

Online Appendix to ‘Disentangling Covid-19, Economic Mobility and Containment Policy Shocks’

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Abstract

This online appendix contains further sensitivity tests of the baseline model.

A Posterior Distributions

This section presents further details regarding the posterior distributions of the contemporaneous relations in the baseline model. Figure 1 shows histograms of the accepted draws (satisfying the sign and exclusion restrictions, before re-sampling) from the posterior distribution for each element in the matrix of contemporaneous relations, \mathbf{B}_0^{-1} . The black vertical lines present the draws which correspond to the largest ten importance sampler weights. In general, the posterior distributions of all elements show the expected shape given our identifying restrictions.

In most cases, the largest importance sampler weights are drawn for parameter values where the majority of draws is allocated, that is, close to the mode of the respective histogram. The only visible exception are the elements $\mathbf{B}_{0.3,4}^{-1}$ (policy shock on mobility)

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and $\mathbf{B}_{0.4,3}^{-1}$ (mobility shock on policy). Here, the draws with the largest importance sampler weights lean towards zero. On the other hand, in line with the sign restrictions set on $h = 7$, the majority of draws favor negative (for $\mathbf{B}_{0.3,4}^{-1}$) or positive (for $\mathbf{B}_{0.4,3}^{-1}$) values. We argue in the main text why the sign restrictions are set on $h = 7$. Thus, the capping in the sampler slightly reduces the otherwise relatively high probability that the draws with the largest importance sampler weights are re-sampled. This reduces the probability for a zero impact effect for the elements $\mathbf{B}_{0.3,4}^{-1}$ and $\mathbf{B}_{0.4,3}^{-1}$. We do not exclude the possibility of a zero. Setting a strong sign restriction on the element $\mathbf{B}_{0.3,4}^{-1}$, e.g. $\mathbf{B}_{0.3,4}^{-1} < -5$, increases the efficiency of the sampler (no capping necessary) and does not change our main results. In contrast, it sharpens the impulse response of economic mobility to a containment policy shock.

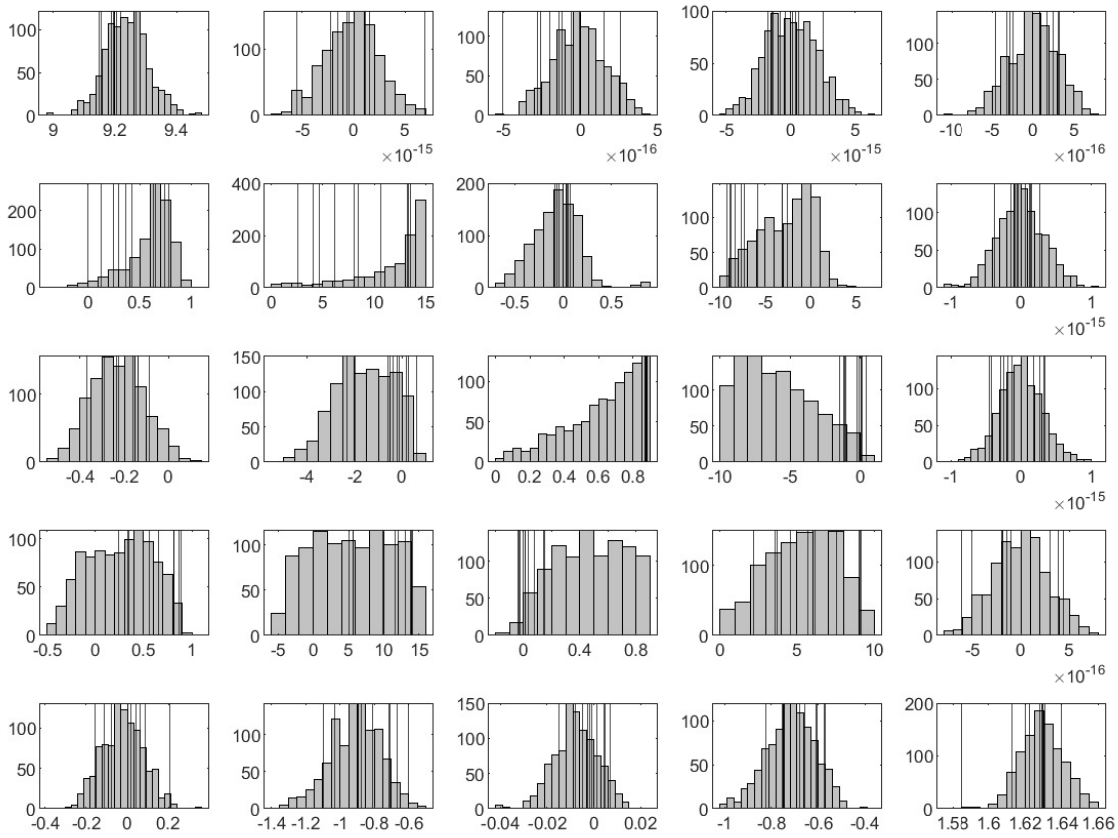


Figure A1: Posterior draws of \mathbf{B}_0^{-1} . The gray bars show the accepted draws (satisfying the sign and exclusion restrictions) from the posterior distribution for each element in the matrix of contemporaneous relations, \mathbf{B}_0^{-1} , for the base line models. The black vertical lines present the draws which obtain the largest ten importance sampler weights.

B Further sensitivity tests

This Appendix presents further robustness analysis for the baseline model. All graphs below show the impulse responses to positive incidence shocks, economic mobility shocks and containment policy shocks of one standard deviation based on the benchmark specification. Solid lines are the median estimate and shaded areas are the credible sets. In addition, each figure shows the estimates from an alternative specification using dashed lines. We change both either the reduced form model or the identification strategy. All in all, the figures show that the main results hold.

First, we construct three alternative mobility indices: a first one which, in addition to

the base indices also includes the mobility index for grocery and pharmacy, a second one only consisting of the indices for transit stations and workplaces, and a third one which is just the mobility index for workplaces. Figure A2 shows the impulse responses when using the second alternative mobility index (transit stations and workplaces) in comparison to the ones of the main model. The other indices generate the same patterns (not shown here). The results are thus robust with respect to the construction of the mobility index. Second, Figure A3 shows the responses for a model in which we use the stringency index of the Oxford Covid-19 Government Response Tracker as the containment policy index.

Third, Figure A4 shows the impulse response for a model including a linear trend. Fourth, Figure A5 presents the responses for a model including 7 lags. Fifth, Figure A6 shows results for a model with 21 lags. Sixth, Figure A7 summarizes the estimates for a model without week-day-dummies. Seventh, Figure A8 gives the results using data starting on 15 February 2020. Eighth, Figure A9 gives the impulse response functions for a model including as an alternative measure for stock prices MSCI large cap indices. Ninth, Figure A10 shows the results for the baseline model additionally including 2-year government bond yields. This model includes 40 countries as for the rest (AE, AR, EE, and LU) the 2-year rate is not available. We order the interest rate variable last in the model and set contemporaneous exclusion restrictions as the ones imposed for the fifth structural shock and no restriction on the response of stock prices. Note that when we include the interest rate, the fifth structural shock cannot be interpreted as a news shock. Tenth, the responses for a model additionally including a variable on total tests performed are given in Figure A11. We include total tests as second variable and set the contemporaneous reactions of it to all other shocks starting with the incidence shock equal to zero.

