

with more frequent flights than by seeking to increase the number of airlines and direct connections.

The paper also estimates the impact of expanding flights from the U.S. to Cuba on the rest of the Caribbean. Changes in the number of U.S.-Cuba flights over the last 25 years have been large, reflecting changing U.S. travel policies to Cuba. The paper finds that, based on past experience, there has been no negative effect from expanded flights to Cuba on the number of flights to the rest of the Caribbean. However, given the change in magnitude likely under a full U.S.-Cuba opening, caution is warranted as these results might not hold under such a scenario. Nonetheless, in a scenario of gradual and orderly opening, the Caribbean should not fear losing flights after U.S. travel to Cuba is liberalized.

VII. REFERENCES

- Acevedo, Sebastian, 2014, “Debt, Growth and Natural Disasters: A Caribbean Trilogy”, IMF Working Paper 14/125.
- Andrews, Donald WK, and Biao Lu. 2001, "Consistent model and moment selection procedures for GMM estimation with application to dynamic panel data models." *Journal of Econometrics* 101, no. 1 pp.123-164.
- Athiyaman, A.,1997, “Knowledge development in tourism: tourism demand research”, *Tourism Management*, Vol. 18, pp. 221-228.
- Crouch, G., 1994, “The Study of International Tourism Demand: A Survey of Practice,” *Journal of Travel Research*, Vol. 33, pp. 41-55.
- Culiuc, Alexander, 2014, “Determinants of International Tourism,” IMF Working Paper No. 14/82.
- Harvey, Andrew C., and P. H. J. Todd. 1983, "Forecasting economic time series with structural and Box-Jenkins models: A case study." *Journal of Business & Economic Statistics* 1, no. 4 pp.299-307.
- Gustavsson, Patrik, and Jonas Nordström. "The impact of seasonal unit roots and vector ARMA modelling on forecasting monthly tourism flows." *Tourism Economics* 7, no. 2 (2001): 117-133.
- Kim, Jae H., and Imad A. Moosa. 2005, "Forecasting international tourist flows to Australia: A comparison between the direct and indirect methods." *Tourism Management* 26, no. 1 pp. 69-78.
- Laframboise, Nicole, Nkunde Mwase, Joonkyu Park, and Yingke Zhou. 2014, “Revisiting Tourism Flows to the Caribbean: What is Driving Arrivals?”. IMF Working Paper 14/229.
- Li, Gong, H. Song, and SF Witt., 2005 “Recent developments in econometric modelling and forecasting” *Journal of Travel Research* 44 (1), pp.82-99.
- Mwase, Nkunde, 2013, “Tourism flows to Caribbean islands: an empirical note,” *Applied Economics Letters*, Volume 20, Issue 10, pp. 957-965.
- Love, Innessa, 2015, “PVAR: Package of programs to estimate panel VAR”. Available: <https://sites.google.com/a/hawaii.edu/inessalove/home/pvar>
- Song, Haiyan, and Stephen F. Witt., 2006 "Forecasting international tourist flows to Macau." *Tourism management* 27, no. 2 pp. 214-224.
- Tsounta, Evridiki, 2008, “What Attracts Tourists to Paradise?” IMF Working Paper No. 08/162.

Vu, Jo Chau, and Lindsay W. Turner. 2006, "Regional data forecasting accuracy: the case of Thailand." *Journal of Travel Research* 45, no. 2 pp. 186-193.

Wolfe, Andy and Rafael Romeu, 2011, "Recession and Policy Transmission to Latin American Tourism: Does Expanded Travel to Cuba Offset Crisis Spillovers?" IMF Working Paper No. 11/32.

Witt, Stephen F., and Christine A. Witt. 1992, "Modeling and forecasting demand in tourism", *International Journal of Forecasting*, Vol. 8, pp. 643-644.

Zhang, Xinyan, Haiyan Song, and George Q. Huang. 2009, "Tourism supply chain management: A new research agenda." *Tourism management* 30, no. 3 pp. 345-358.

VIII. APPENDIX

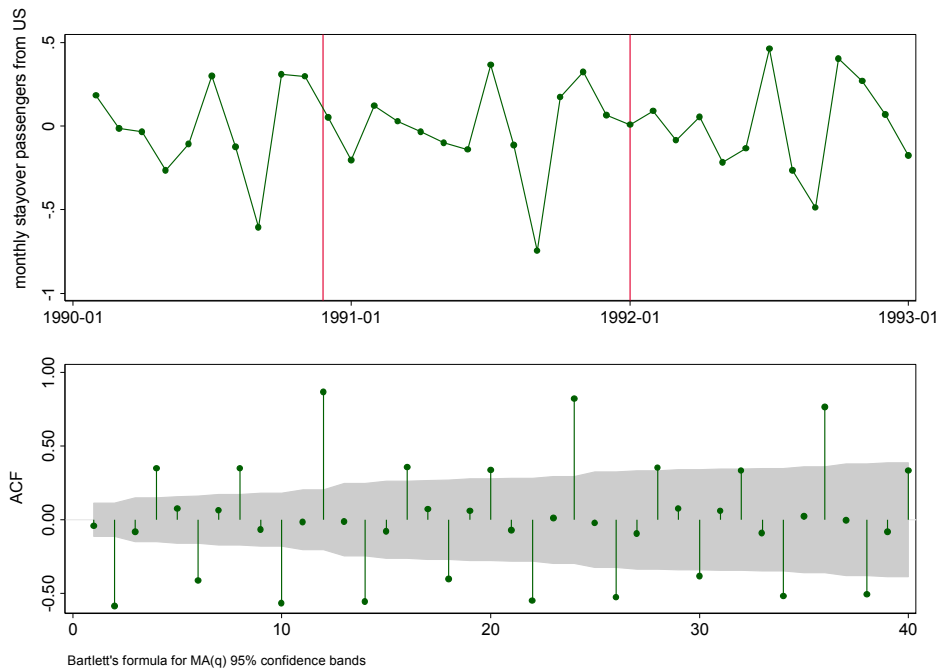
Table A1. Coefficient of Variation (1990-2014) and Significance of Tourist Arrivals Response to Different Airlift Supply Factors

