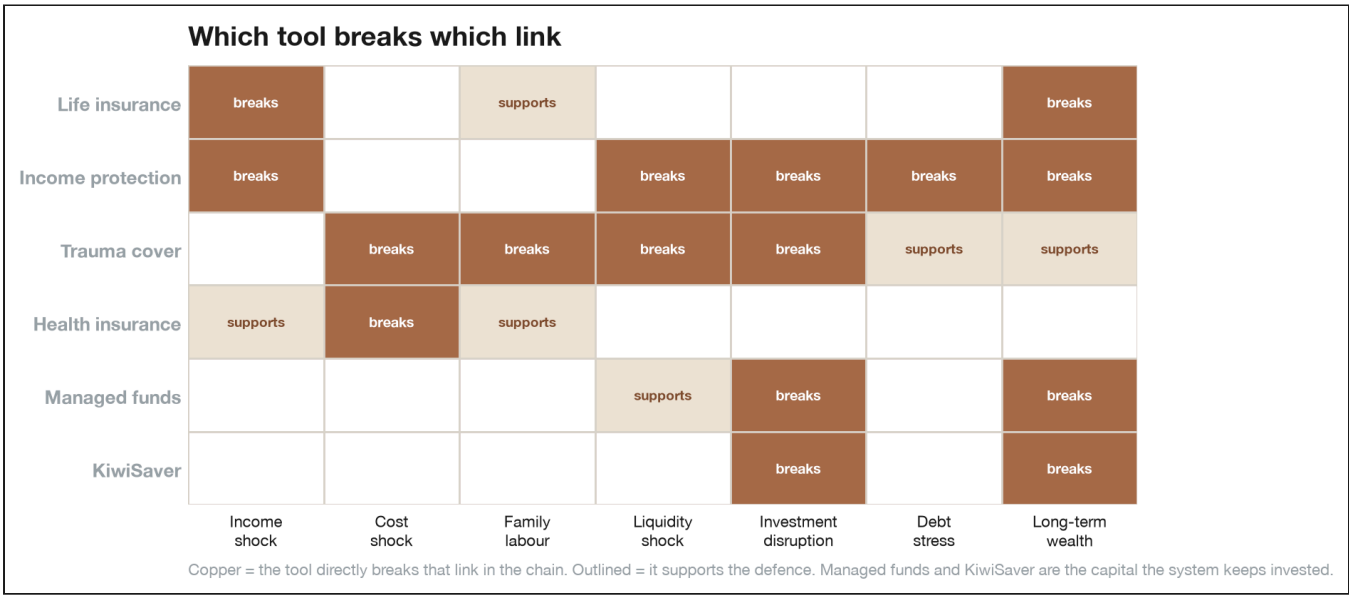
> **Resilience to a health shock is simply the number of links a household can break before the chain reaches its long-term wealth.**

This reframes insurance. Each protection tool is a circuit-breaker on a specific link of the same chain.

Each tool breaks a different link

A financial immune system is not one product. Like a biological immune system it is a set of defences, each suited to a different threat at a different point in the chain.

PROTECTION TOOL	THE LINK IT BREAKS	WHAT IT ACTUALLY DOES
Life insurance	Income shock (on death); wealth damage	Replaces the lost future income of a family, the human capital that dies with an earner.
Income protection	Income shock; liquidity; investment; debt	Pays a monthly income while an earner cannot work, protecting human capital directly.
Trauma cover	Cost; family labour; liquidity	Pays a lump sum on a serious diagnosis, creating immediate liquidity when it is needed most.
Health insurance	Cost shock; speed of recovery	Protects access to and timing of treatment, shortening the income and care disruption.
Managed funds	Investment disruption (protected)	Flexible capital that, once liquidity is secured elsewhere, can stay invested through the shock.
KiwiSaver	Long-term wealth (protected)	Long-horizon capital whose contributions should keep running rather than being stopped or withdrawn.



Which tool breaks which link. The first four tools intervene in the chain; managed funds and KiwiSaver are the long-term capital the system exists to keep invested and growing.

The structure matters. Income protection and trauma cover are the tools that break the chain *early*, at income, cost and liquidity, before the household is ever forced to sell growth assets or stop saving. That is why they do the most to protect the long-term wealth trajectory, even though they are the cover New Zealand households are least likely to hold.

