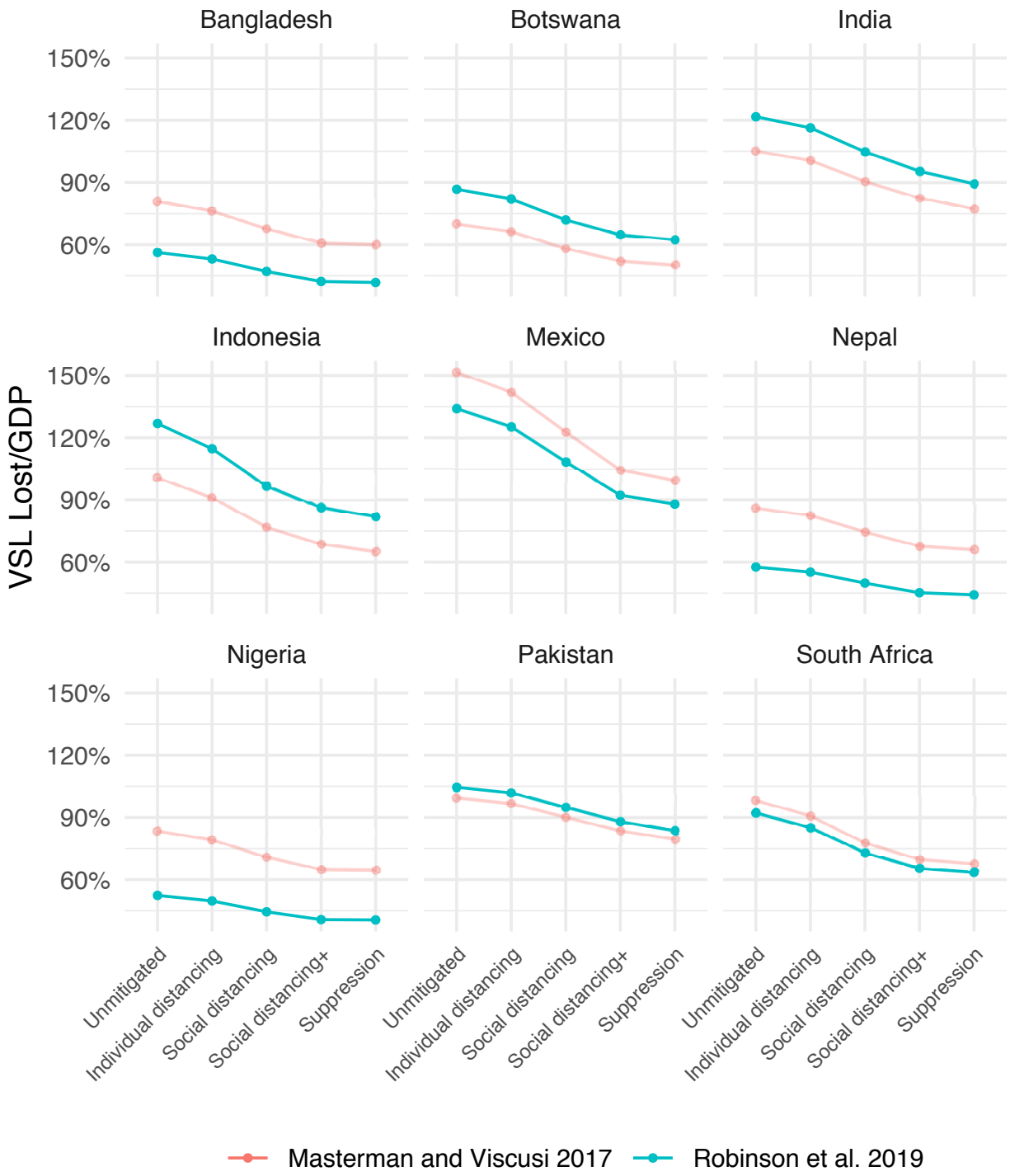
A Robustness checks

A.1 Alternative estimates of the VSL

We re-estimate the relative value of lockdowns and social distancing interventions using an alternative estimate of the VSL for low- and middle-income countries, which uses a higher income elasticity for mortality risk valuation.[11] In Figure A.1 we show estimates of the relative VSL lost for each country under each intervention. The shaded points represent estimates using the VSL from Robinson, Hammitt, and OKeeffe [11], the triangles represent estimates from our primary analysis using the estimates from Viscusi and Masterman [10]. In Botswana, India, and Indonesia the relative value of intervention increases; in Bangladesh and Nigeria the relative value falls.