	Airlines	Cities	Flights	Seats	Tourist Arrivals	Vacancy Rate	Arrivals / Passengers
Antigua and Barbuda	0.30	0.26	0.27	0.32	0.33	0.33	0.27
Aruba	0.25	0.29	0.18	0.16	0.26	0.37	0.11
Barbados	0.30	0.30	0.23	0.23	0.23	0.35	0.19
Belize	0.24	0.32	0.22	0.24	0.38	0.27	0.14
Bermuda	0.24	0.29	0.30	0.33	0.53	0.24	0.23
Cancun	0.24	0.16	0.34	0.33	0.26	0.39	0.23
Cayman Islands	0.26	0.27	0.21	0.22	0.32	0.25	0.29
Dominica	0.22	0.09	0.28	0.30	0.29	0.26	0.35
Dominican Republic	0.30	0.46	0.35	0.32	0.53	0.35	0.22
Grenada	0.45	0.40	0.38	0.31	0.33	0.34	0.40
Jamaica	0.19	0.21	0.21	0.18	0.34	0.34	0.14
St Kitts and Nevis	0.52	0.58	0.34	0.38	0.45	0.23	0.35
St Lucia	0.29	0.37	0.34	0.30	0.35	0.32	0.22
The Bahamas	0.28	0.21	0.56	0.26	0.27	0.25	0.33

Source: Authors' calculations based on country specific SVARs.

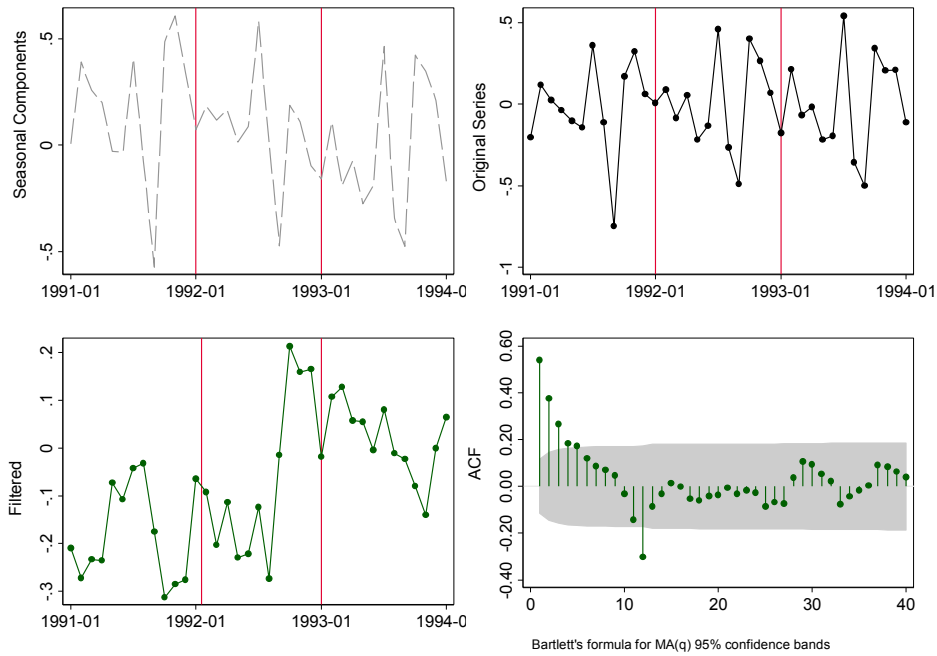
Notes: The numbers in each cell represent the coefficient of variation (standard deviation over mean) statistics for airlift supply variables. The green color indicates the significance of the tourist arrivals response after each airlift supply shock. The dark green color indicates the response is different from zero for more than 4 periods; the lighter green for more than 2 periods.

Figure A1. Stochastic Seasonality



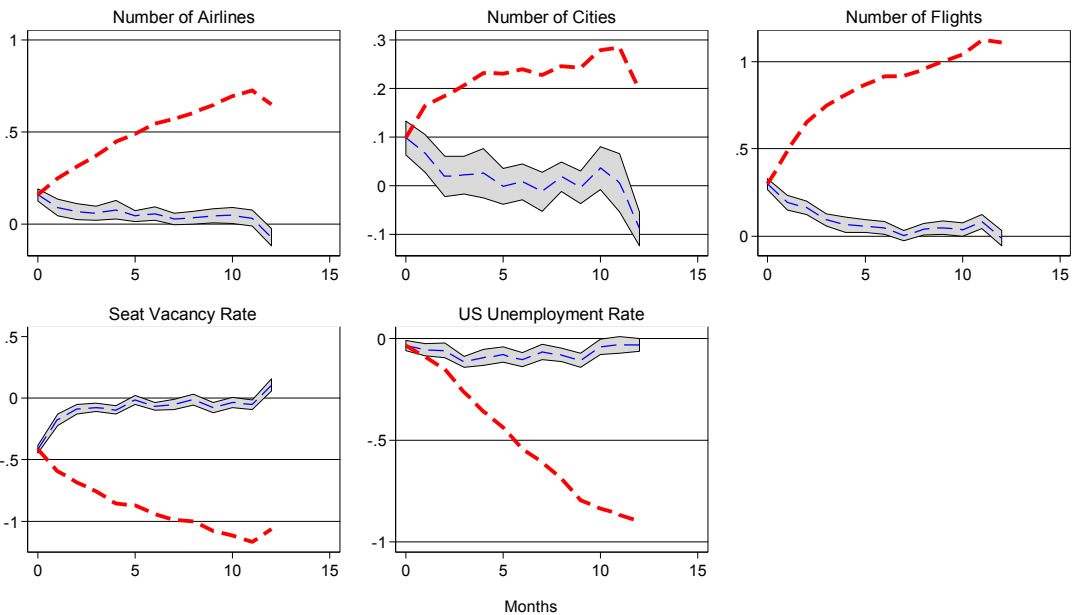
Note: The upper figure presents the percentage change of tourist arrivals for Barbados from 1990 to 1993. The bottom figure gives the autocorrelation function of the series. The high correlation with its 12th, 24th and 36th lags indicates a strong seasonality in the series.