TWO NEW ZEALAND HOUSEHOLDS

The same shock, two outcomes

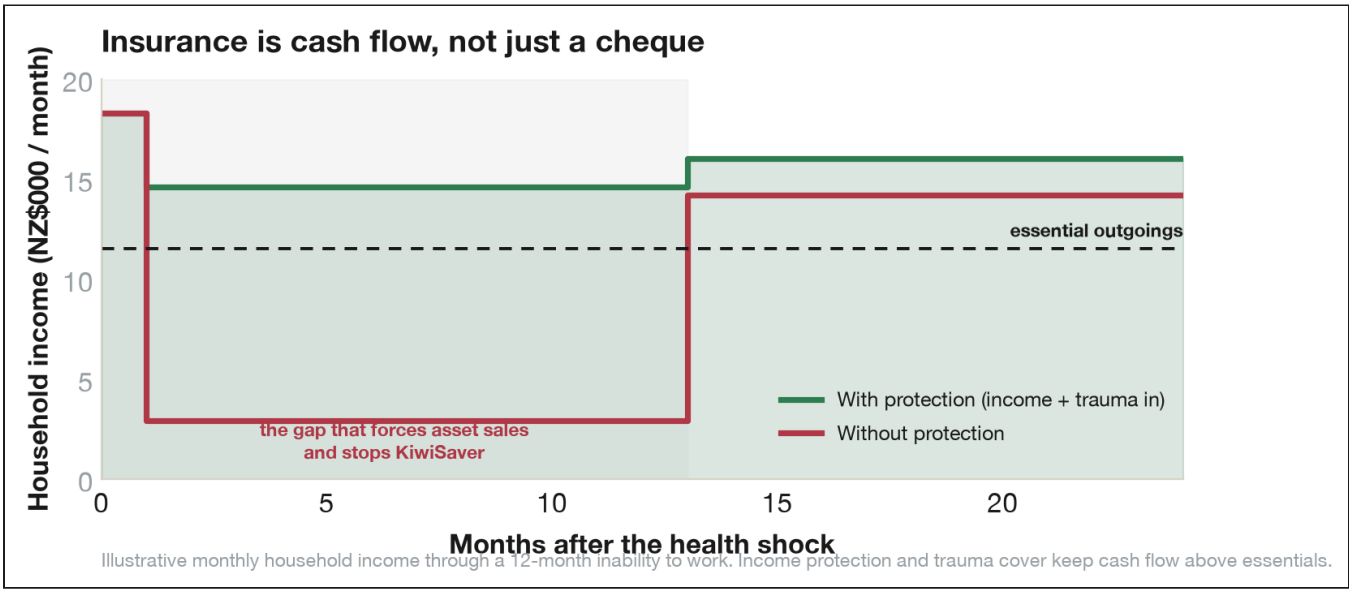
Consider two real-shaped New Zealand families, alike in almost every way. Both are forty, both earn well, both carry a large mortgage and two young children. One has a financial immune system. One does not. Then the primary earner is diagnosed with a serious illness and cannot work for a year. Because it is illness, not accident, ACC pays nothing; everything turns on the private cover each family holds.

The Reillys · no immune system	
Family home (Auckland)	$1.20m
Managed funds (growth)	$0.15m
KiwiSaver (combined)	$0.12m
Cash buffer	$0.01m
Mortgage	−$0.90m
Net worth	**$0.58m**

Income $220k. Cover: a small group life policy only. No income protection, no trauma cover, public health system, two weeks of cash. A shock forces the sale of the managed funds, stops KiwiSaver and pushes debt onto the credit card.

The Okafors · with immune system	
Family home (Auckland)	$1.20m
Managed funds (growth)	$0.15m
KiwiSaver (combined)	$0.12m
Cash buffer	$0.03m
Mortgage	−$0.90m
Net worth	**$0.60m**

Income $220k. Cover: needs-based life, income protection (about $8,750/month), $250k trauma, full health insurance. The income keeps flowing, the lump sum creates liquidity, the funds stay invested and KiwiSaver keeps running.



Illustrative monthly household income through a 12-month inability to work. Income protection and trauma cover keep cash flow above essentials.