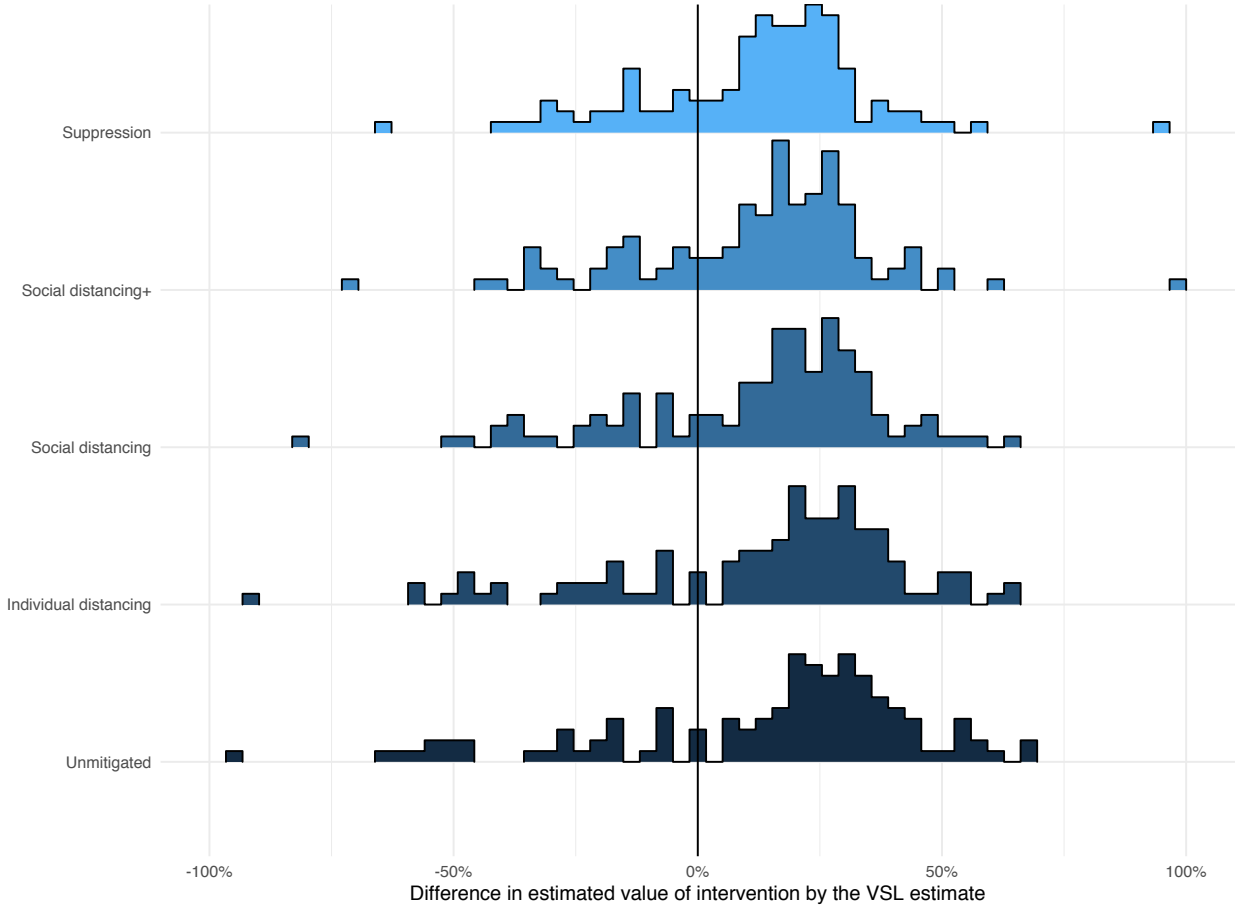
We show the difference between the relative value of each policy between our primary specification and using the VSL estimates in Robinson, Hammitt, and OKeeffe [11] for middle- and low-income countries in Figure A.2. On average our preferred specification finds the relative value of interventions to be 9% higher than if we used the alternative VSL estimates.