Figure A2. Unobserved Component Model



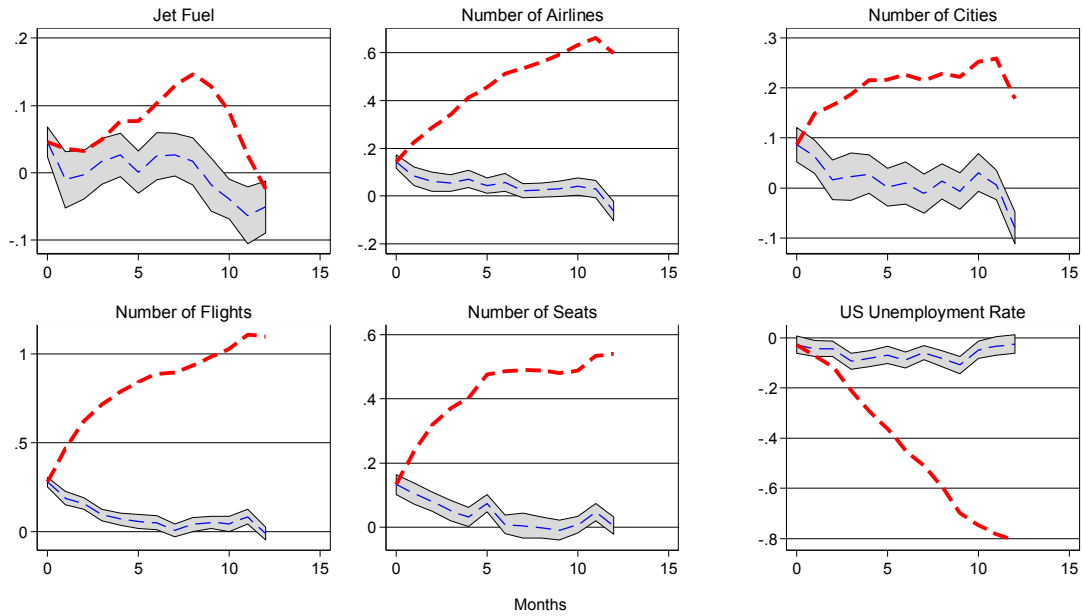
Note: Upper left graph gives the seasonal pattern detected by the unobserved component model; Bottom left represents the filtered series (eliminated the seasonal components); Bottom right gives the autocorrelation function of the filtered series. We can see the autocorrelation function looks like an AR process after filtering out the seasonality.

Figure A3. Response of Tourist Arrivals to Different Shocks (specification with vacancy rate, panel VAR)



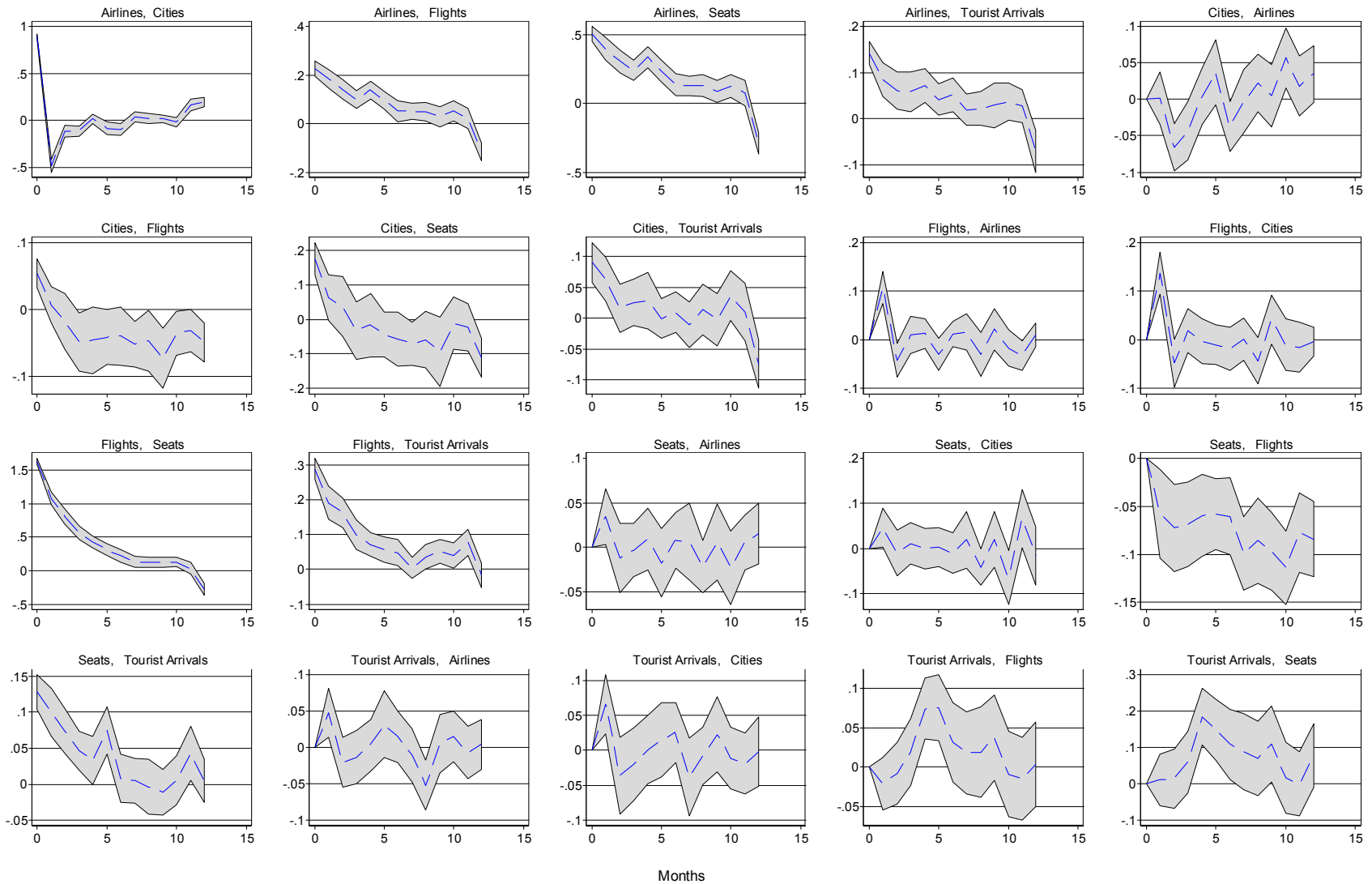
Notes: The blue dashed represents the percentage deviation from the steady state of the response variable (tourist arrivals) to a one percent positive shock of the impulse variable. The shaded area is the 90% confidence interval and the red dashed line shows the cumulative percentage change of tourist arrivals.

