Online Appendix for "Emerging Economies Business Cycles: The Role of the Terms of Trade Revisited"

Nadav Ben Zeev[*]   Evi Pappa[†]   Alejandro Vicondoa[‡]

June 13, 2016

Abstract

The online appendix contains three sections. First, Section A presents the individual Impulse Response Functions (IRFs) from our baseline SVAR, which is described in section 3.3. Second, Section B displays the IRFs for the robustness exercises described in section 3.4. Finally, Section C shows the results from the Monte Carlo exercise (section 4.2) by country.

[*]Department of Economics, Ben-Gurion University of the Negev, Beer-Sheva, Israel. *E-mail:* nadavbz@bgu.ac.il.

[†]Department of Economics, European University Institute, Florence, Italy; UAB; BGSE; and CEPR. *E-mail:* evi.pappa@eui.eu.

[‡]Department of Economics, European University Institute, Florence, Italy. *E-mail:* alejandro.vicondoa@eui.eu.

Appendix A   Individual IRFs

In this section we present the individual Impulse Response Functions (IRFs) from our baseline SVAR presented in section 3.3. Figures 1 to 10 display the IRFs to an Unanticipated and News TOT shock for Argentina, Brazil, Chile, Colombia, and Peru, respectively.

Figure 1: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock-Argentina**
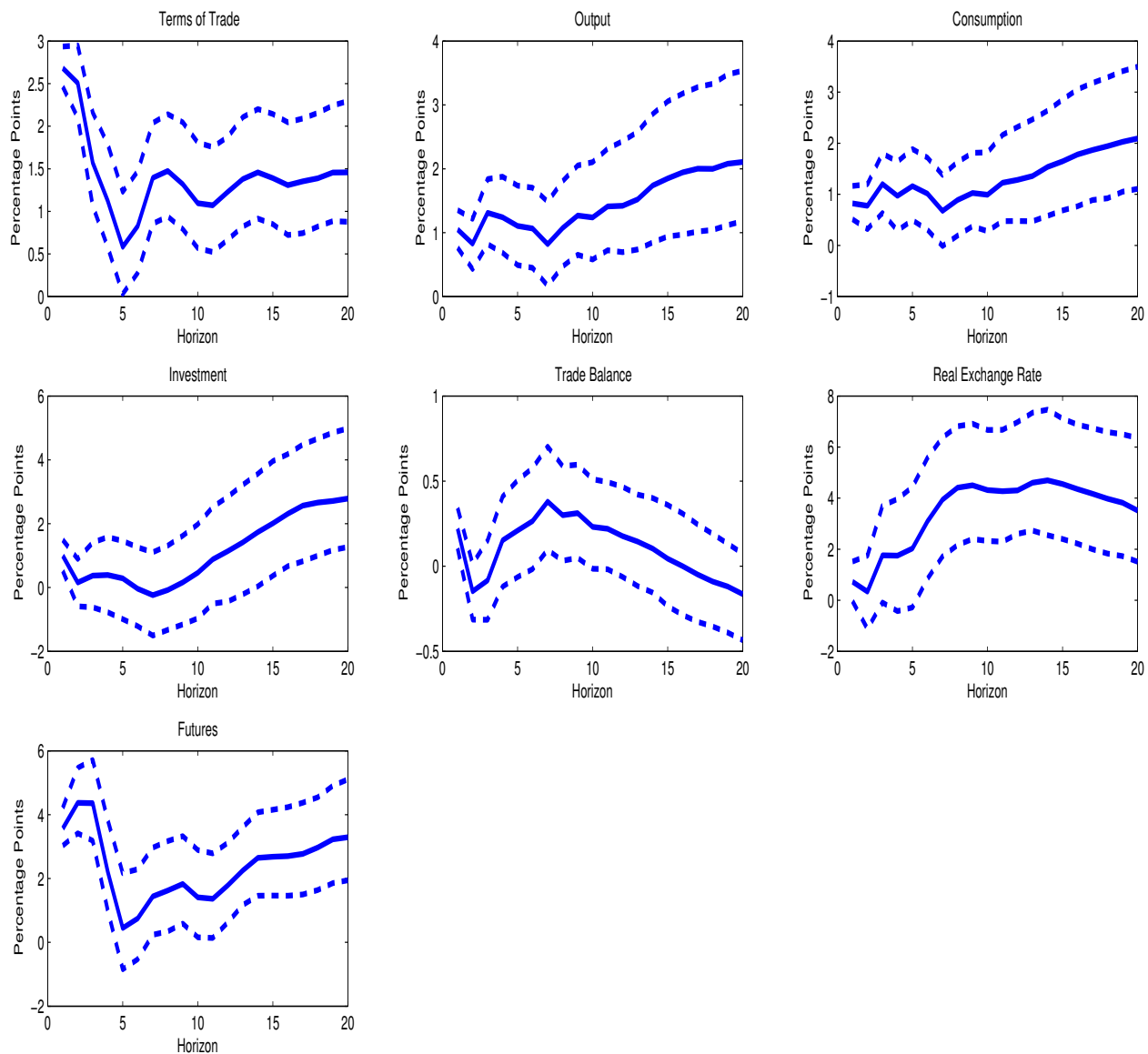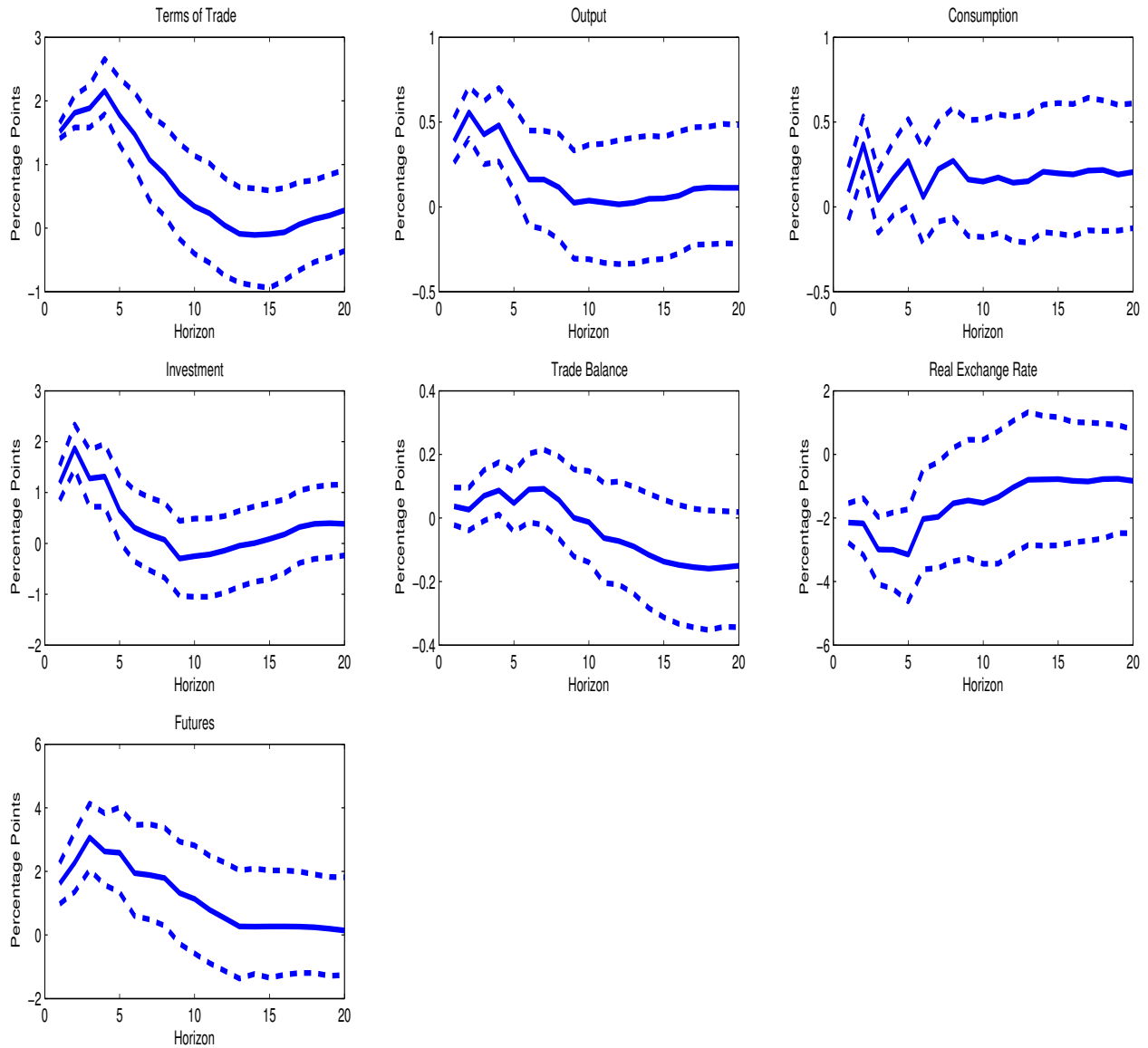