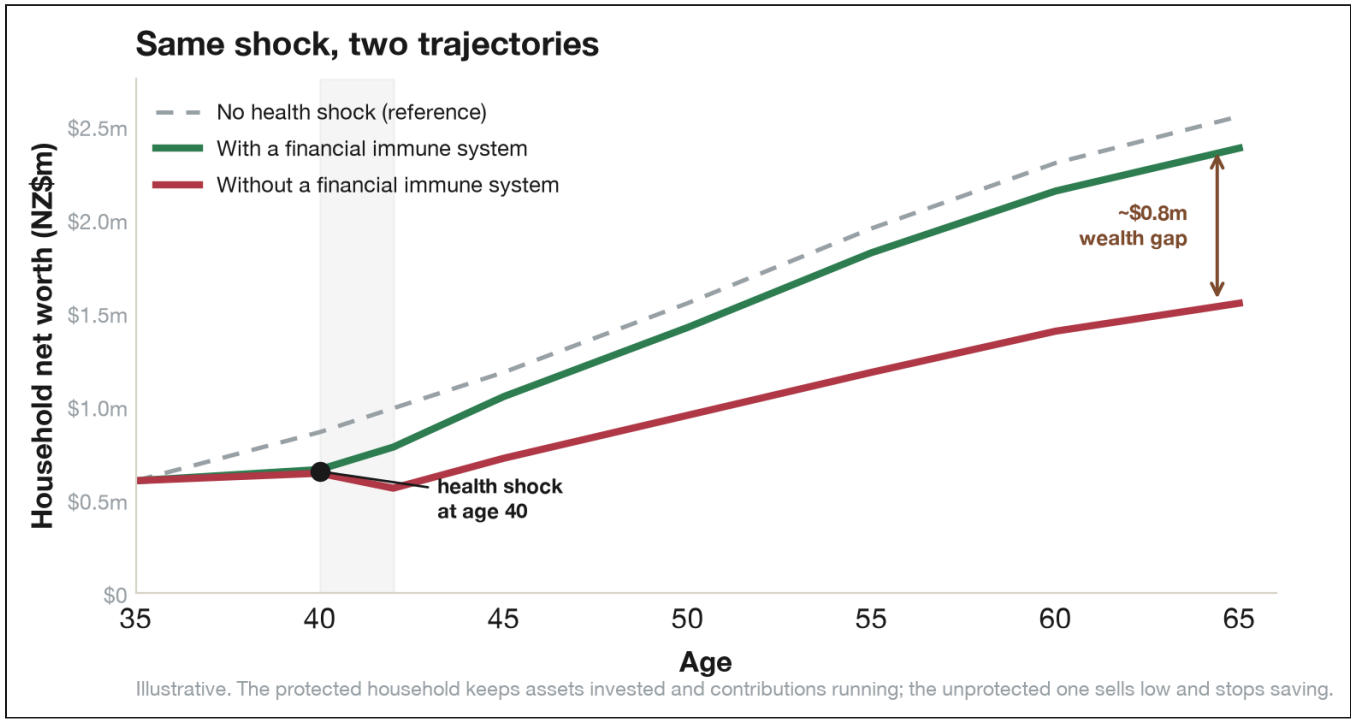
Through the twelve months an earner cannot work, the protected household's income stays above essential outgoings. The unprotected household falls into a gap it can only fill by selling assets.

Illustrative households built to representative New Zealand parameters. The two start within $20,000 of each other in net worth; the difference is entirely in how their balance sheets are protected.

THE COST OF AN UNBROKEN CHAIN

A gap that compounds for thirty years

The two families begin the shock almost identical. They do not end it that way. The damage is not the medical bill; it is what the unbroken chain does to the wealth trajectory.



The same health shock at age 40, two trajectories. The unprotected household never regains the path; by retirement the gap is on the order of $800,000.

The Reillys, without

- Income collapses; the partner cuts work to provide care, deepening the loss.
- The cash buffer is gone in weeks; managed funds are sold to pay the mortgage and costs.
- KiwiSaver contributions stop for the duration; years of compounding are lost.
- Credit-card debt builds. Net worth falls and the long-term trajectory bends permanently lower.

The Okafors, with

- Income protection replaces the lost earnings; essentials and the mortgage are still met.
- The trauma lump sum funds treatment, care and the cost shock, keeping liquidity intact.
- Managed funds stay invested through the shock; nothing is sold at the wrong time.
- KiwiSaver keeps running. The trajectory bends only briefly, then rejoins its path.