**Figure A4. Response of Tourist Arrivals to Different Shocks
(specification including jet fuel, panel VAR)**



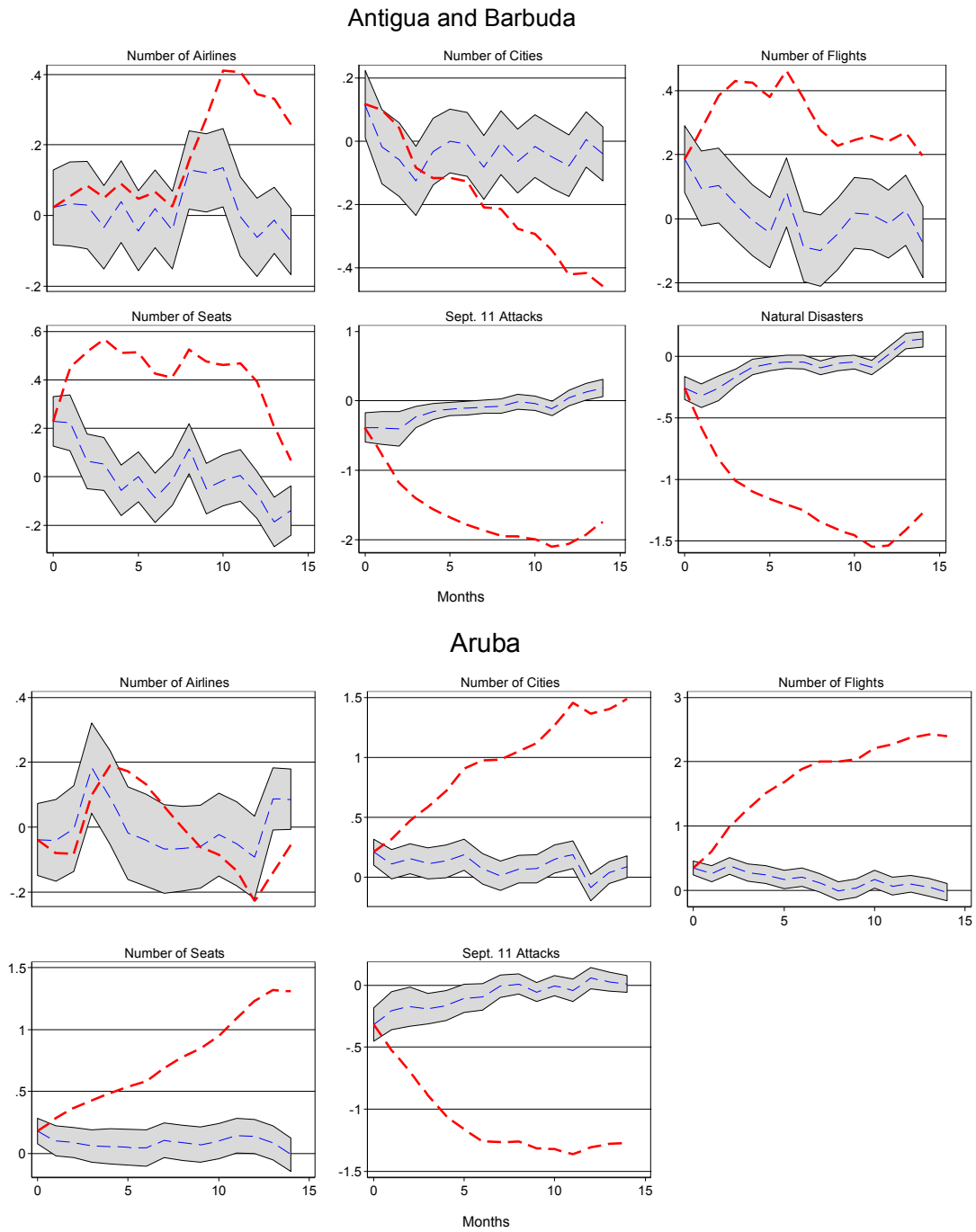
Notes: The blue dashed represents the percentage deviation from the steady state of the response variable (tourist arrivals) to a one percent positive shock of the impulse variable. The shaded area is the 90% confidence interval and the red dashed line shows the cumulative percentage change of tourist arrivals.