Notes: The solid line represents the median responses of Argentina to the unanticipated TOT shock. The dashed lines are one standard error bands. The estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.

Figure 2: **Impulse Responses to a One Standard Deviation TOT News Shock-Argentina**
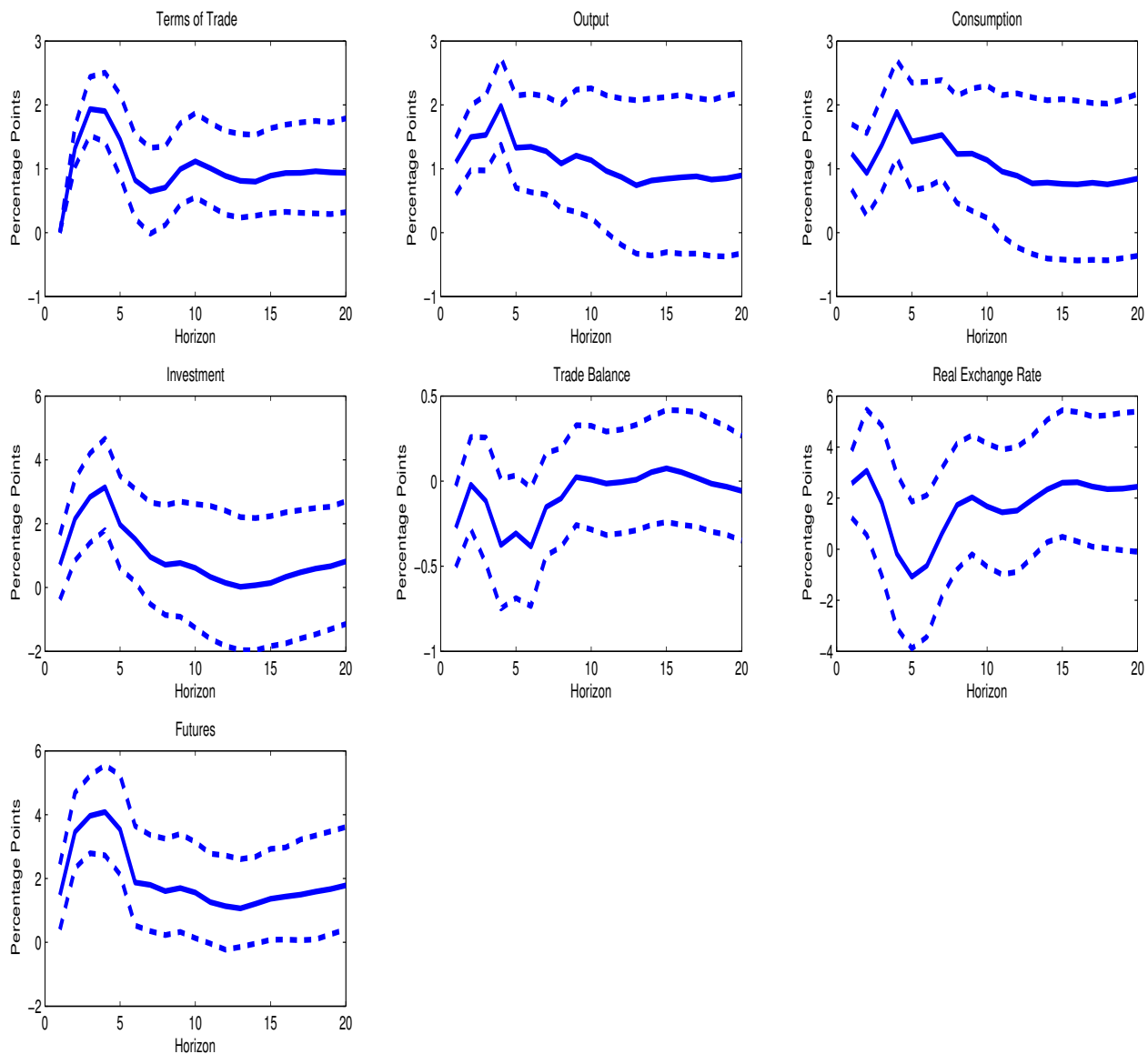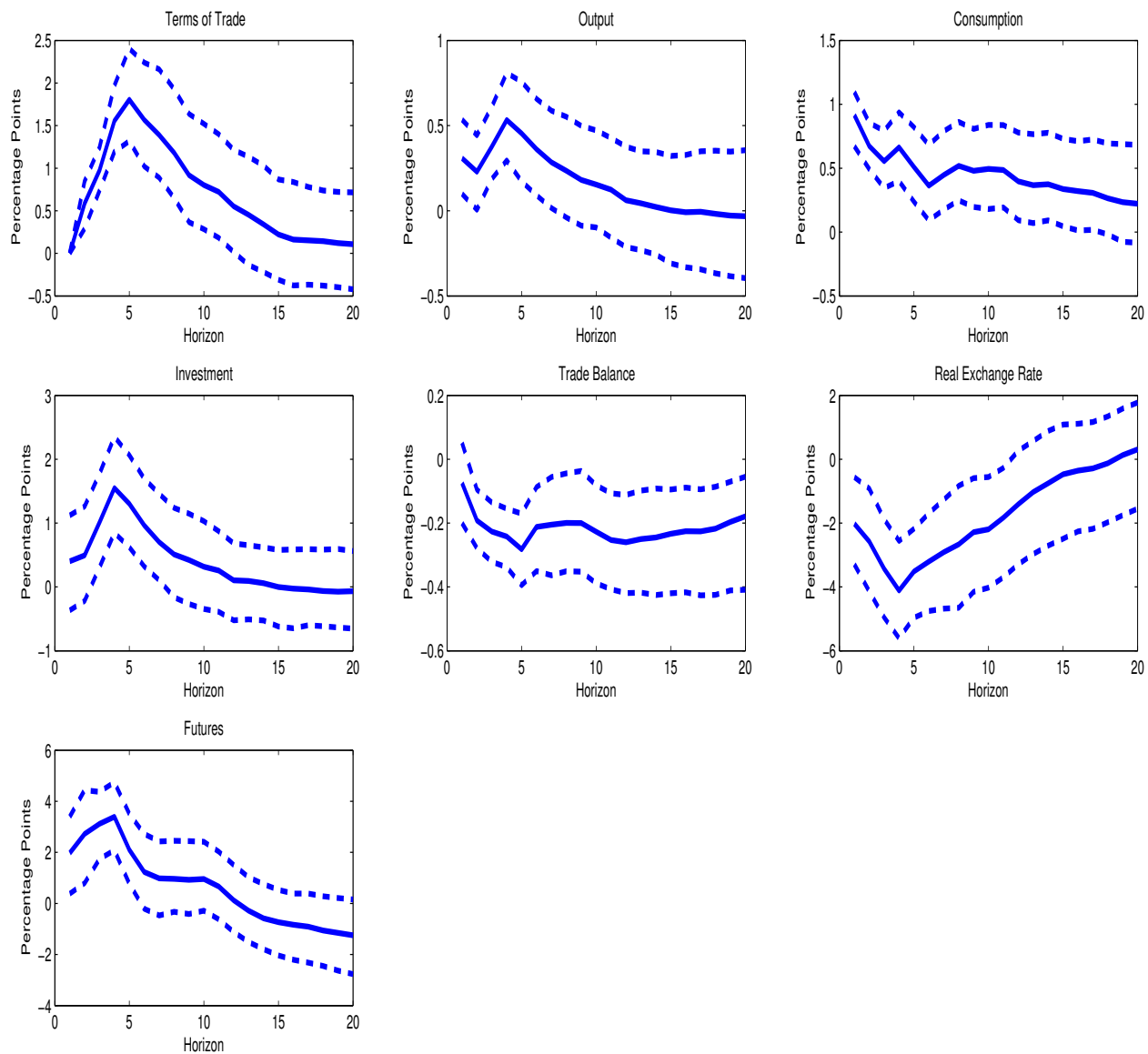