FIGURE A.1: Alternative VSL



Note: Point estimates of the relative VSL lost in each country taken from mortality predictions generated by the `squire` model under each scenario, estimates of the VSL from Viscusi and Masterman [10] and Robinson, Hammitt, and OKeeffe [11], and estimates of each country's GDP from the World Bank. The difference in estimates of the VSL between the two sources means that in some countries, including Bangladesh, Mexico, and Nigeria, losses decrease under the alternative VSL estimates. In other countries, including India and Indonesia, the estimated loss is higher under the alternate estimes of the VSL.

FIGURE A.2: Distribution of the Difference in Relative Value of Interventions Using Preferred and Alternative VSL Estimates



Note: The preferred country specific estimate of the VSL are those given by Viscusi and Masterman [10]. Alternative estimates are given by Robinson, Hammitt, and OKeeffe [11]. The distribution in the difference in the relative value of each intervention shows that a switch to the alternative VSL estimates would our estimate of the value of each intervention by approximately 25%.

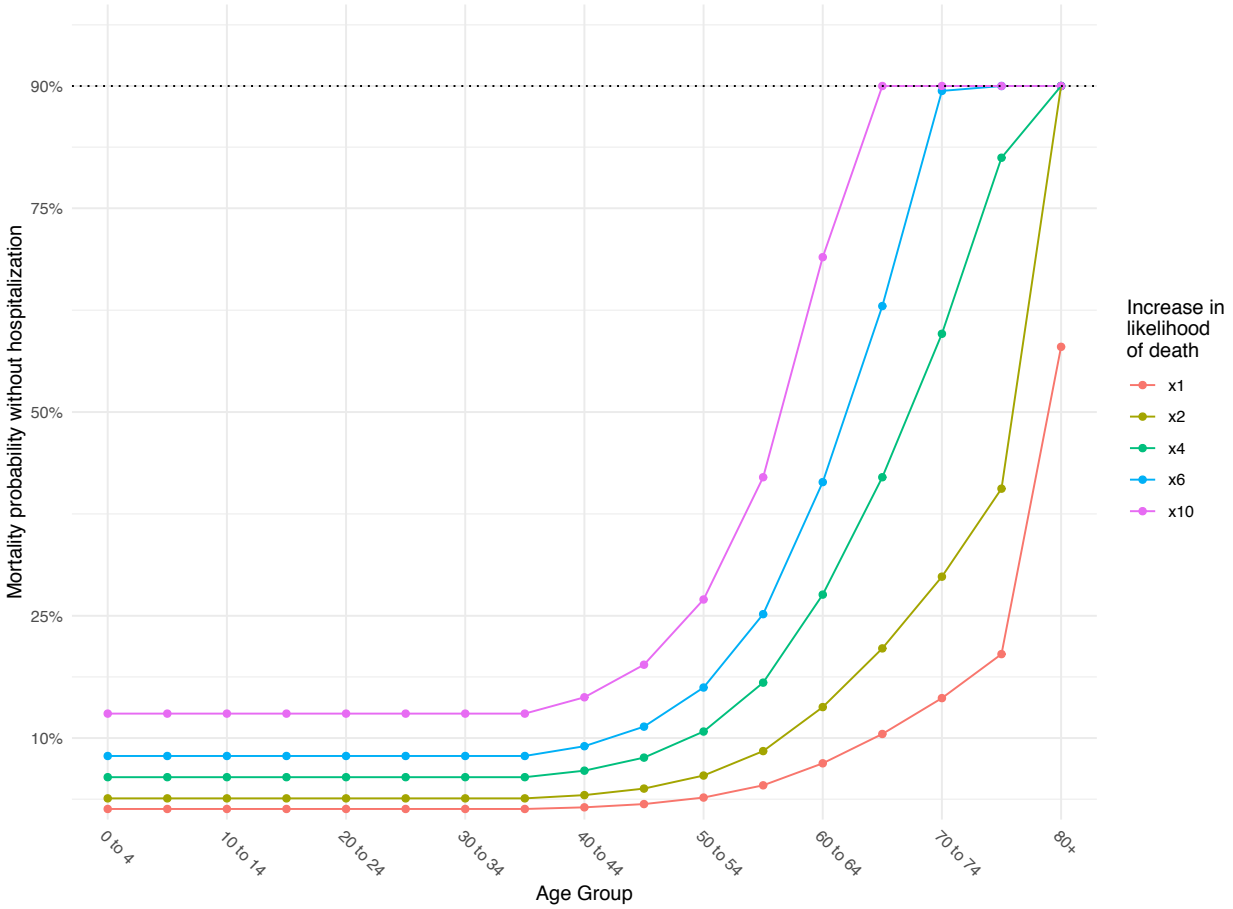
A.2 Alternative excess mortality demand parameters

