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Regressivity in Public Natural Hazard Insurance: a Quantitative Analysis of the New Zealand Case

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Economics of Disasters and Climate Change

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Abstract

Natural hazard insurance is almost always provided by the public sector (directly, or indirectly through public-private partnerships). Given this dominant role of the public sector in hazard insurance, and the importance of shocks in economic dynamics, it is surprising that equity issues have not faced more scrutiny with respect to the design of hazard insurance. The nature of the regressivity we quantify has not been previously identified. We provide a detailed quantification of the degree of regressivity of the New Zealand earthquake insurance program – a system that was designed with an egalitarian purpose. We measure this regressivity as it manifested in the half a million insurance claims that resulted from the Canterbury earthquakes of 2011. We suggest how this regressivity can be remedied with modifications to the programs' structure, and point to how other insurance schemes internationally are likely to also be regressive.

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Notes

1. Natural hazard insurance is also known as catastrophe insurance, disaster insurance, or natural disaster insurance, depending on the context. We use natural hazard insurance for specificity.

2. Belgium, France, Japan, New Zealand, Spain, Switzerland, Turkey, UK, and the USA to name only a few. Section 6 discusses these international programs in more detail.

3. Paudel (2012) provides nine recommendations for designing such PPP schemes. His recommendations include: mandatory participation; adequate enforcement to ensure compliance; public responsibility for the extreme risk (the catastrophic end) of the insured risk, private sector administering of policies; public provision of subsidies through, for example, tax exemptions; public investment in risk mitigation; a (publicly provided) detailed assessment and mapping of risk; and the provision of financial incentives for policyholders to take risk mitigation measures.

4. Kunreuther (2015) suggests that to address issues of equity and fairness, homeowners who cannot afford insurance could be given vouchers tied to loans for investing in loss reduction measures, but this kind of voucher program is yet to be implemented anywhere.

5. The three highest cost earthquakes in the Canterbury sequence are among the top 10 costliest earthquakes for 1980–2015 (by insured losses). Relative to damages, these events were at least twice as well insured as any of the others on the list.

6. *For a 'semi-random' sample of 8000 houses for which we have complete data on all houses (those homes that are in the Residential Red Zone), more than 98% of homes were insured.*

7. Ability to pay is generally measured by annual income. There is no agreed upon standard to determine what vertical differentiation in tax liabilities is most fair (Joint Committee on Taxation 2015).

8. Slitor (1948) used this type of definition to propose a measure of progression: dt(x)/ dx = [m(x) -t(X)]/x; where t(x) is the average tax rate at the income level x and m(x) is the marginal tax rate at that level of income.

9. Kakwani (1977), however, pointed out that by doubling the tax rates at all income levels, the tax progressivity would mechanically increase when using the Musgrave-Thin ratio. This is problematic because progressivity (or regressivity) is supposed to measure the deviation of a tax system from proportionality. Kakwani proposes to use the Gini index only to measure the distributional effects of taxation, and presents an alternative measure using the Lorenz Curve to create a measure that accounts for both the distributional and proportional elements of a tax system.

10. Poterba (1991a), Lyon and Schwab (1991), Bento et al. (2009), and Borren and Sutton (1992).

11. Wier et al. (2005), and Poterba (1991b).

12. In an ‘actuarially fair’ program, the two should be roughly equal.

13. Since the homeowners’ policies in NZ are always ‘all perils’, and there are few disclosure requirments regarding premium prices, we do not know what is the earthquake-peril component of the overall premium that homeowners pay to their private insurers.

14. Part of the motivation for this was the slow rates of repair following the 1931

and 1942 events (NZ Treasury 2015). In the years that followed NZ was hit by a number of disasters including an earthquake triggered tsunami in 1944, an earthquake in 1968 and a major landslip in 1979. The Earthquake Commission Act of 1993 redesigned the scheme. A major development was the phase-out of cover for commercial properties. It also amalgamated the War Damage and Earthquake Fund and the Disaster and Landslip Fund as the Natural Disaster Fund. This is the fund EQC draws from to pay out on claims.

15. Recall the building cover from EQC is capped at NZ$ 100,000 per dwelling. Nguyen and Noy (2018) show that this is, comparatively, a very low premium.

16. Some other areas closer to the epicenter were with wealthier homeowners (especially the Port Hills area that was later red-zoned). The Red Zone area, however, is not part of our analysis. We also note that this earthquake occurred on a previously unknown fault, so no area-specific advanced preparedness could have occurred.

17. On September 4th, 2010, Canterbury was hit by a magnitude 7.1 earthquake. This was followed by a series of aftershocks, the most devastating of which was a 6.3 earthquake on February 22nd, 2011, which took 185 lives.

18. A meshblock is the smallest unit for which Statistics New Zealand collects data, with boundaries related to population. Censuses are conducted every 5 years. The 2011 census was postponed to 2013 because of the earthquakes.

19. The top income is censored at $100,000. In 2006, there were 0.03% of meshblocks where the Med HH Income top censored at $100,000, and in 2001 0.01%.

20. Due to the nature of the available data, we could not identify whether a single homeowner owned multiple properties. Given this missing indicator of the particularly wealthy, our results are likely to be conservative. The identification based on a proxy for wealth (the value of the home) is potentially more informative than the distinction based on average income (per meshblock). The latter suffers, potentially, from the Ecologicial Fallacy (Robinson 1950) – that the statistical correlation between two variables when they are grouped might be different from the statistical correlation of the individual members of these groups. Furthermore, although the property valuation spoke somewhat directly to the wealth of the homeowner, the census income data related to the residents of these meshblocks rather than the homeowners. Thus, for example, a “slum lord” who owned a number of cheaper properties in low socioeconomic areas could not be identified cleary. However, these are unlikely to be very important considerations as the majority of houses were owner occupied (67% of the 2006 Census stated occupied private dwellings were owner occupied).

21. We estimate this with heteroscedastic and cluster robust standard errors (Cameron and Miller 2015). We also performed this analysis at the claim level (rather than summing all claims for a single property). The results were very similar, and are available upon request.

22. we should note here that quantile coefficients tell us about effects on the distribution, not on individuals.

23. One possible reason for the differences across countries is the degree of implicit insurance, in the form of post-disaster assistance, that citizens expect their government to provide (often based on past experiences). See for example Goeschl and Managi (2018).

24. Whether or not it is desirable is outside of the scope of this paper, as answer this question requires also an examination of various unintended consequences of having disaster insurance (see Onuma et al. 2017a; b).

Suffice for us to observe that the international community has decided that more insurance is desirable in its Sendai Framework for Disaster Risk Reduction (the UN General Assembly's international agreement signed in 2015).

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