Notes: The solid line represents the median responses of Argentina to the TOT news shock. The dashed lines are one standard error bands. The estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.

Figure 3: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock-Brazil**
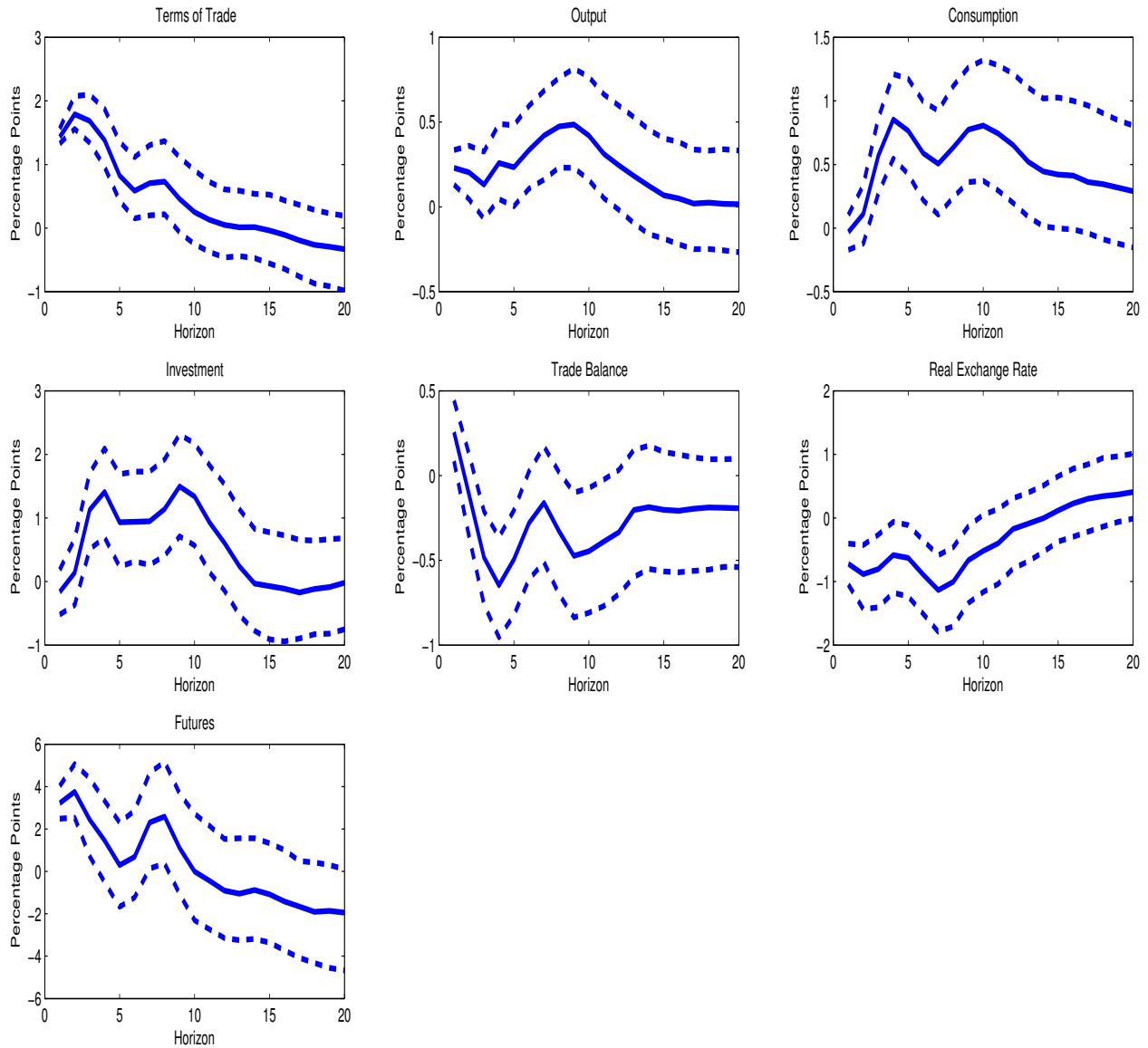

Notes: The solid line represents the median responses of Brazil to the unanticipated TOT shock. The dashed lines are one standard error bands. The estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.