Figure A5. Impulse Response Functions (benchmark specification, panel SVAR)



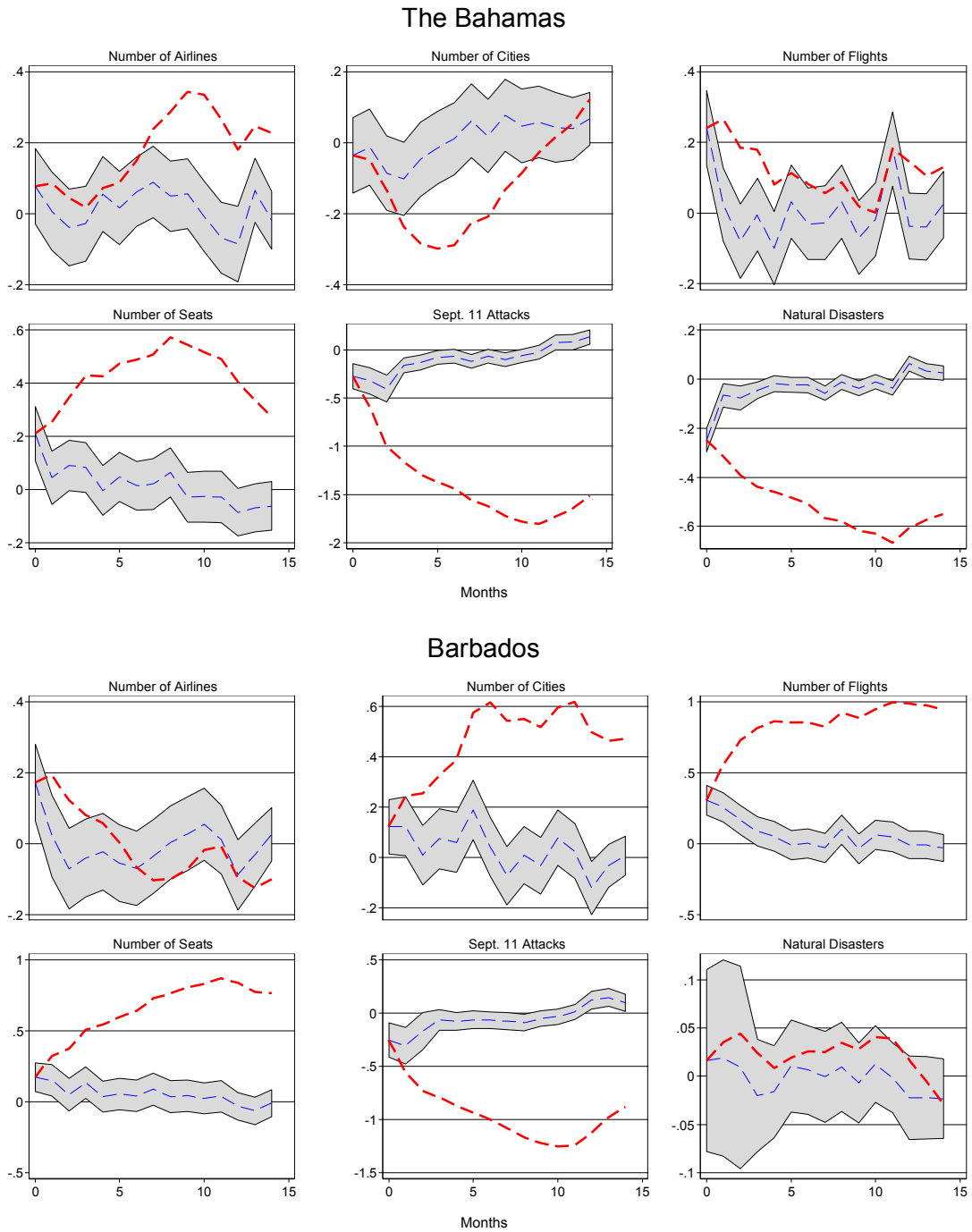
Notes: The title of the sub graphs indicates “the impulse variable, the response variable”. The horizontal axis represents percentage deviation from the steady state in response to a 1% positive shock. The shaded area is the 90% confidence interval and the red dashed line shows the cumulative percentage change of tourist arrivals.

Figure A6. Response of Tourist Arrivals to Different Shocks (country SVAR Results)



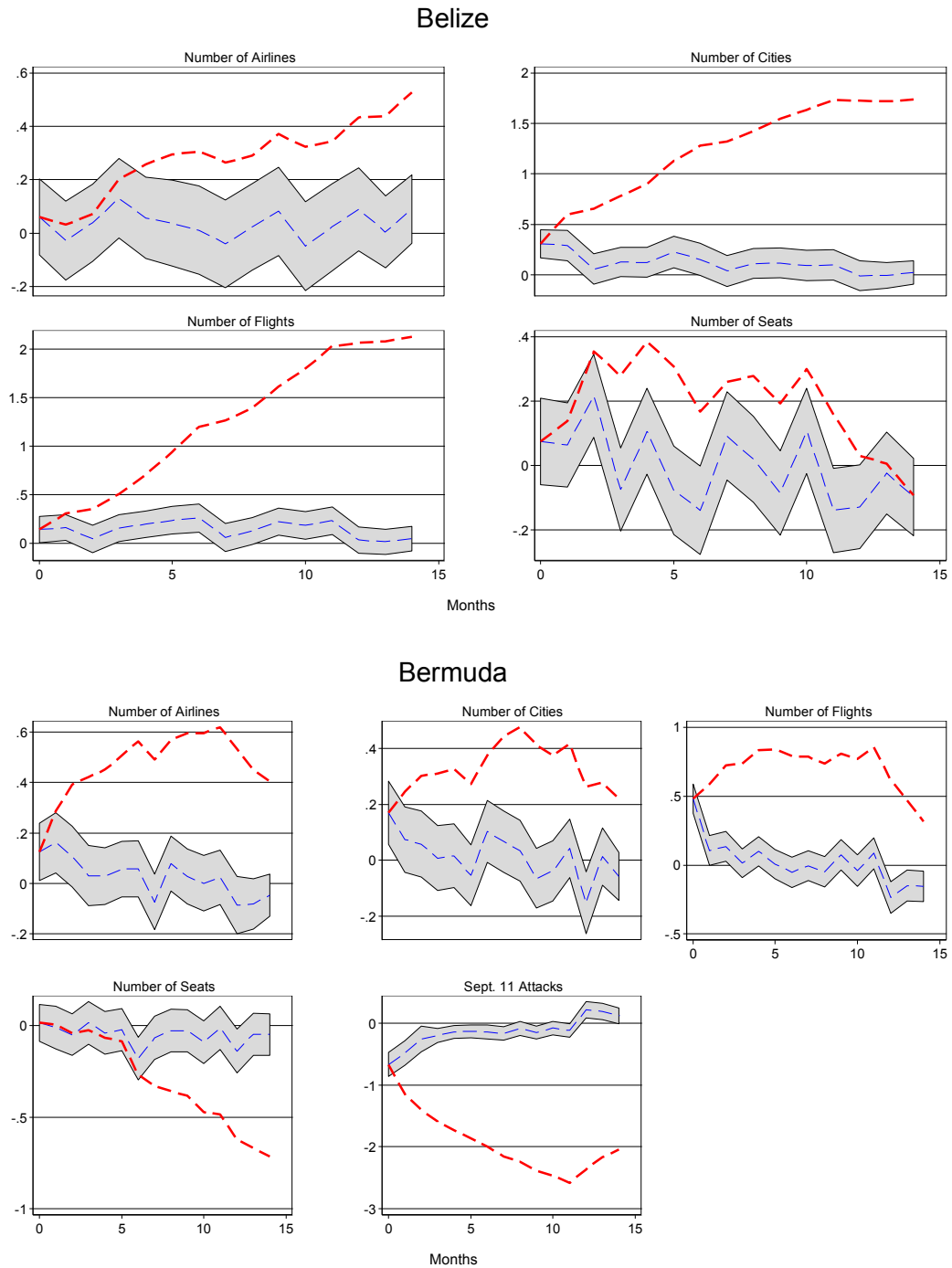
Notes: The blue dashed line represents the percentage deviation from the steady state of the response variable (tourist arrivals) to a one percent positive shock of the impulse variable. The shaded area is the 90% confidence interval and the red dashed line shows the cumulative percentage change of tourist arrivals.