Eleventh, the estimates for a model setting restrictions on horizon 0 and 14 are given in Figure A12. Twelfth, Figure A13 depicts the reactions for a model without exclusion restrictions to identify the news shock. Since the news shock is technically an expected negative incidence shock, relaxing the restrictions on it mainly impacts the responses to the incidence shock. Finally, we do not present the responses of the following specifications but mention that they are similar to the baseline specification: including a subset of countries

which is obtained by splitting the countries in half based on either alphabetical order or taking every second country.

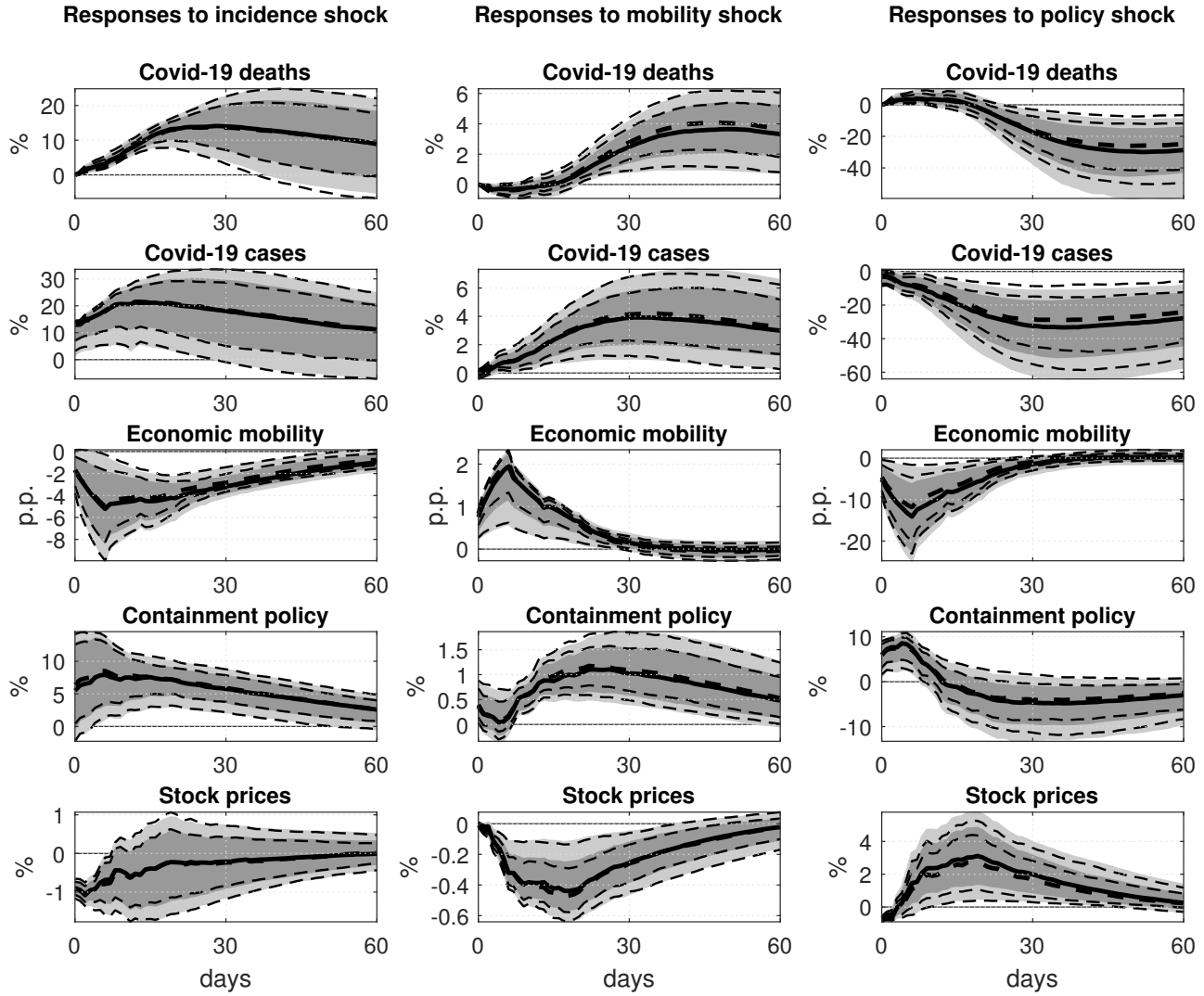


Figure A2: The dynamic effects of incidence, economic mobility and containment policy shocks with alternative mobility index. *Notes:* The figure shows the median response (solid lines for the benchmark model and bold dashed lines for the model of the sensitivity analysis) of the endogenous variables to an incidence shock (first column), a mobility shock (middle column) and a containment policy shock (right column) over 60 days, along with 68% and 90% credible sets (dark and light shaded areas/dashed lines, respectively). The shocks are normalized to be positive and have size of one standard deviation.