4

Figure 4: **Impulse Responses to a One Standard Deviation TOT News Shock-Brazil**
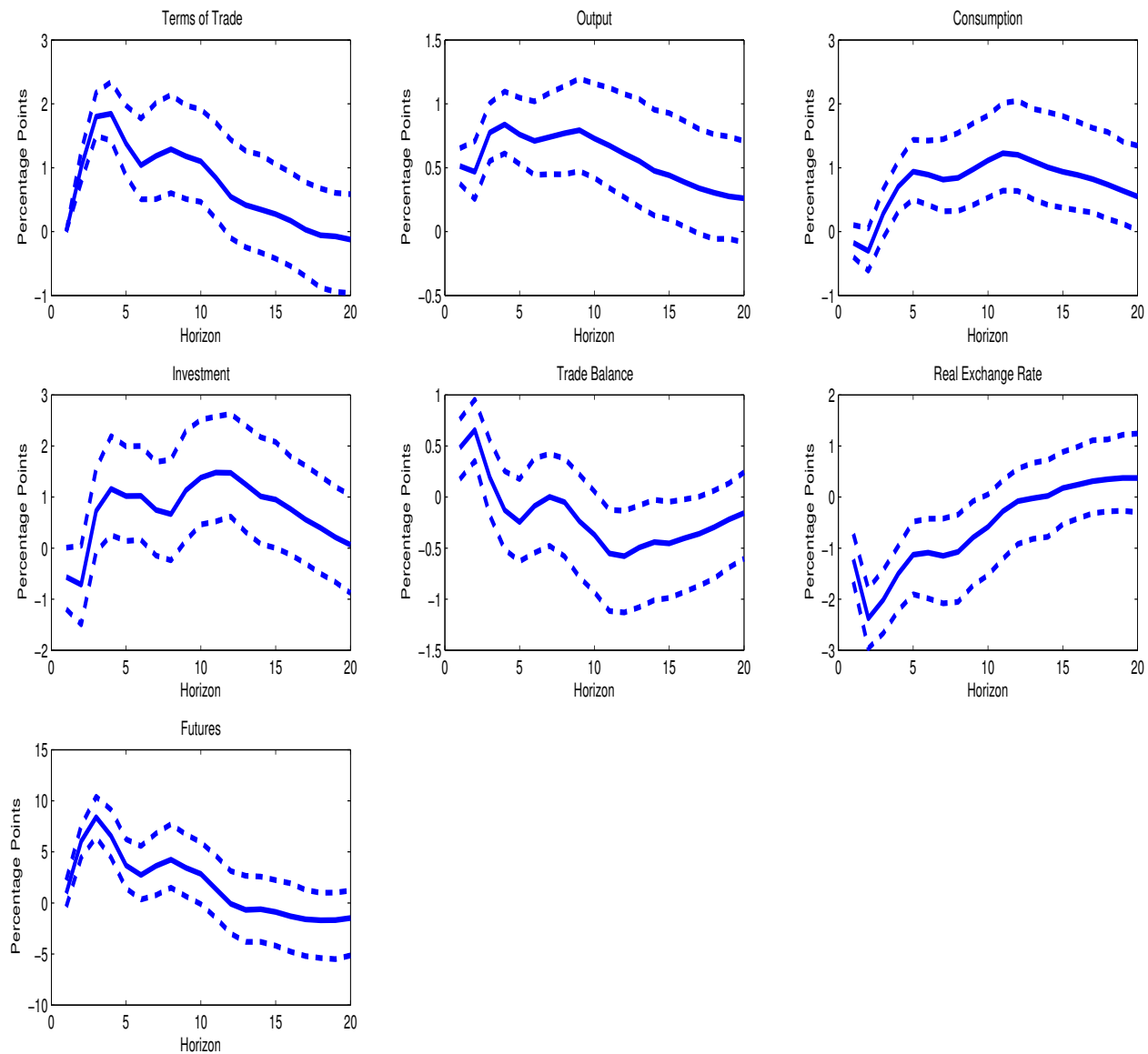

Notes: The solid line represents the median responses of Brazil to the TOT news shock. The dashed lines are one standard error bands. The estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.

Figure 5: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock-Chile**

Notes: The solid line represents the median responses of Chile to the unanticipated TOT shock. The dashed lines are one standard error bands. The estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.

Figure 6: **Impulse Responses to a One Standard Deviation TOT News Shock-Chile**

Notes: The solid line represents the median responses of Chile to the TOT news shock. The dashed lines are one standard error bands. The estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.
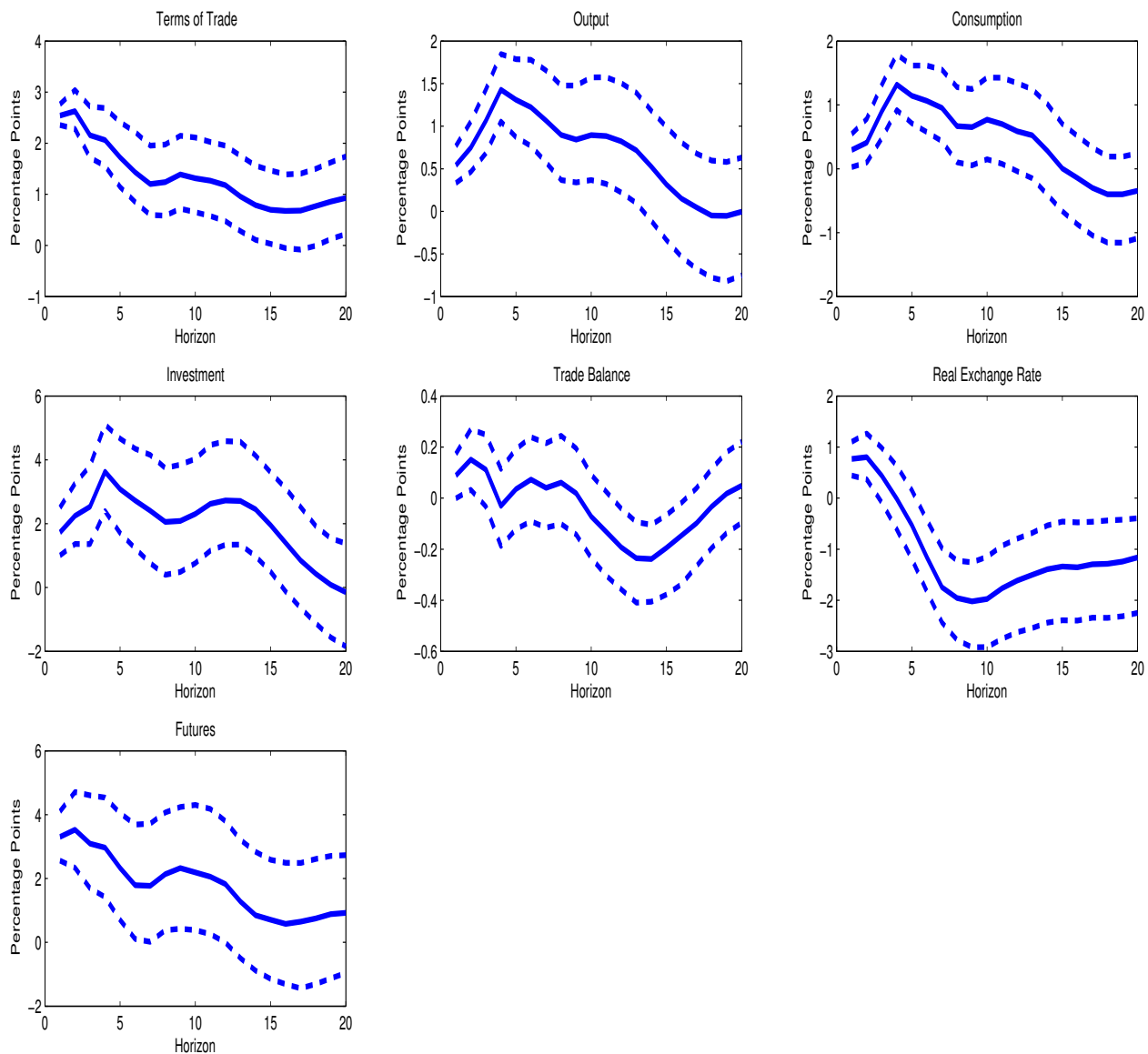
Figure 7: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock-Colombia**