The epidemiological model distinguishes between COVID-19 cases that are severe—requiring hospitalization—and those that are critical—requiring intensive care. An open question is the likelihood of death for people who require but cannot access hospital or ICU care. In our primary specification we set the age-specific excess mortality parameter to be 100% that of people receiving hospital care, up to a mortality rate of 90%. For example, where the likelihood of a severe cases leading to death is 1.3% for a patient ages 0 to 39, we set the probability of death to 2.6% for patients in this same range that cannot access a hospital bed. Similarly a hospitalized patient age 80 and above dies 58% of the time, and without a hospital bed they die 90% of the time in our preferred specification.[2,3]

As there is presently no effective treatment for COVID-19, much of what is provided to patients in hospitals is considered supportive care. Supplemental oxygen provides relief to patients, but it is unclear whether it leads to a higher survival rate. Of course, if COVID-19 leads to other complications, hospitals are effective at treating those, which can dramatically reduce mortality.

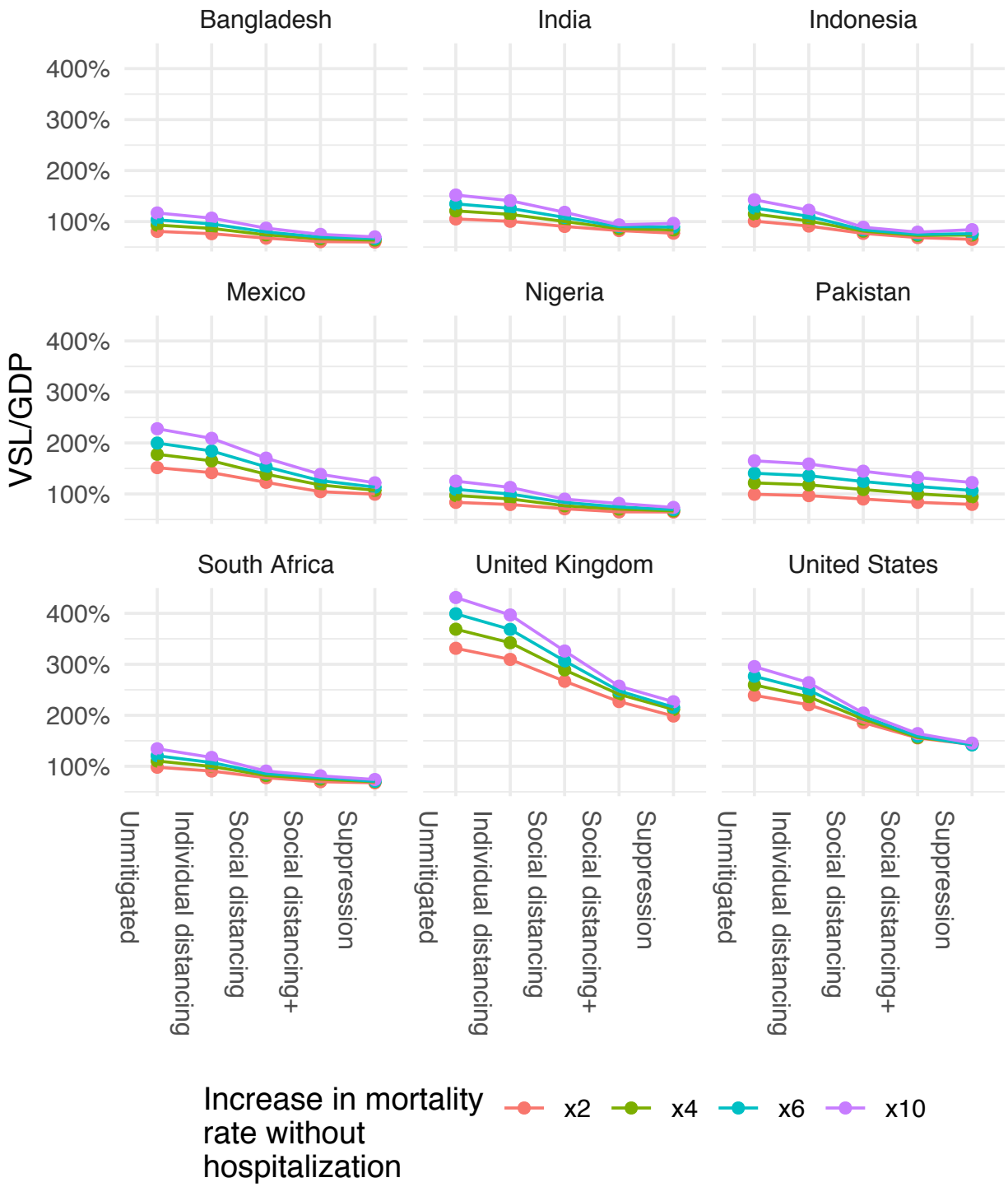
We re-estimate mortality in our model across the same five scenarios using alternative excess mortality rates for severe non-hospitalized cases of four, six, and ten times that of hospitalized cases. We show these excess mortality rates by age group relative to the baseline rate of hospitalized severe cases (x1) in Figure A.3. The relative value of social distancing in each scenario by excess mortality parameter is shown for a set of countries in Figure A.4. The value of social distancing increases in the likelihood of death without hospital care. The peak of COVID-19 becomes proportionally more deadly when a patient requires but cannot access a hospital bed, increasing the value of "flattening the curve." Figure A.5 shows the distribution of the relative value of social distancing by income group, suppression strategy, and excess mortality parameter. Our estimate of the relative value of social distancing is the most sensitive to this parameter in countries that are high and lower middle income. In these countries the efficacy of hospital treatment, or the lack thereof, is a hugely important factor on which to condition the implementation of social distancing policies.