Figure A6. Response of Tourist Arrivals to Different Shocks (country SVAR Results)



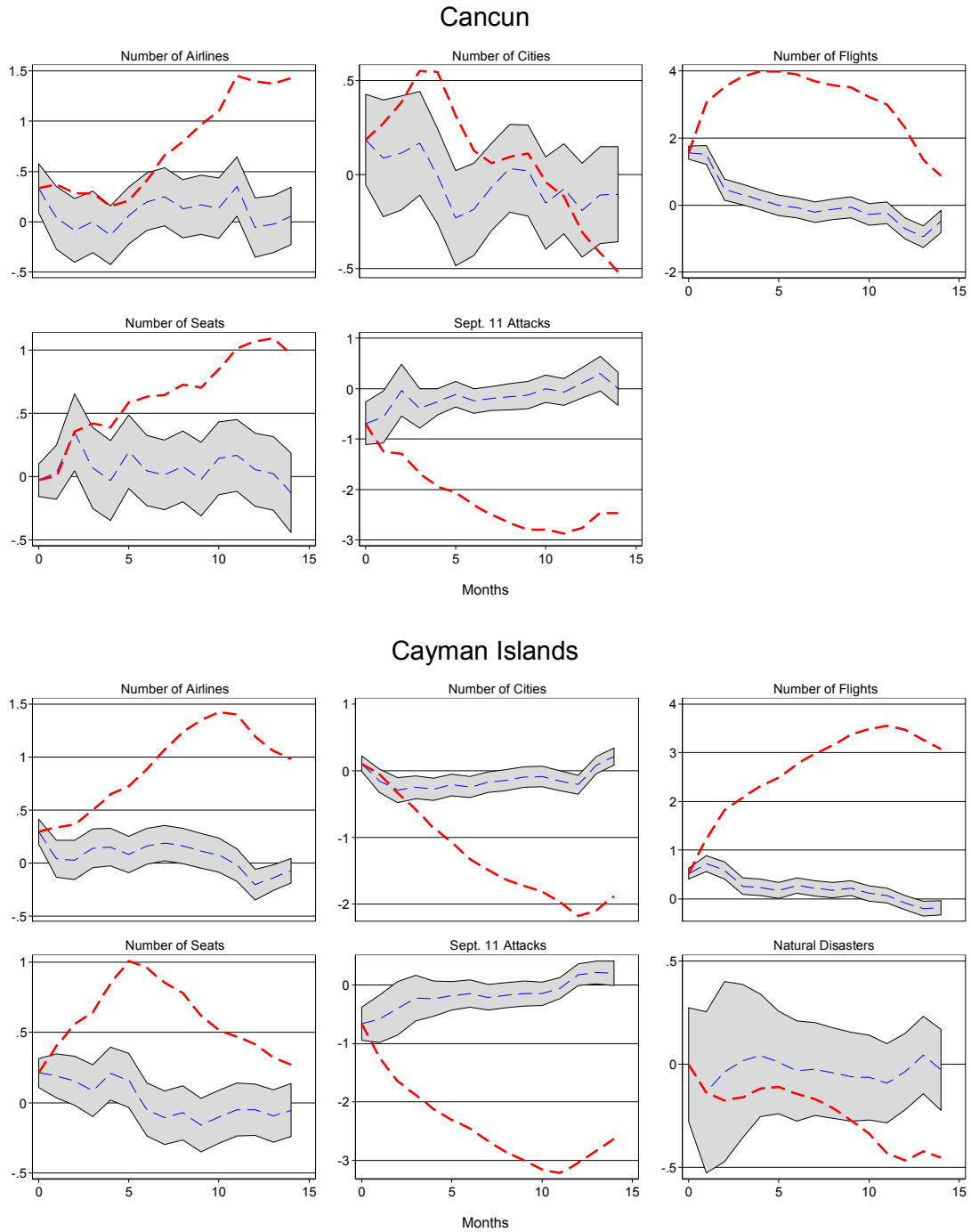
Notes: The blue dashed line represents the percentage deviation from the steady state of the response variable (tourist arrivals) to a one percent positive shock of the impulse variable. The shaded area is the 90% confidence interval and the red dashed line shows the cumulative percentage change of tourist arrivals.