Notes: The solid line represents the median responses of Colombia to the unanticipated TOT shock. The dashed lines are one standard error bands. The estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.
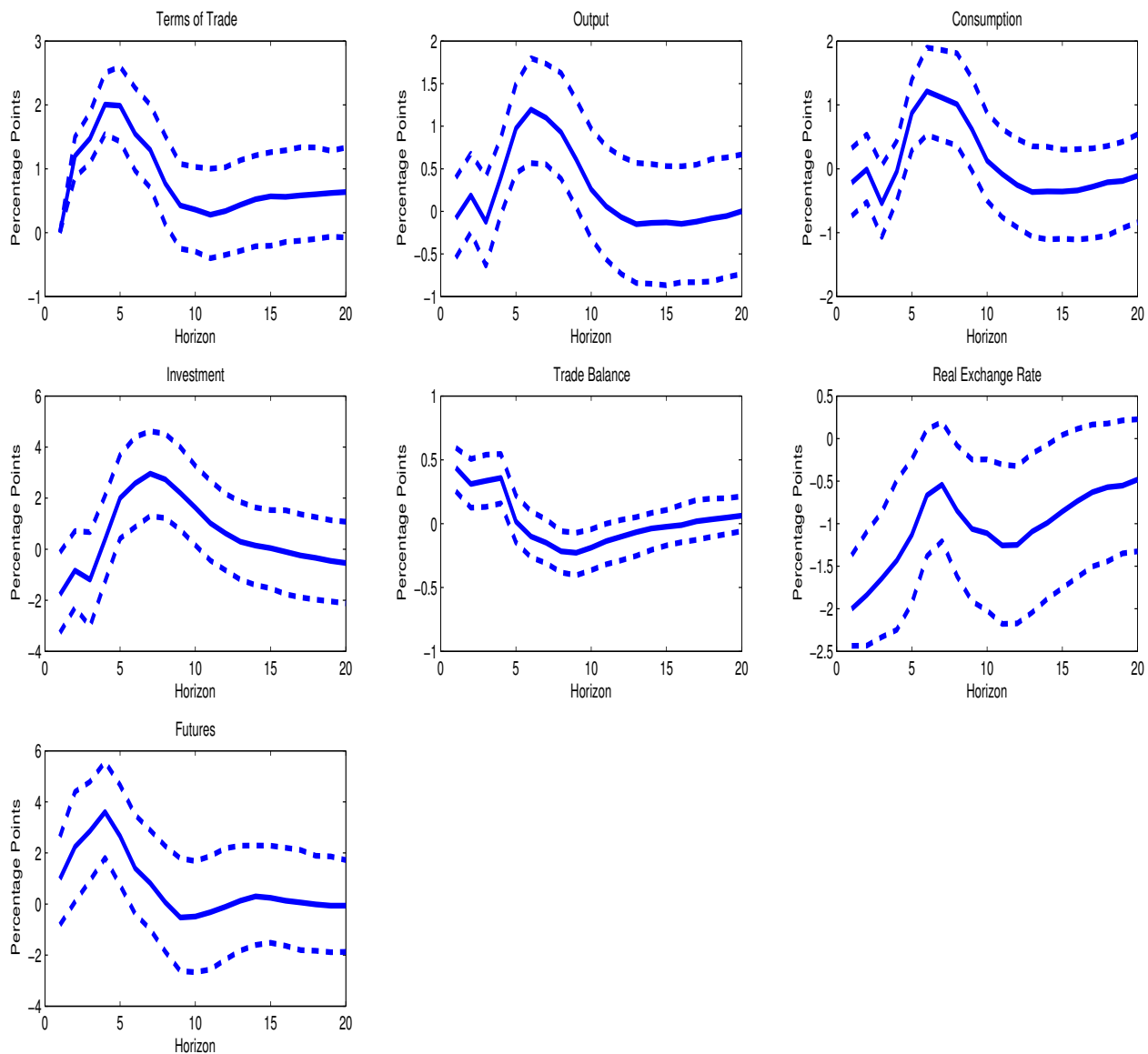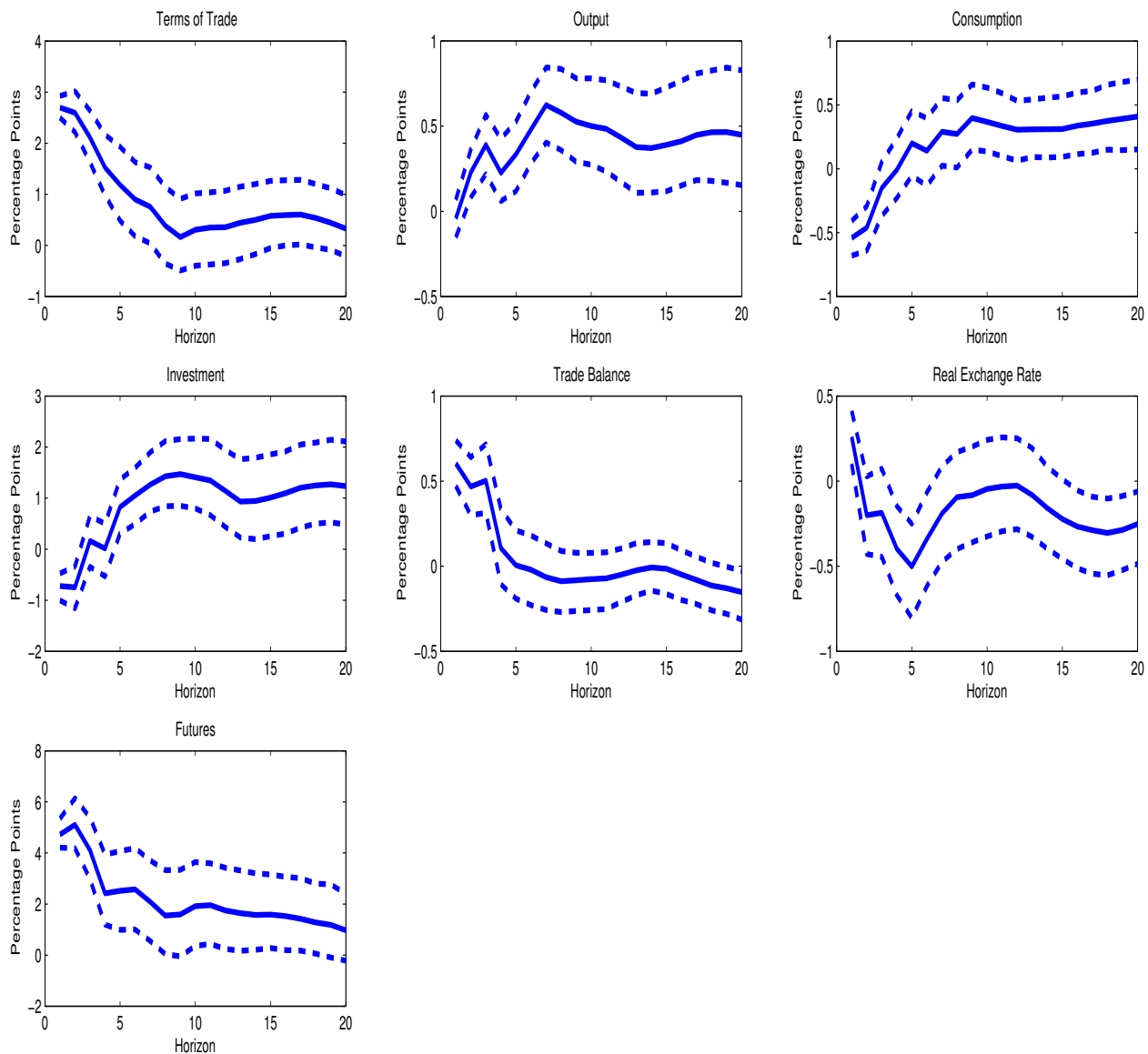
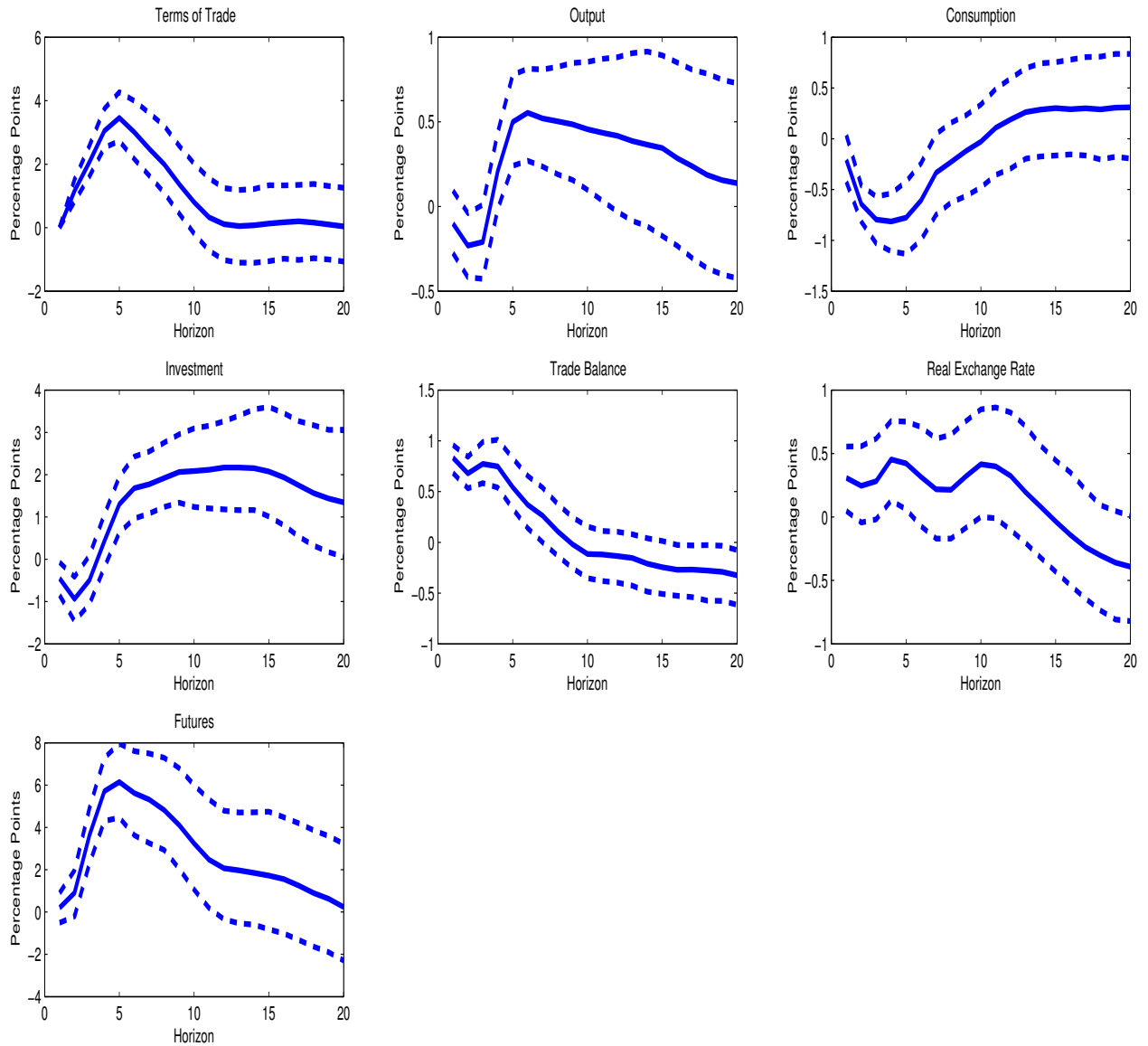Figure 8: **Impulse Responses to a One Standard Deviation TOT News Shock-Colombia**