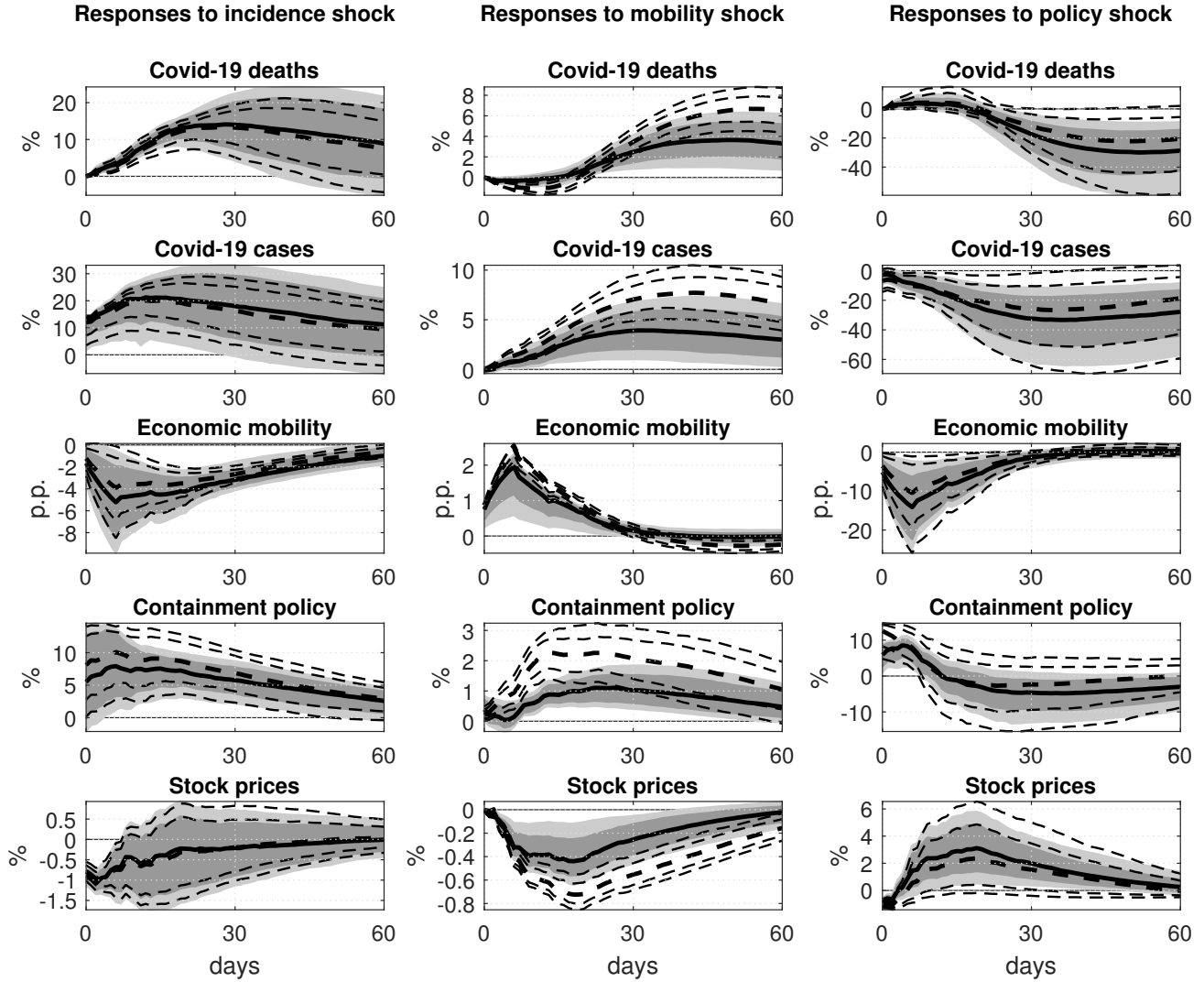


Figure A3: The dynamic effects of incidence, economic mobility and containment policy shocks with an alternative containment policy index. *Notes:* The figure shows the median response (solid lines for the benchmark model and bold dashed lines for the model of the sensitivity analysis) of the endogenous variables to an incidence shock (first column), a mobility shock (middle column) and a containment policy shock (right column) over 60 days, along with 68% and 90% credible sets (dark and light shaded areas/dashed lines, respectively). The shocks are normalized to be positive and have size of one standard deviation.

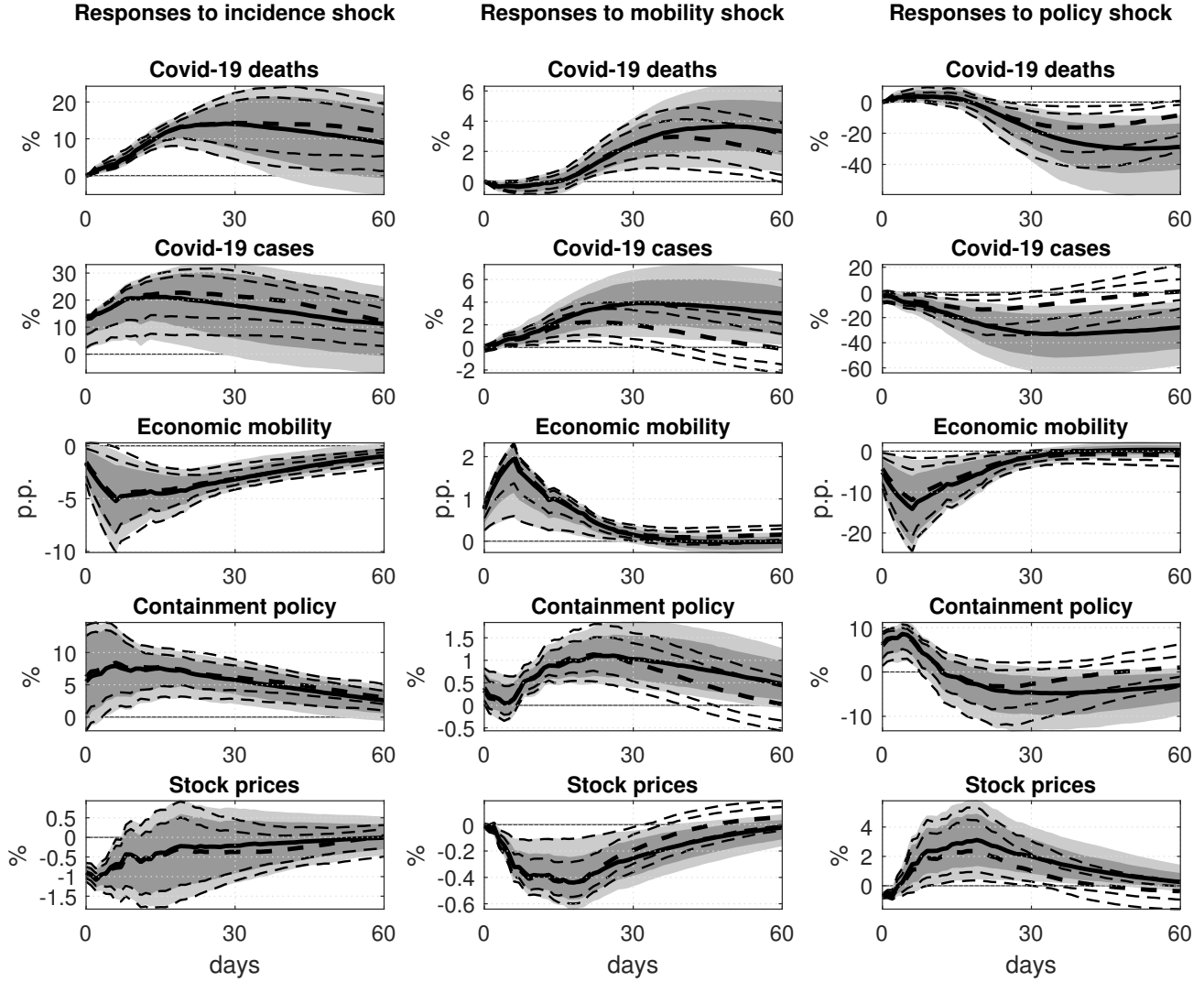


Figure A4: The dynamic effects of incidence, economic mobility and containment policy shocks including a linear trend. *Notes:* The figure shows the median response (solid lines for the benchmark model and bold dashed lines for the model with linear trend) of the endogenous variables to an incidence shock (first column), a mobility shock (middle column) and a containment policy shock (right column) over 60 days, along with 68% and 90% credible sets (dark and light shaded areas/dashed lines, respectively). The shocks are normalized to be positive and have size of one standard deviation.