The lesson is the asymmetry. The Reillys are not careless and not poor. They simply left the largest asset, their earning power, uninsured, so a survivable medical event became a permanent wealth event. The Okafors paid modest premiums for years and, in return, kept their long-term plan intact through the worst year of their lives.

Trajectories are illustrative, built to representative New Zealand parameters; the reference line assumes no shock occurs.

THE NEW ZEALAND PICTURE

The ACC carve-out, and the gap it leaves

New Zealand has a feature no other framing of this problem can ignore. ACC covers income loss and treatment from *accident*, and only accident. The single most important fact for a New Zealand household is what ACC does *not* cover.

Where an accident stops someone working, ACC pays weekly compensation at 80 per cent of pre-incapacity earnings, up to a cap of $2,418.55 gross a week, about $125,800 a year (ACC, 2025/26). That is a genuinely strong public backstop. But it is built around personal injury by accident. **Illness is outside it entirely**: cancer, stroke, heart disease, most mental-health conditions and most gradual or degenerative musculoskeletal problems trigger no ACC weekly compensation at all. And illness, not accident, causes the large majority of long-term inability to work.

> **For the most common reason a New Zealander cannot work, ACC pays nothing. The state fallback is the means-tested Supported Living Payment of $424.60 net a week (Work and Income, April 2026), roughly $22,000 a year, against a professional salary several times larger.**

This is why the whole income-protection and trauma proposition in New Zealand hinges on the accident/illness line. Income protection carries the full weight of the illness risk that ACC declines; trauma cover supplies the liquidity ACC never provides for a serious diagnosis. The country's largest asset is, for its most likely threat, almost entirely uninsured by the state, and yet privately under-insured as well.

11%

of New Zealanders hold income protection; trauma cover 18%, TPD 14% (FSC, 2022)

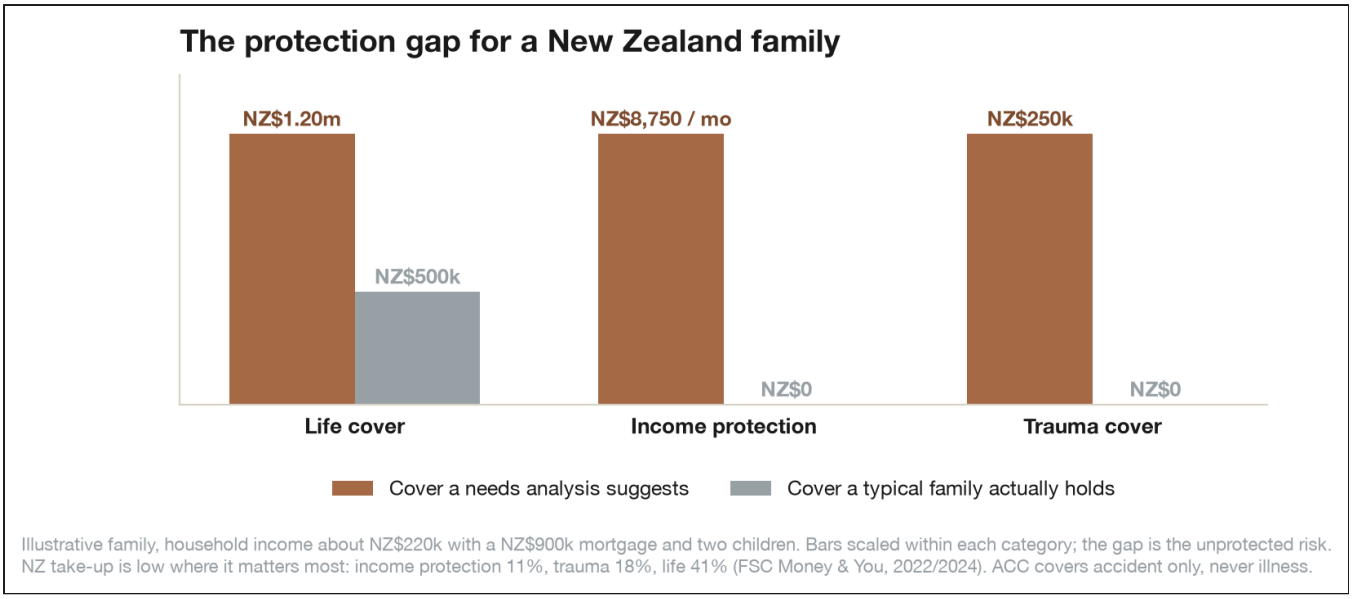
~41%

hold any life insurance; ~39% any health insurance (FSC Money & You, 2024)