Notes: The solid line represents the median responses of Colombia to the TOT news shock. The dashed lines are one standard error bands. The estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.

Figure 9: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock-Peru**

Notes: The solid line represents the median responses of Peru to the unanticipated TOT shock. The dashed lines are one standard error bands. The estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.

Figure 10: **Impulse Responses to a One Standard Deviation TOT News Shock-Peru**

Notes: The solid line represents the median responses of Peru to the TOT news shock. The dashed lines are one standard error bands. The estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.

Appendix B   Alternative SVAR Specifications

In this section we present the IRFs for each specification described in section 3.4.

B.1   Country Spreads

Figures 11 and 12 display the IRFs of the baseline SVAR including country spreads as en endogenous variable in the system.

Figure 11: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock from VARs including Country Spreads (solid lines).**

Notes: The solid lines are the average of the country-specific median responses to the unanticipated TOT shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.
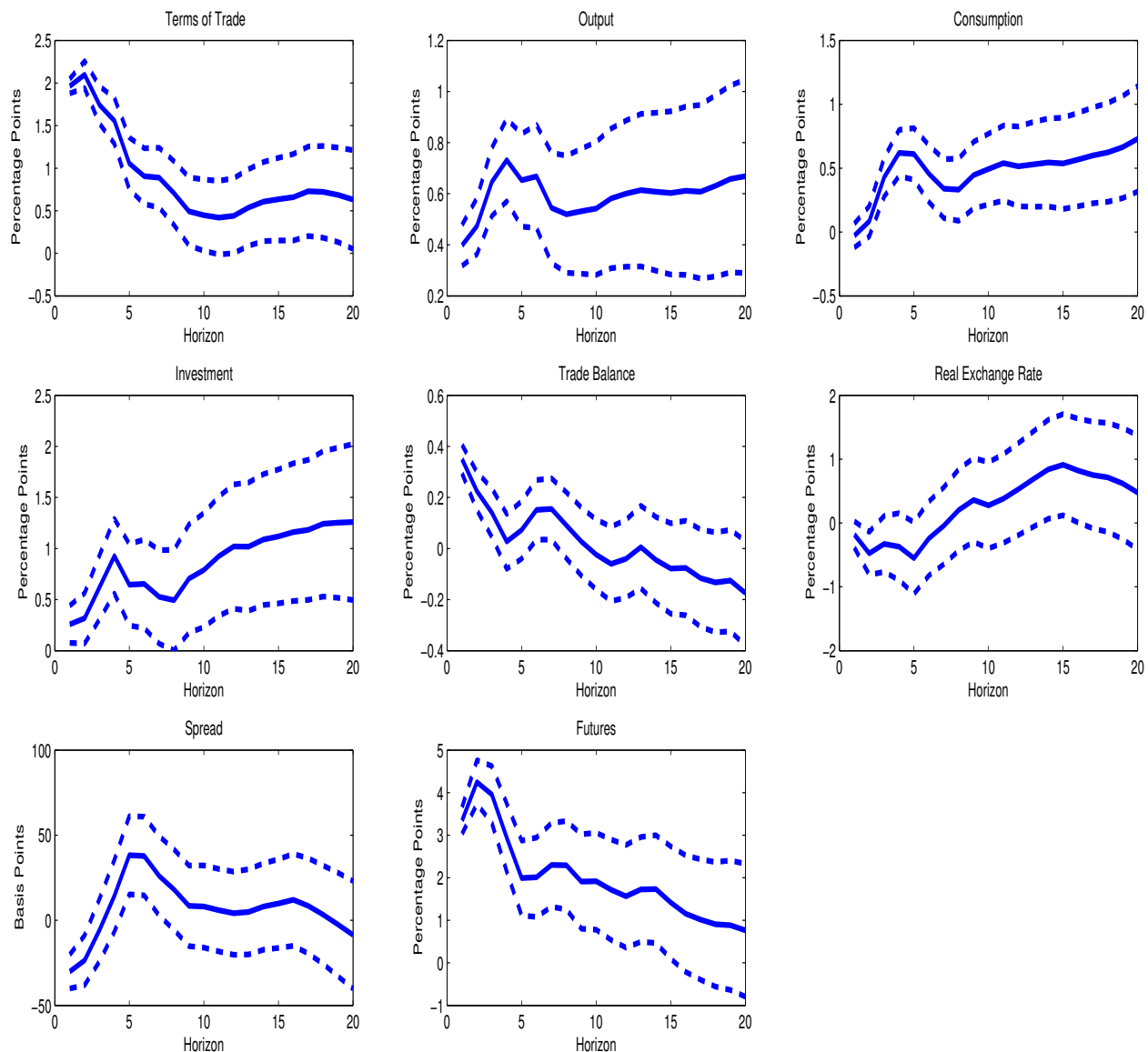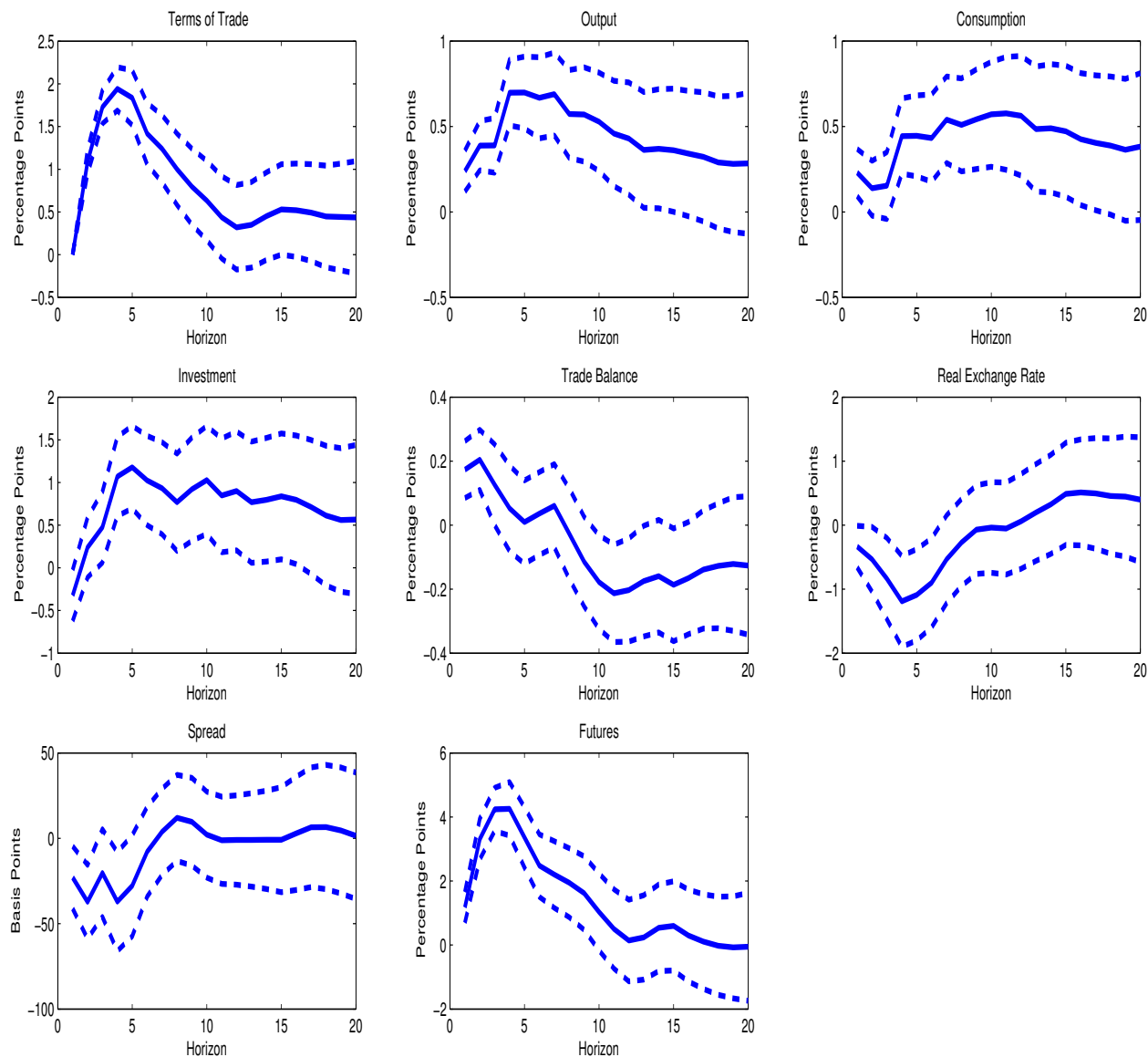
Figure 12: **Impulse Responses to a One Standard Deviation TOT News Shock from VARs including Country Spreads (solid lines).**
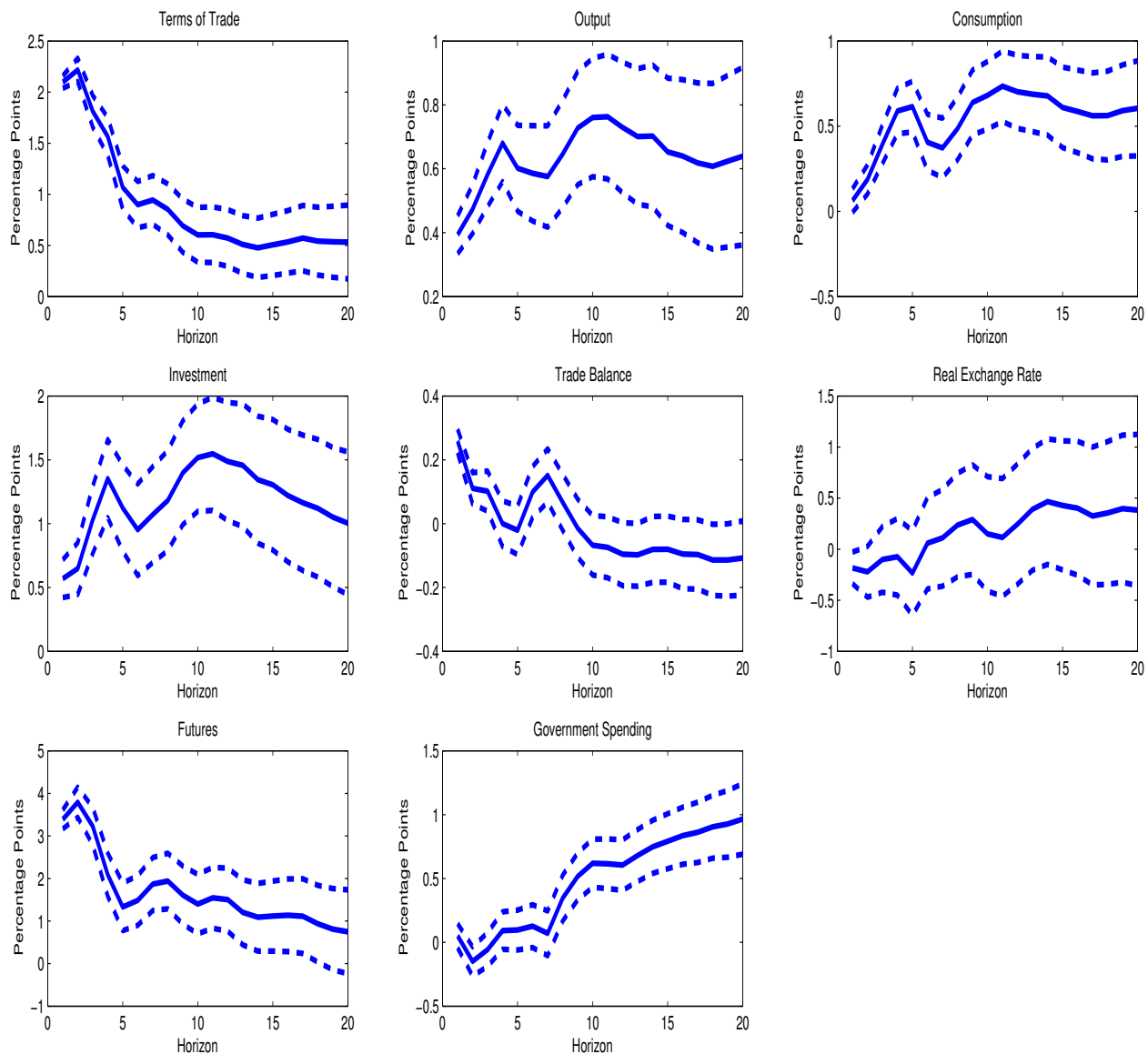