FIGURE A.3: Alternative Parameters for Excess Mortality Rates by Age



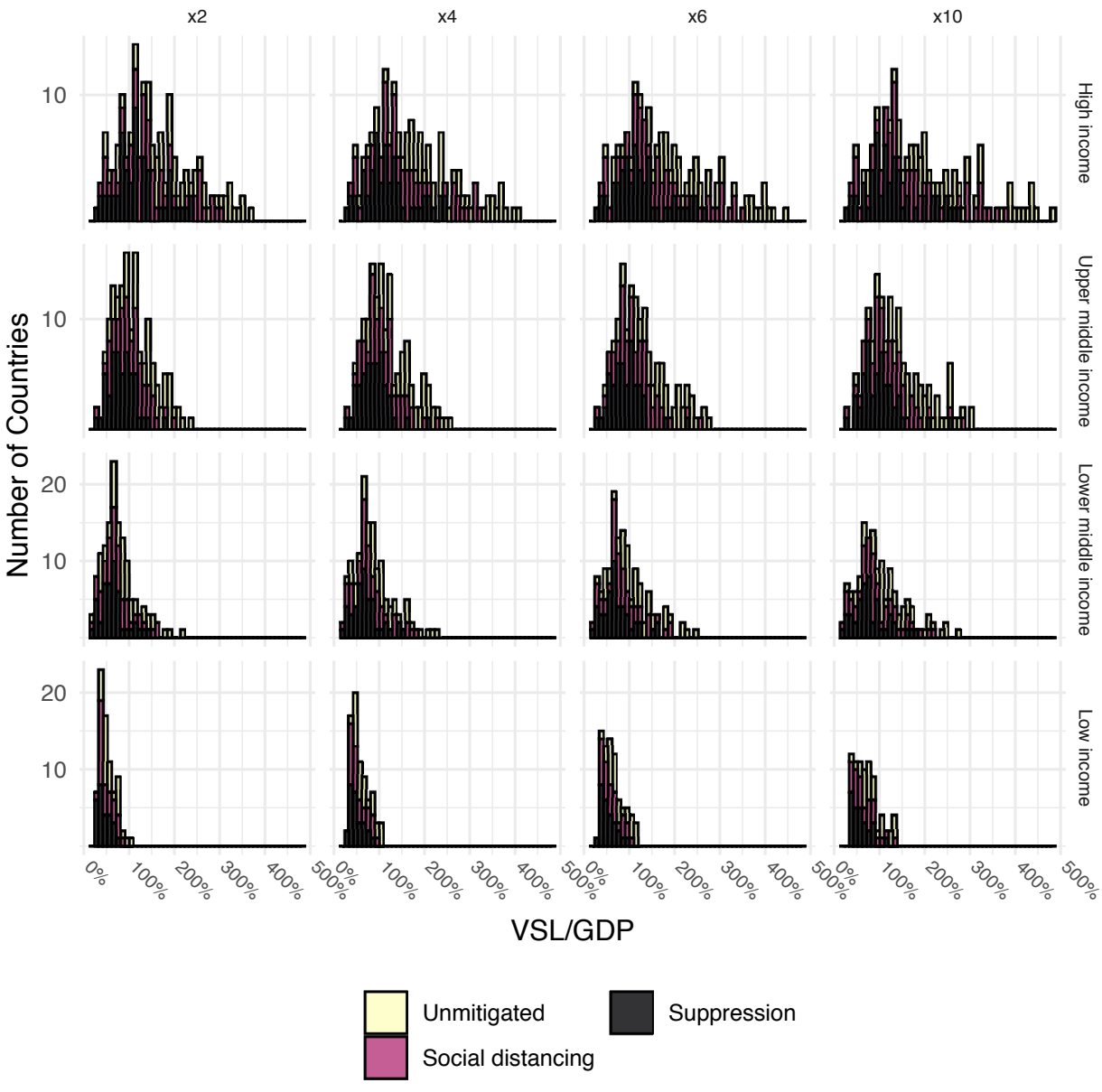
Note: Potential increases in mortality rate by age group for people with COVID-19 who require but cannot receive hospital care. Our primary specification considers an increase in mortality of 100% under this scenario (x2), but we consider a range of parameters of mortality increasing by a factor of four to ten. We limit mortality risk for cases of COVID-19 that require hospitalization but not a ventilator to a maximum of 90%.

FIGURE A.4: Change in Relative Value of VSL by Excess Mortality Measures



Note: Estimated relative loss by mortality parameter, scenario, and country. The increase in mortality rates for people requiring but not receiving hospital care is largest in countries like the United Kingdom and the United States, smaller in countries like Bangladesh and South Africa. This is largely due to the demographics of each country, where younger people are estimated to have lower mortality risk.

FIGURE A.5: Relative Value of Social Distancing by Income Group and Excess Mortality Parameter



Note: The distribution of relative losses given by the estimated total loss of the VSL over the total GDP in each income group across three intervention scenarios and four parameterizations of increased mortality without hospitalization from a factor of two to ten. An increase in mortality greatly increases estimated losses in high income countries, while the change in estimated losses is lower in lower-income countries.