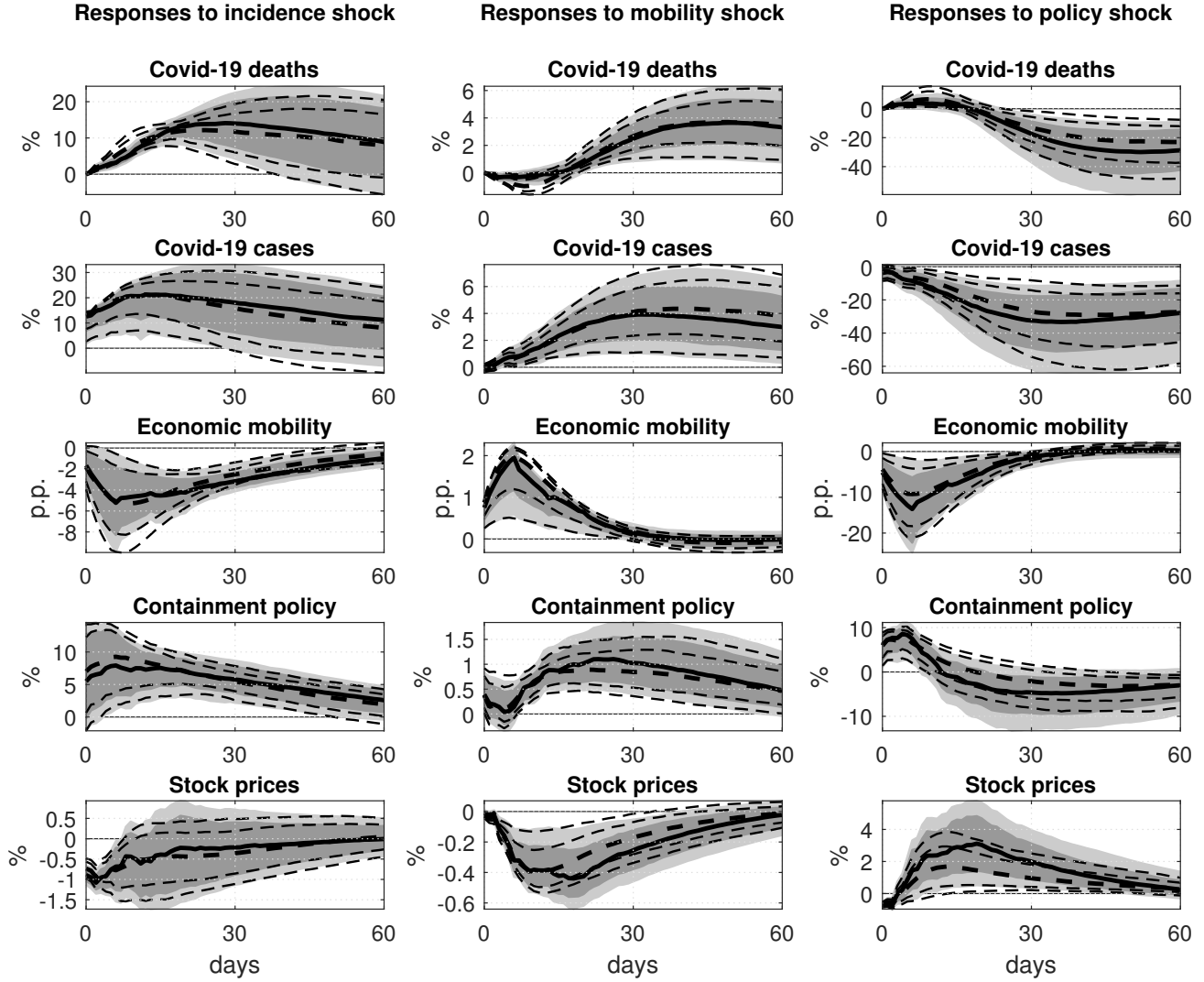


Figure A5: The dynamic effects of incidence, economic mobility and containment policy shocks with 7 lags. *Notes:* The figure shows the median response (solid lines for the benchmark model and bold dashed lines for a model with 7 lags) of the endogenous variables to an incidence shock (first column), a mobility shock (middle column) and a containment policy shock (right column) over 60 days, along with 68% and 90% credible sets (dark and light shaded areas/dashed lines, respectively). The shocks are normalized to be positive and have size of one standard deviation.

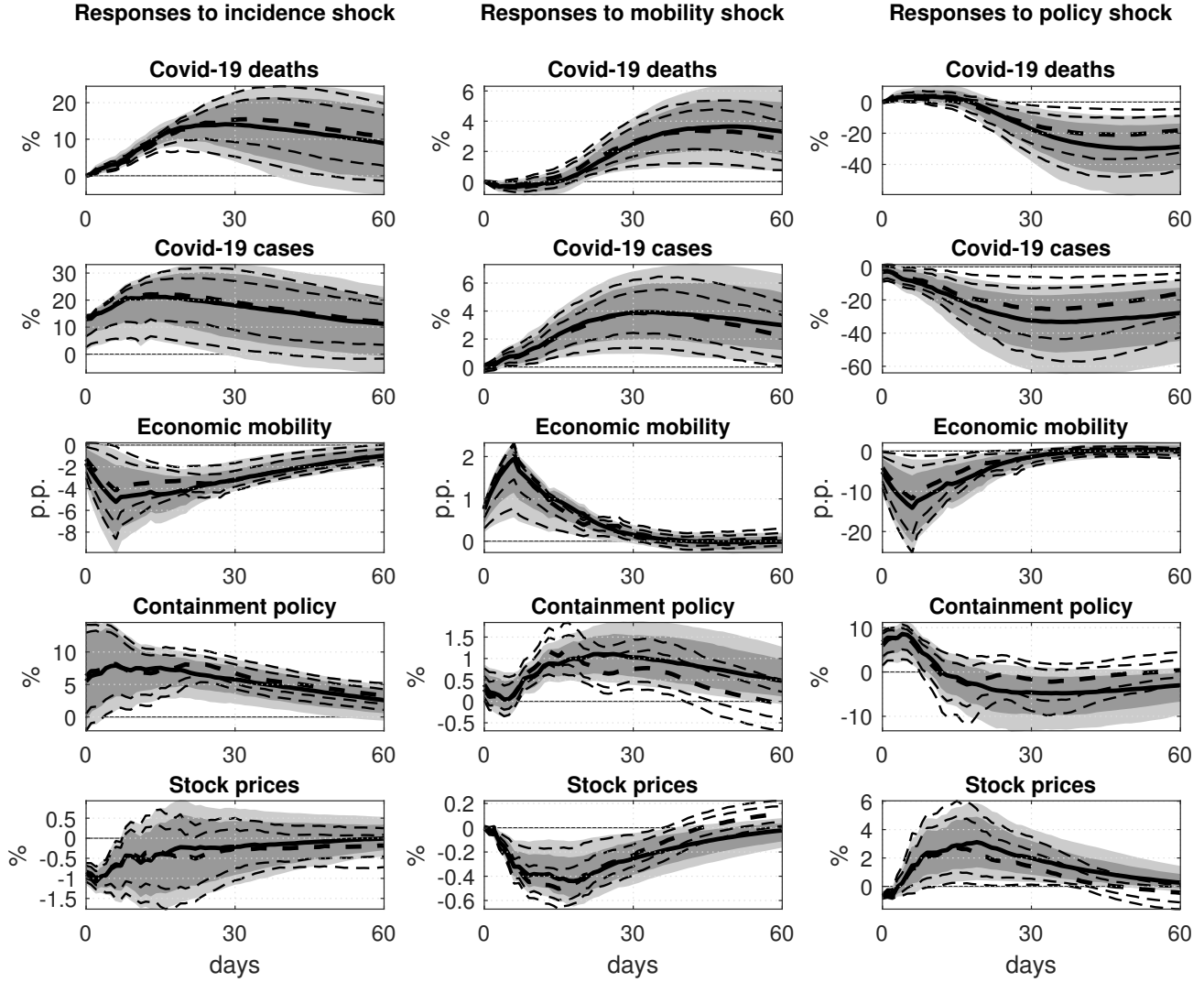


Figure A6: The dynamic effects of incidence, economic mobility and containment policy shocks with 21 lags. *Notes:* The figure shows the median response (solid lines for the benchmark model and bold dashed lines for a model with 21 lags) of the endogenous variables to an incidence shock (first column), a mobility shock (middle column) and a containment policy shock (right column) over 60 days, along with 68% and 90% credible sets (dark and light shaded areas/dashed lines, respectively). The shocks are normalized to be positive and have size of one standard deviation.