Figure A6. Response of Tourist Arrivals to Different Shocks (country SVAR Results)



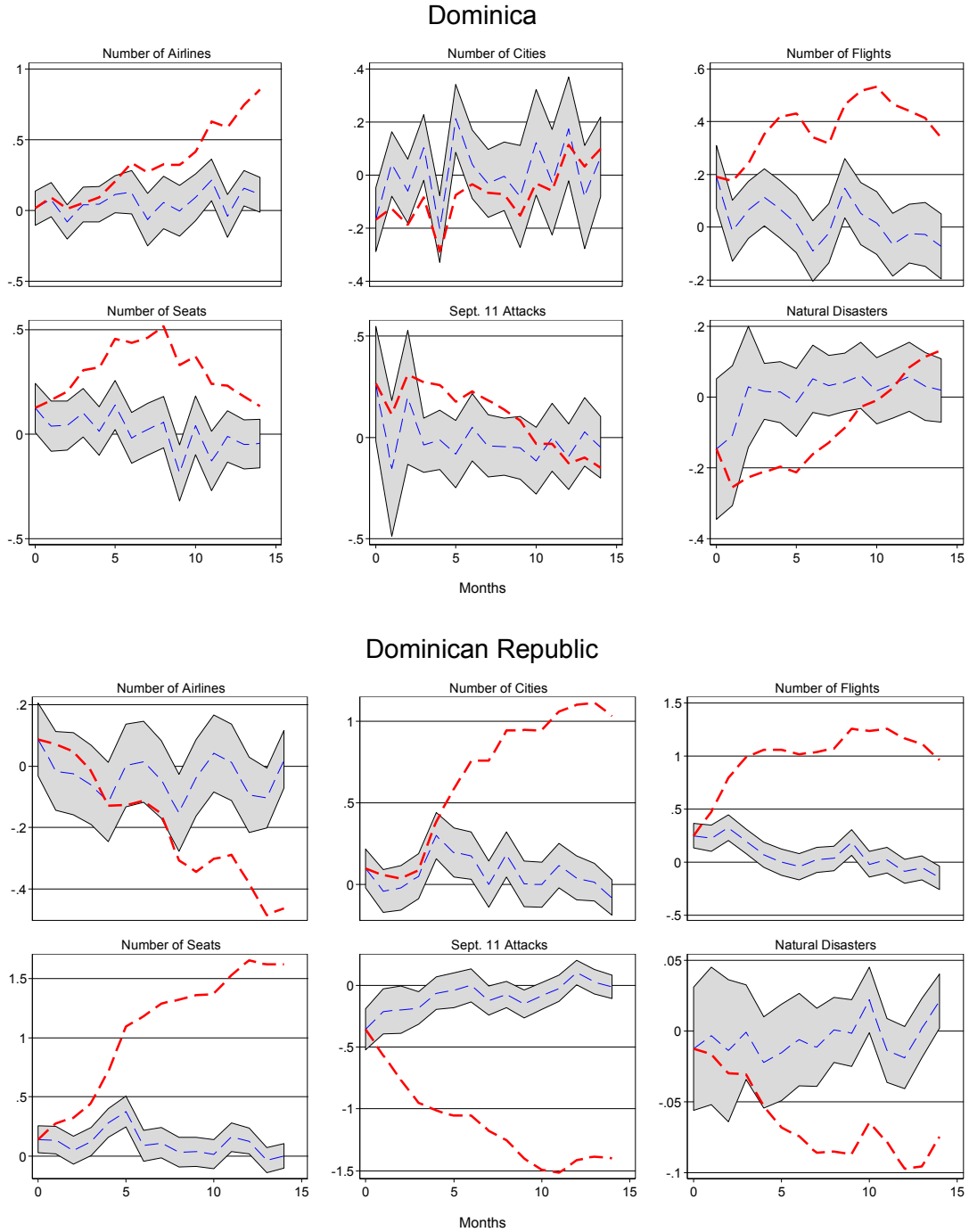
Notes: The blue dashed line represents the percentage deviation from the steady state of the response variable (tourist arrivals) to a one percent positive shock of the impulse variable. The shaded area is the 90% confidence interval and the red dashed line shows the cumulative percentage change of tourist arrivals.

Figure A6. Response of Tourist Arrivals to Different Shocks (country SVAR Results)