~70%

of New Zealanders are under-insured against the risks they actually carry (FSC / Massey)

The gap is largest exactly where it matters most. Life cover, when held, is often a fraction of the income and debt it would need to replace. Income protection, the tool that defends human capital directly and carries the entire illness risk ACC excludes, has the lowest take-up of all at 11 per cent, even though loss of earning power is the most common and most damaging shock a working household faces. Trauma cover, which creates the liquidity that keeps the chain from breaking, is held by fewer than one in five.



The protection gap for a representative New Zealand family. The gap is the unprotected risk: the part of the household's largest asset that no policy stands behind.

This is not a failure of intelligence or of care. It is a failure of *visibility*. Because human capital never appears on a statement, the risk to it is invisible until the day it crystallises, and by then it cannot be insured. The whole purpose of a financial immune system is to make that invisible asset, and the cover that protects it, part of the plan before the shock arrives.

WHAT IT MEANS FOR YOUR MONEY

Building a financial immune system

Protect the income first

The largest asset is future earnings, so the first defence is income protection. It breaks the chain at its earliest link, before any asset has to be sold or any contribution stopped.

Create liquidity for the worst case

Trauma cover turns a severe diagnosis into a lump sum. That liquidity is what lets a family pay for care, free a partner to step back from work, and avoid selling growth assets at the wrong moment.

Protect access and timing

Health insurance shortens the disruption itself. Faster treatment means a faster return to work and a smaller income shock, which protects every link downstream.

Keep the long-term capital invested

The point of the first three tools is to let managed funds stay invested and KiwiSaver keep contributing through the shock. Long-term capital does its work only if it is never disrupted.

Notice what this does to the conversation about insurance. Premiums are not a cost bolted onto a financial plan; they are the price of keeping the plan intact when life tests it. A modest, regular outflow buys the household the ability to leave its wealth-building engine running through the one event most likely to switch it off.

The honest counterargument: when more cover is not the answer

The central claim of this paper is that most New Zealand households are under-insured. Intellectual honesty requires stating, plainly, the conditions under which that claim is wrong and more cover is *not* optimal. There are several, and they are not edge cases.

- **No dependents.** Life cover exists to replace income others rely on. A single person with no one depending on their earnings needs little or none of it; the human-life value is real but no household consumption collapses on their death.
- **High liquid wealth.** A household that can self-fund a long income loss from liquid assets is, in effect, already self-insured. Precautionary saving substitutes for cover (Hubbard, Skinner & Zeldes, 1995), and paying premiums on top is a deadweight drag.
- **An accident-dominated risk profile.** A worker whose realistic risk is overwhelmingly physical injury is already covered by ACC at 80 per cent. Layering a full illness-priced income-protection policy on top can be poor value for that specific profile.
- **Mis-sold or over-long product.** Whole-of-life cover sold as investment, benefit periods longer than the human capital they protect, and duplicate trauma cover are all genuine over-insurance. Premiums spent on cover a household does not need are a drag on the very wealth the cover is meant to defend.

So the aim is not the most protection possible. It is enough protection, sized to the income and debt actually at risk and to the risks ACC leaves uncovered, to keep a survivable shock from becoming a permanent one. Under-insurance is the common failure; over-insurance is the real and opposite one.

> **The order matters: protect the income first, then create liquidity, then protect access. Only once those defences are in place can the long-term capital be left to do its work.**

This is also why the defences belong together rather than one at a time. A household with trauma cover but no income protection still breaks at the very first link; a household with income protection but no liquidity still scrambles for cash in the first month. The immune system works because each component covers a different threat, and the chain is only as strong as its earliest unbroken link.

IN ONE SENTENCE

"Insure the asset that pays for everything else, so a health shock bends the wealth trajectory for a year instead of breaking it for a lifetime."