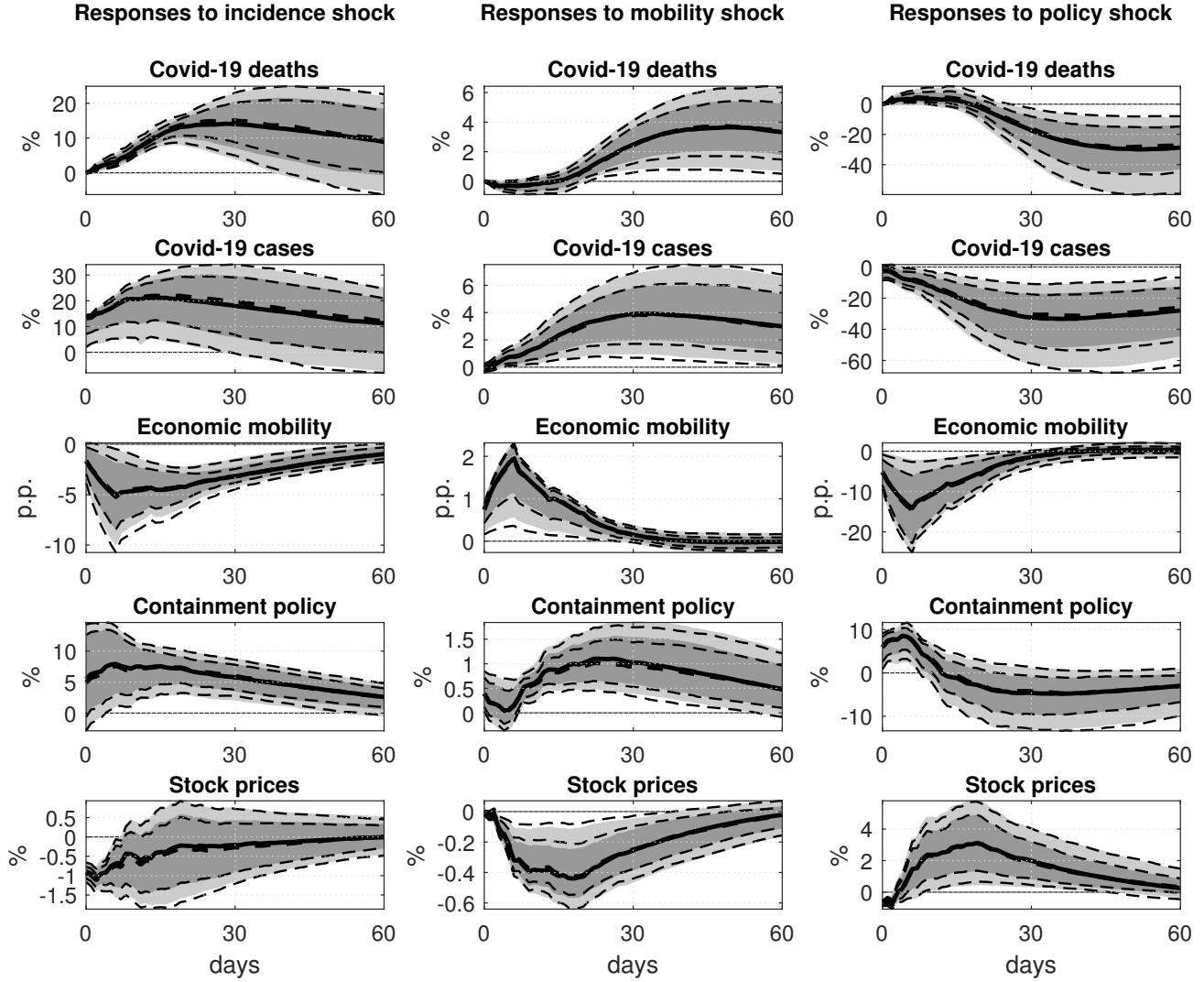


Figure A7: The dynamic effects of incidence, economic mobility and containment policy shocks excluding weekday dummies. *Notes:* The figure shows the median response (solid lines for the benchmark model and bold dashed lines for the model of the sensitivity analysis) of the endogenous variables to an incidence shock (first column), a mobility shock (middle column) and a containment policy shock (right column) over 60 days, along with 68% and 90% credible sets (dark and light shaded areas/dashed lines, respectively). The shocks are normalized to be positive and have size of one standard deviation.

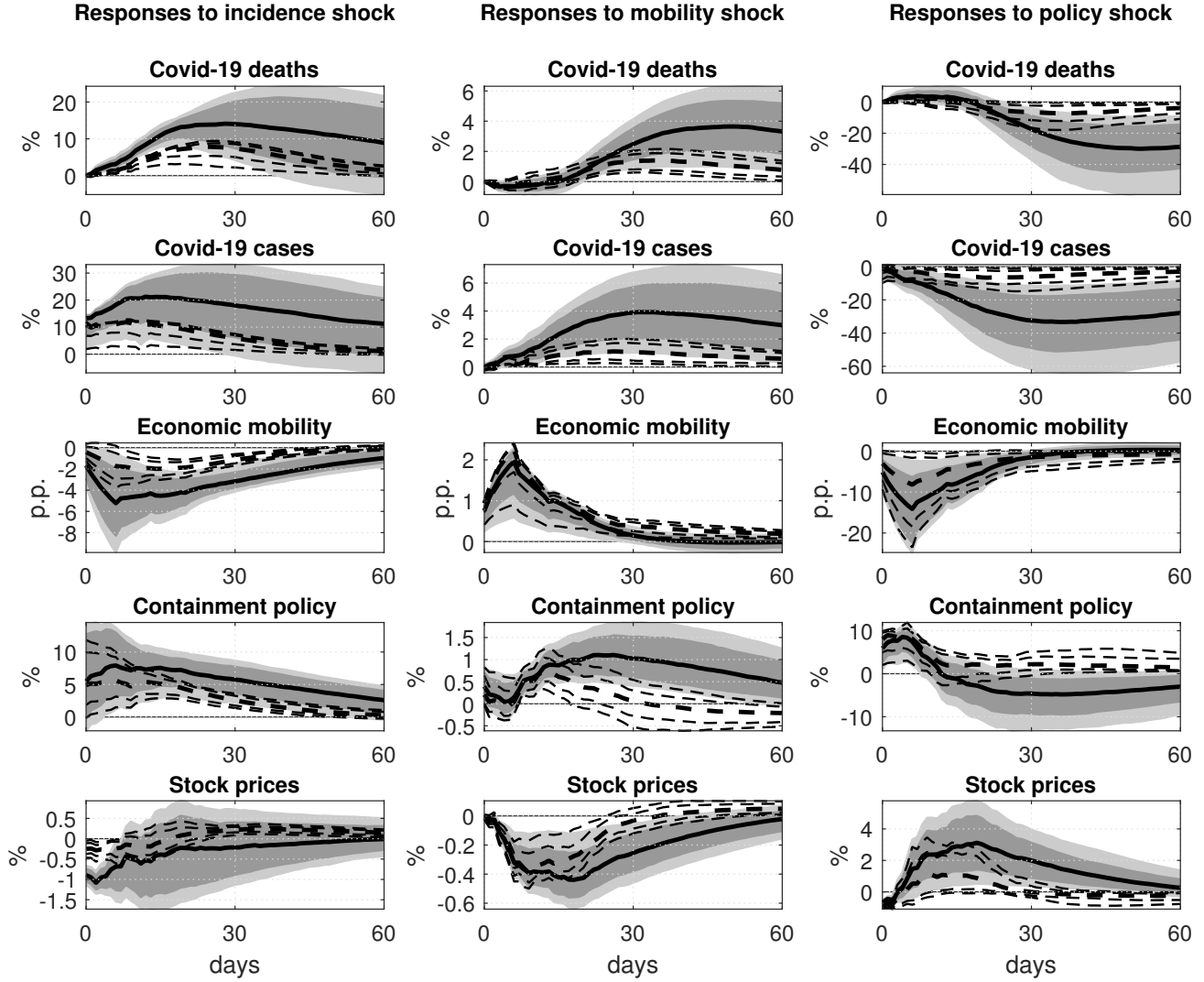


Figure A8: The dynamic effects of incidence, economic mobility and containment policy shocks starting on 15 Feb 2020. *Notes:* The figure shows the median response (solid lines for the benchmark model and bold dashed lines for the model with shorter sample) of the endogenous variables to an incidence shock (first column), a mobility shock (middle column) and a containment policy shock (right column) over 60 days, along with 68% and 90% credible sets (dark and light shaded areas/dashed lines, respectively). The shocks are normalized to be positive and have size of one standard deviation.

