Causal insights on the spectrum of "fair" insurance tariffs

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In many jurisdictions, insurance companies are prohibited from discriminating based on some given policyholder characteristics. The more stringent regulations are now further requiring to mitigate disparate impact, in terms of profit and/or premium, or proxy discrimination with respect to protected groups. In practice, these conflicting fairness goals cannot be simultaneously achieved when the sensitive attribute is associated with the claim risk. A compromise must be made along the fairness spectrum, ranging from best-estimate (actuarially fair) premiums to corrective (demographically fair) premiums. Along that spectrum lies the aware premium, that does not discriminate directly and admits precisely the demographic disparities that are justified by causality. We propose a methodology to position a given tariff structure on the spectrum and assess its fairness outcome with respect to a given portfolio. We illustrate with high-dimensional real data from a Canadian insurance company, where the sensitive attribute is an indicator of low credit-based insurance score, whose use is prohibited in the province of Ontario. From the policyholder's perspective, premiums that are deemed fair with respect to a specific insurer's portfolio might not lead to fair market-wide premiums. Taking advantage of causal graphs, we study the impact of portfolio composition under various data-generating mechanisms with two insurers. We analyze how aware and corrective estimates from each insurer may generate a market-wide expected price — derived from a mixture of all insurers' prices, weighted by underwriting criteria — that behaves like a different fair premium family. This market-wide price is perceived by regulators and consumers, who are at the centre of fairness considerations.