WHAT THIS MEANS IN PRACTICE

From a diagnosis to a plan

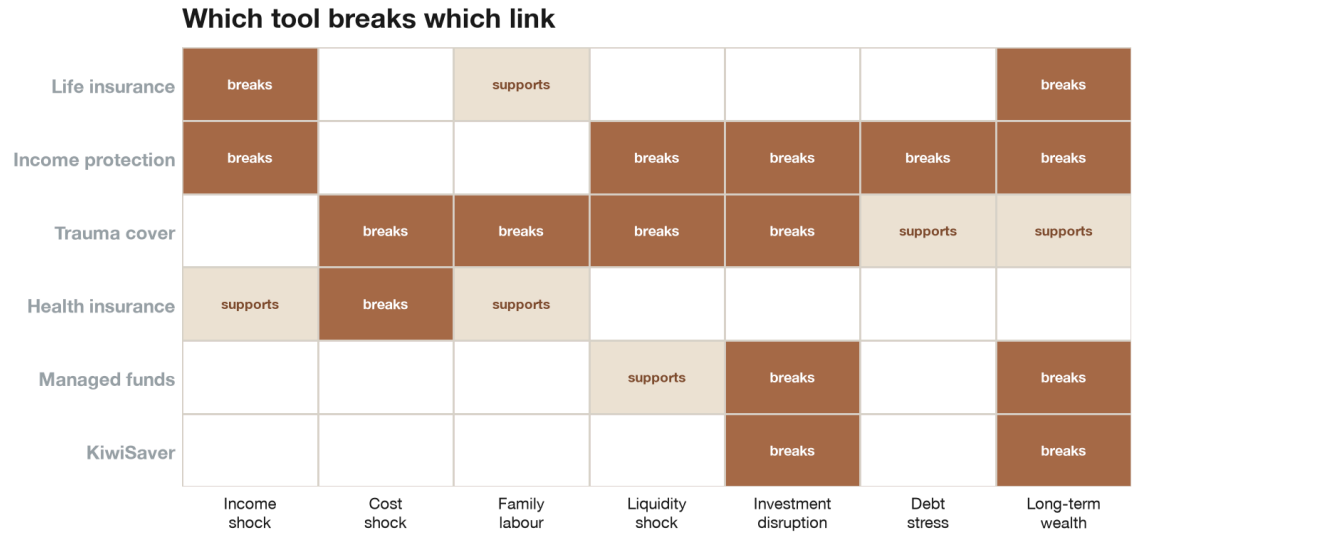
Applying the transmission mechanism to a real household is a short, structured exercise.

- **Value the human capital.** Estimate the present value of future earnings. For most working families it is the largest number on the page, and the one no statement shows.

- **Trace the chain.** Ask what happens at each link if an earner cannot work: income, costs, the partner's hours, the cash buffer, the funds, KiwiSaver, the mortgage.
- **Find the earliest unbroken link.** Resilience is set by how early the chain can be interrupted. A household with no income protection breaks at the very first link.
- **Match a tool to each exposed link.** Income protection, trauma cover, health insurance and life cover, sized to the actual income and debt at risk, not to a round number.
- **Protect the long-term capital.** Structure cover so that managed funds and KiwiSaver can keep running through a shock rather than becoming its first casualties.

None of this requires the household to be wealthier. It changes the *shape* of the balance sheet, not its size. The same family, with the same net worth, can be one diagnosis from forced selling or fully able to ride the shock out, and the difference is entirely in whether the largest asset was insured.

> **A household does not get to choose whether it carries the risk of a health shock. It only gets to choose whether that risk is insured or self-funded out of its future.**



Each defence breaks a specific link. Together they form the financial immune system, keeping a health shock from ever reaching the long-term wealth trajectory.

TECHNICAL APPENDIX

Model, assumptions and data

A.1 The Grossman model, run: health as capital and the shock as a jump in δ

Grossman (1972) treats health as a durable capital stock H. It depreciates each period at a rate δ that rises with age, and is replenished by gross investment I produced from medical care and the person's own time. The household does not demand health for itself; it demands the *healthy time* that H yields, which is the input that lets human capital earn. So the demand for health is derived, and the optimal stock is the one where the marginal efficiency of health capital, its marginal value product, equals its user cost:

$$\text{MEC}(H^*) = r + \delta(\text{age}) - \pi_H$$

Here r is the discount rate, δ(age) the age-rising depreciation rate, and π_H the rate of change in the relative price of health capital. The line in the body, "a health shock is a sudden jump in the depreciation rate," is now literal: a serious diagnosis sends $\delta \to \delta + \Delta$. User cost rises, the optimal stock H^* falls, healthy time contracts, and earnings fall with it. The entire transmission chain is this single shock to δ propagating through human capital to the balance sheet.