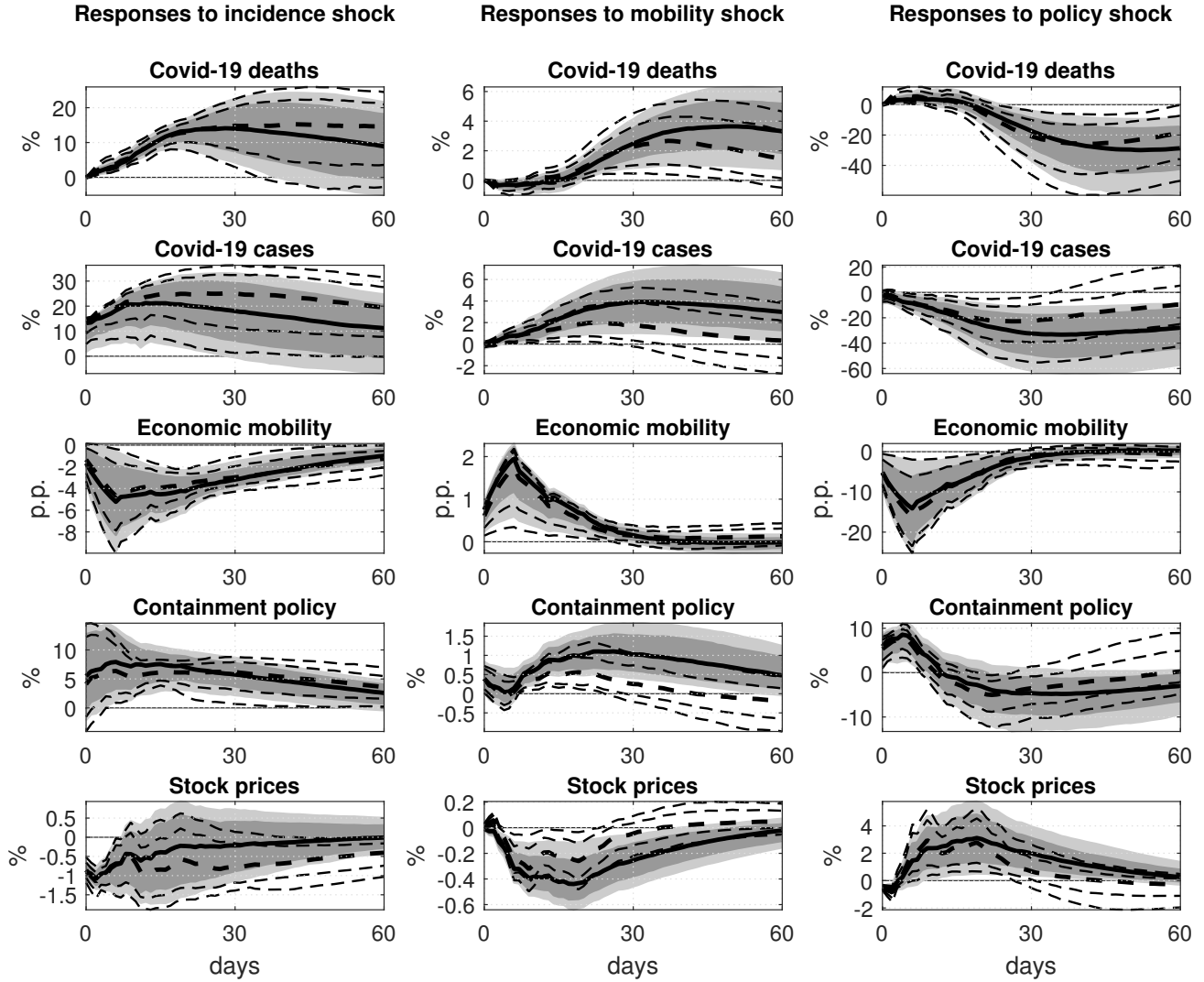


Figure A9: The dynamic effects of incidence, economic mobility and containment policy shocks including alternative stock prices (large cap). *Notes:* The figure shows the median response (solid lines for the benchmark model and bold dashed lines for the model of the sensitivity analysis) of the endogenous variables to an incidence shock (first column), a mobility shock (middle column) and a containment policy shock (right column) over 60 days, along with 68% and 90% credible sets (dark and light shaded areas/dashed lines, respectively). The shocks are normalized to be positive and have size of one standard deviation.