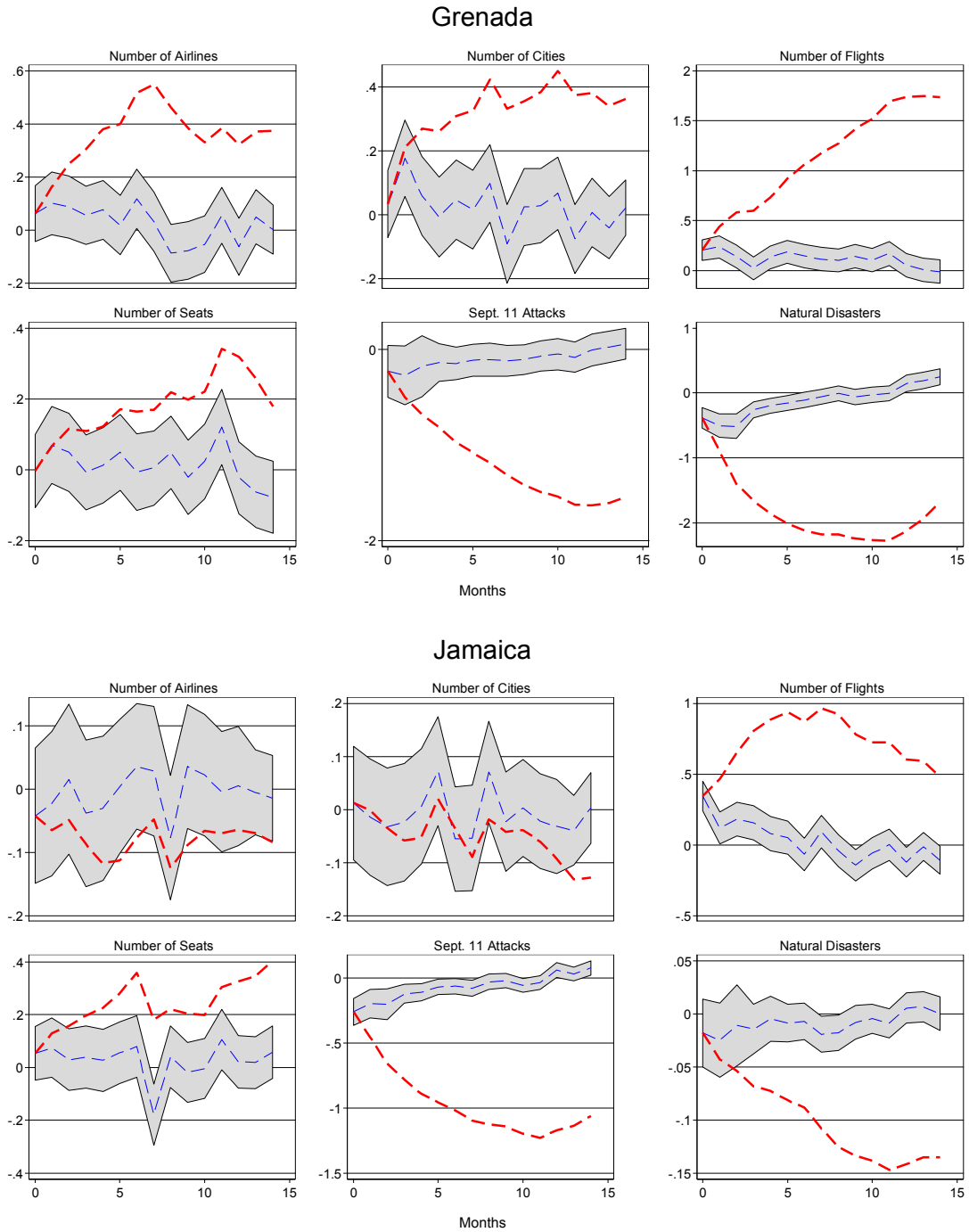
Notes: The blue dashed line represents the percentage deviation from the steady state of the response variable (tourist arrivals) to a one percent positive shock of the impulse variable. The shaded area is the 90% confidence interval and the red dashed line shows the cumulative percentage change of tourist arrivals.

Figure A6. Response of Tourist Arrivals to Different Shocks (country SVAR Results)



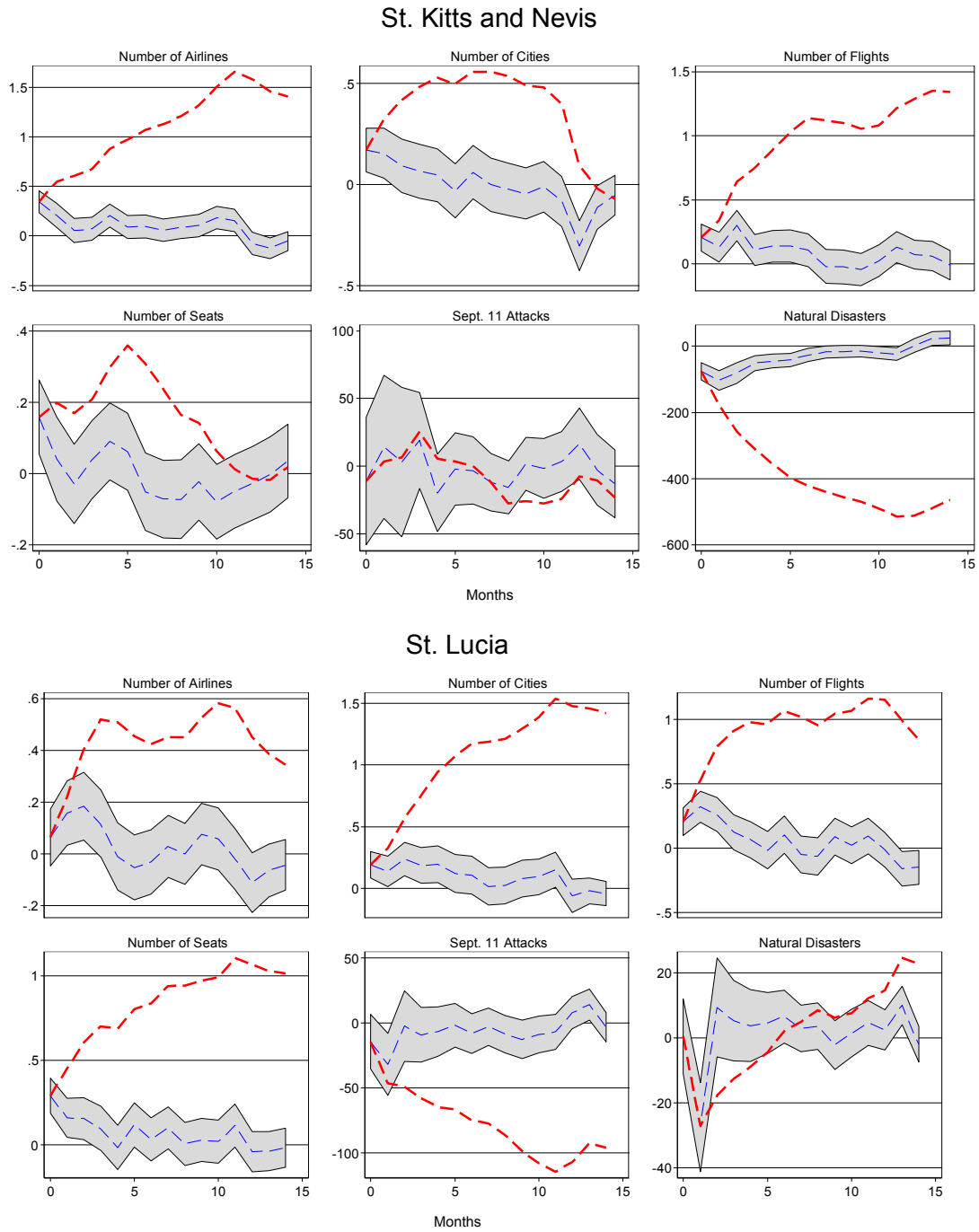
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