A.2 Valuing human capital properly

The naive valuation discounts future earnings as if they were safe. For earnings E, growth g, discount rate r and n years remaining:

$$\text{HC} = \sum_{t=1..n} E \cdot (1+g)^t / (1+r)^t$$

Three corrections matter. **(a) The discount rate.** Human capital is not riskless. Benzoni, Collin-Dufresne and Goldstein (2007) show the labour and stock markets are cointegrated, so for a young worker it is equity-like and should be discounted at a higher, risk-adjusted rate r_h. The practical implication is uncomfortable for standard glidepaths: a young household already long equities through its earnings has less reason to hold maximum financial equity on top. **(b) Mortality and disability.** Earnings only arrive if the earner is alive and able, so each term should be weighted by the probability p_t of being alive and able to work at t:

$$\text{HC} = \sum_{t=1..n} p_t \cdot E \cdot (1+g)^t / (1+r_h)^t$$

(c) Replacement value is not market value. The gross present value above is the human-life value. What life cover must actually replace is smaller and different: the dependants' lost consumption and unmet obligations, not the deceased's whole earning stream. A needs basis nets out the earner's own consumption and counts existing assets and cover:

$$N = \text{PV}(\text{dependants' consumption + debt + final costs}) - \text{liquid assets} - \text{existing cover}$$

For a couple earning $180,000 with thirty years remaining, the gross PV runs to several million dollars, exceeding the house and the retirement account combined for most of working life (Becker, 1964); the replacement figure that drives a life-cover recommendation is materially lower and household-specific.

A.3 Case-study parameters

PARAMETER	REILLYS	OKAFORS
Household income	$220k	$220k
Mortgage	$0.90m	$0.90m
Cash buffer	$0.01m	$0.03m
Income protection (monthly)	nil	~$8,750
Trauma cover (lump sum)	nil	$0.25m
Health insurance	public	full
Net worth at age 65 (illustrative)	**~$1.5m**	**~$2.3m**

A.4 Transmission-chain logic and the liquidity result

Each link is conditional on the one before. The protected household interrupts the chain at the income, cost and liquidity links, so the investment-disruption, debt-stress and wealth-damage links never fire and managed funds and KiwiSaver are left to compound. The unprotected household leaves every link exposed, and the chain runs to its end. Chetty (2008) shows why the liquidity link matters most: about 60 per cent of the welfare gain from insurance is the liquidity it provides at the bad moment, relaxing a binding borrowing constraint rather than smoothing consumption in the abstract. A trauma lump sum is, in this sense, mostly a liquidity instrument, which is why it can outperform an equivalent dollar of life cover for a survivable shock.

A.5 The ACC carve-out and its data

The New Zealand-specific numbers used in the body are real and current: ACC weekly compensation pays 80 per cent of pre-incapacity earnings for *accident only*, capped at $2,418.55 gross a week, about $125,800 a year (ACC, 2025/26); illness is outside ACC entirely; the state fallback for illness is the means-tested Supported Living Payment, $424.60 net a week for a single person 18+ (Work and Income, effective 1 April 2026). Take-up figures are from the Financial Services Council surveys: income protection 11 per cent, trauma 18 per cent, TPD 14 per cent (2022); life 41 per cent, health 39 per cent (Money & You, 2024).

A.6 Assumptions and limitations

- Case-study households are illustrative, built to representative New Zealand parameters, not survey records.
- Human-capital values depend on the discount rate and earnings path assumed; they are indicative.
- The model is deterministic; a fuller version would treat the timing and severity of the shock as random.
- ACC, Supported Living Payment and FSC take-up figures are real and sourced; dollar trajectories are illustrative.
- This is economic commentary, not product advice; cover features and tax treatment vary.

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About the author

This paper builds on Henry W. Smith's academic work in health economics at the University of Queensland, extending the concept of health as capital into household insurance, income protection and long-term wealth management. Henry W. Smith (BBusMan) is a financial adviser and the author of the Smiths Economic Papers, published by Smiths Insurance & KiwiSaver.

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