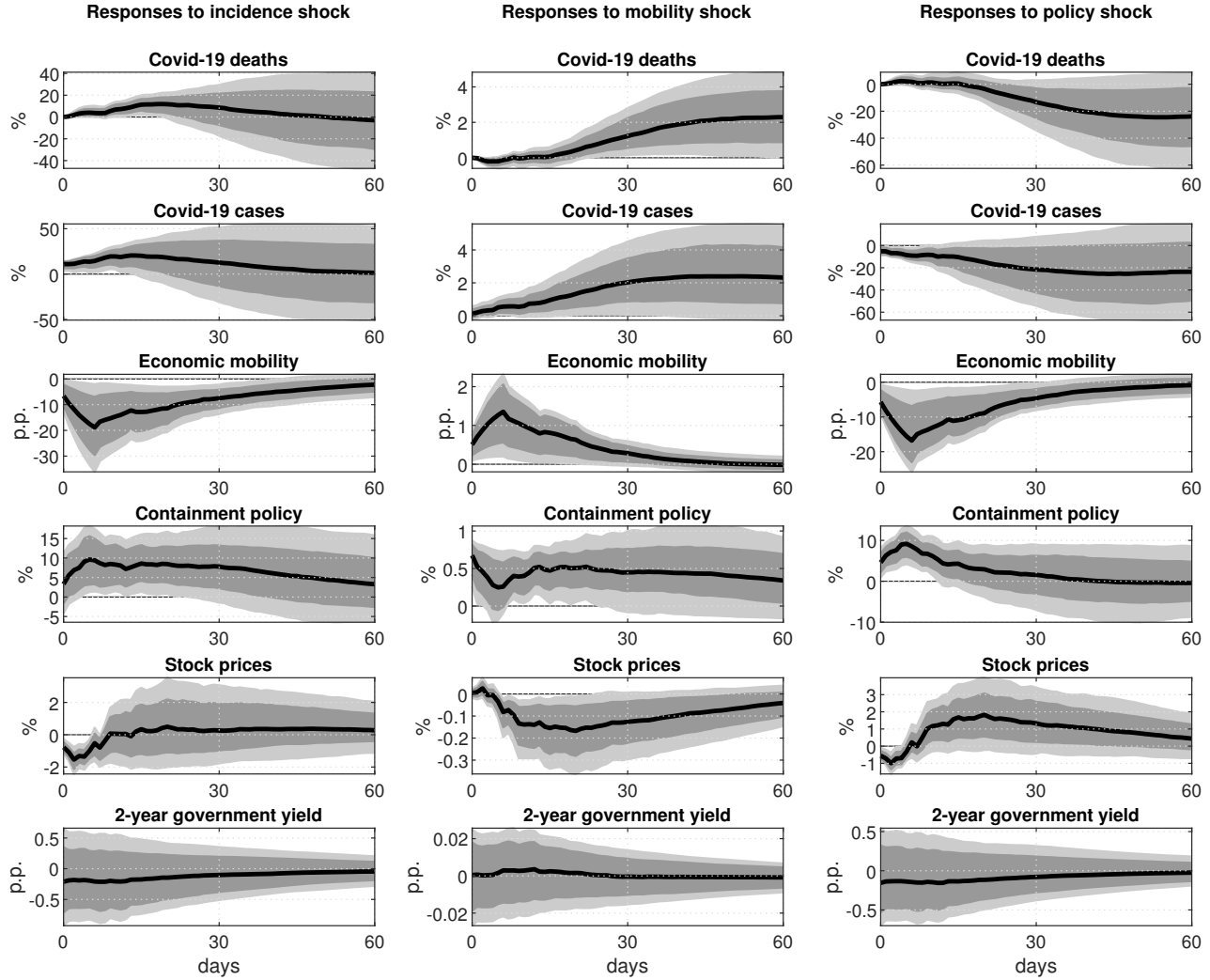


Figure A10: The dynamic effects of incidence, economic mobility and containment policy shocks including additionally an interest rate. *Notes:* The figure shows the median response (solid lines for the model of the sensitivity analysis) of the endogenous variables to an incidence shock (first column), a mobility shock (middle column) and a containment policy shock (right column) over 60 days, along with 68% and 90% credible sets (dark and light shaded areas, respectively). The shocks are normalized to be positive and have size of one standard deviation.

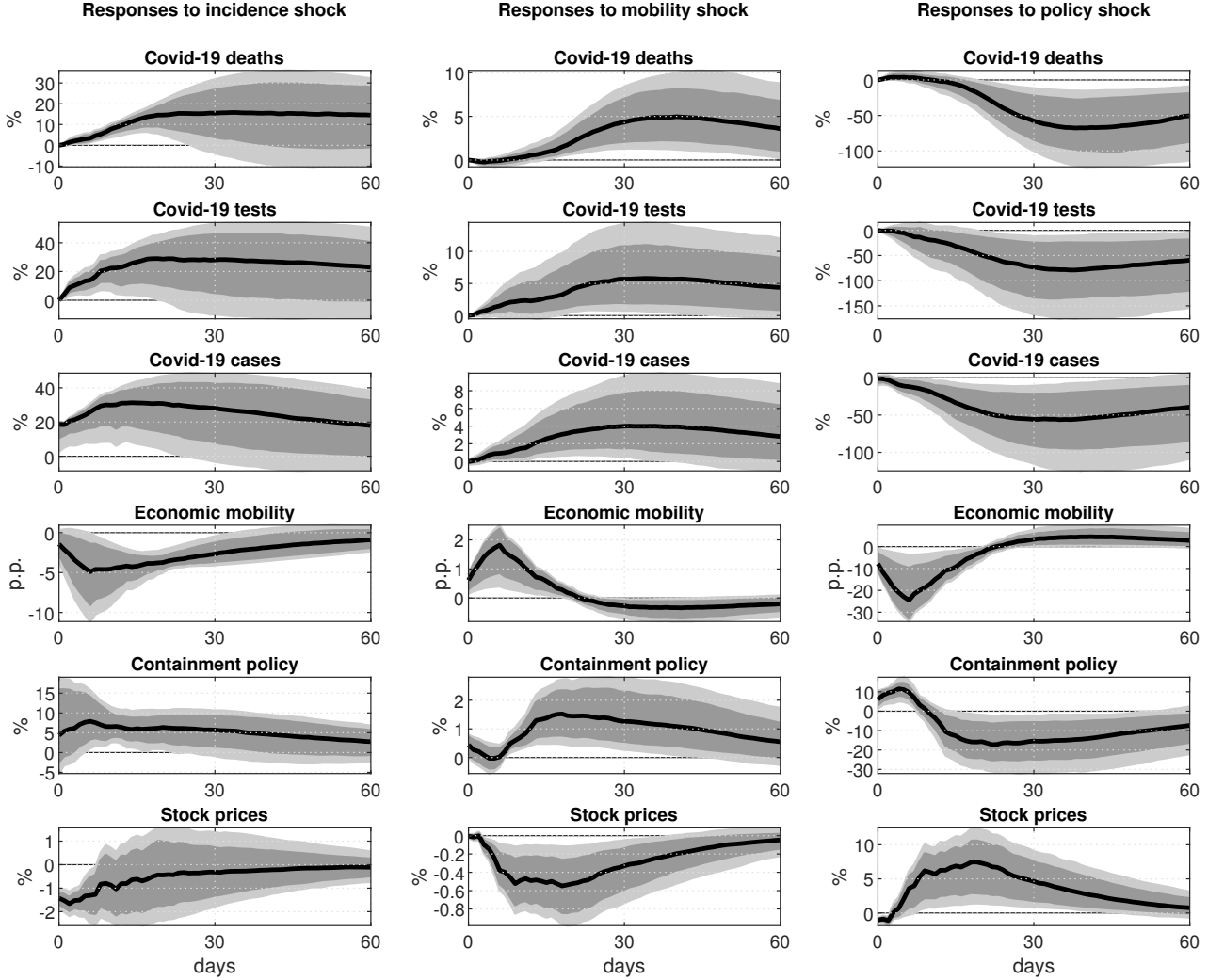


Figure A11: The dynamic effects of incidence, economic mobility and containment policy shocks including additionally total tests. *Notes:* The figure shows the median response (solid lines for the model of the sensitivity analysis) of the endogenous variables to an incidence shock (first column), a mobility shock (middle column) and a containment policy shock (right column) over 60 days, along with 68% and 90% credible sets (dark and light shaded areas, respectively). The shocks are normalized to be positive and have size of one standard deviation.

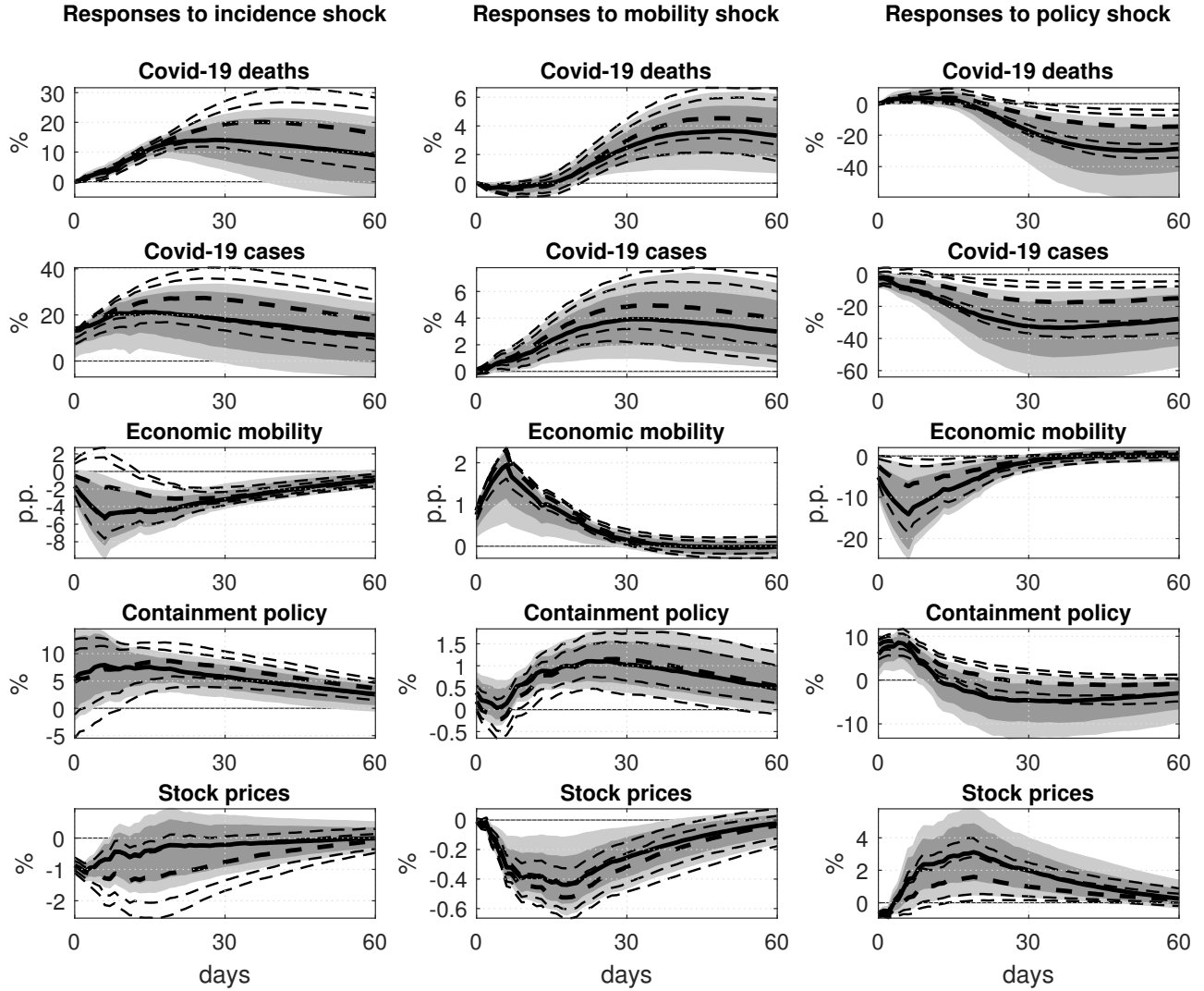


Figure A12: The dynamic effects of incidence, economic mobility and containment policy shocks with restrictions on horizon 0 and 14. *Notes:* The figure shows the median response (solid lines for the benchmark model and bold dashed lines for the model with alternative identification horizon) of the endogenous variables to an incidence shock (first column), a mobility shock (middle column) and a containment policy shock (right column) over 60 days, along with 68% and 90% credible sets (dark and light shaded areas/dashed lines, respectively). The shocks are normalized to be positive and have size of one standard deviation.

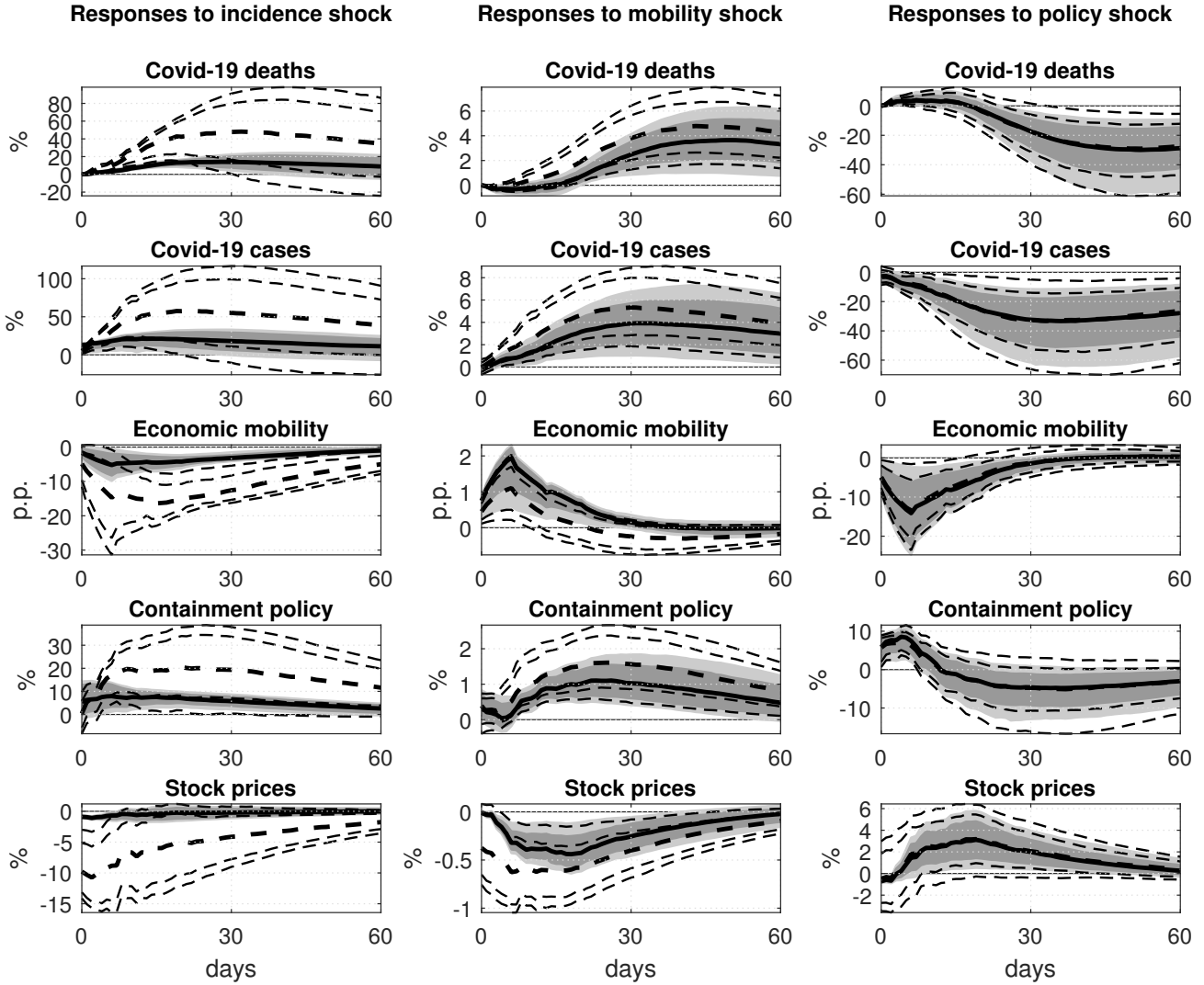


Figure A13: The dynamic effects of incidence, economic mobility and containment policy shocks without imposing exclusion restrictions on the news shock. *Notes:* The figure shows the median response (solid lines for the benchmark model and bold dashed lines for the model of the sensitivity analysis) of the endogenous variables to an incidence shock (first column), a mobility shock (middle column) and a containment policy shock (right column) over 60 days, along with 68% and 90% credible sets (dark and light shaded areas/dashed lines, respectively). The shocks are normalized to be positive and have size of one standard deviation.