Notes: The solid lines are the average of the country-specific median responses to the TOT news shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the TOT news shock is identified in accordance with the MFEV estimation procedure described in Section 2. Horizon is in quarters.

B.2 Government Spending

Figures 13 and 14 display the IRFs of the baseline VAR including government expenditure as an endogenous variable in the system.
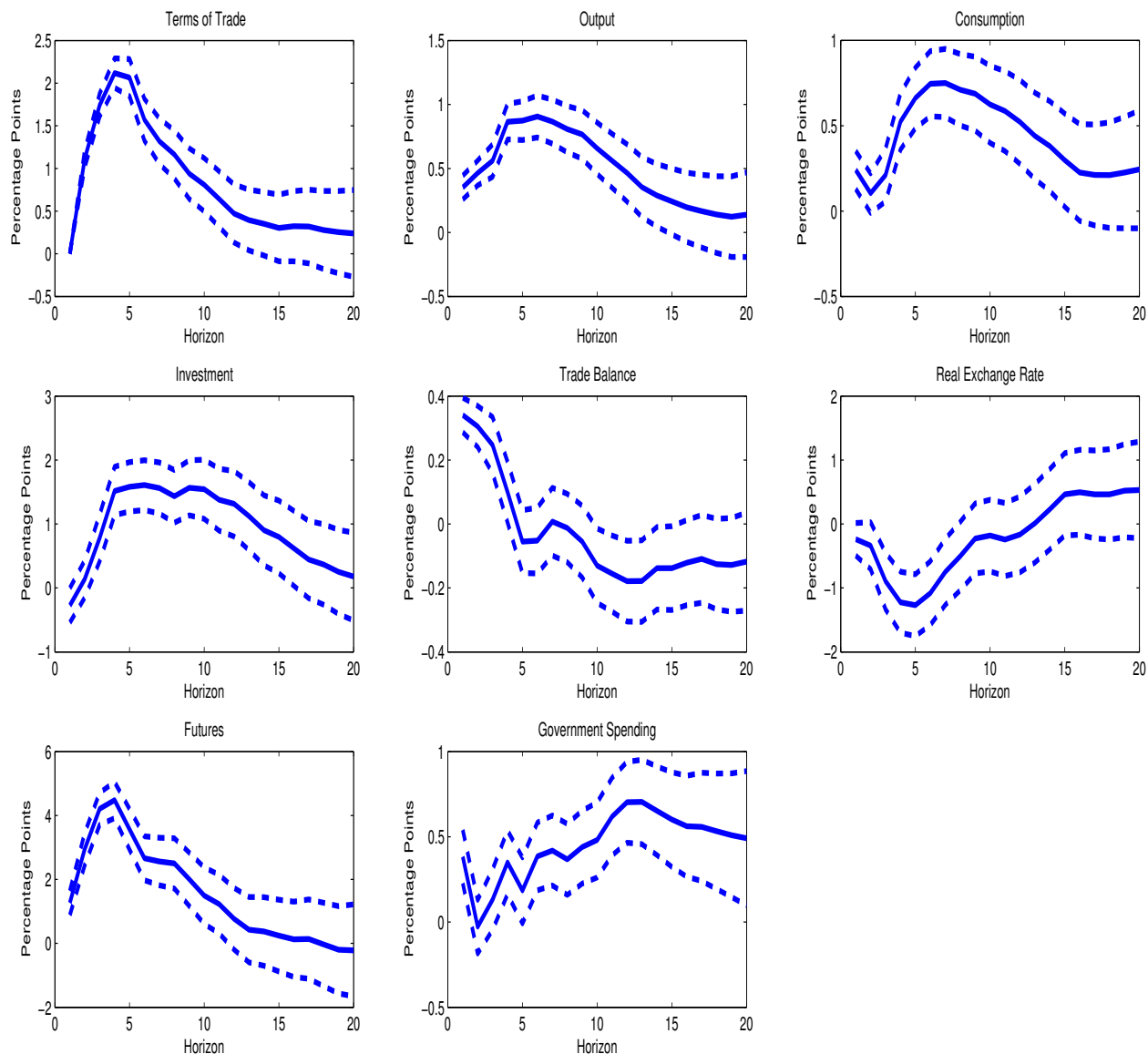
Figure 13: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock from VARs including government spending (solid lines)**.

Notes: The solid lines are the average of the country-specific median responses to the unanticipated TOT shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.

Figure 14: **Impulse Responses to a One Standard Deviation TOT News Shock from VARs including government spending (solid lines).**
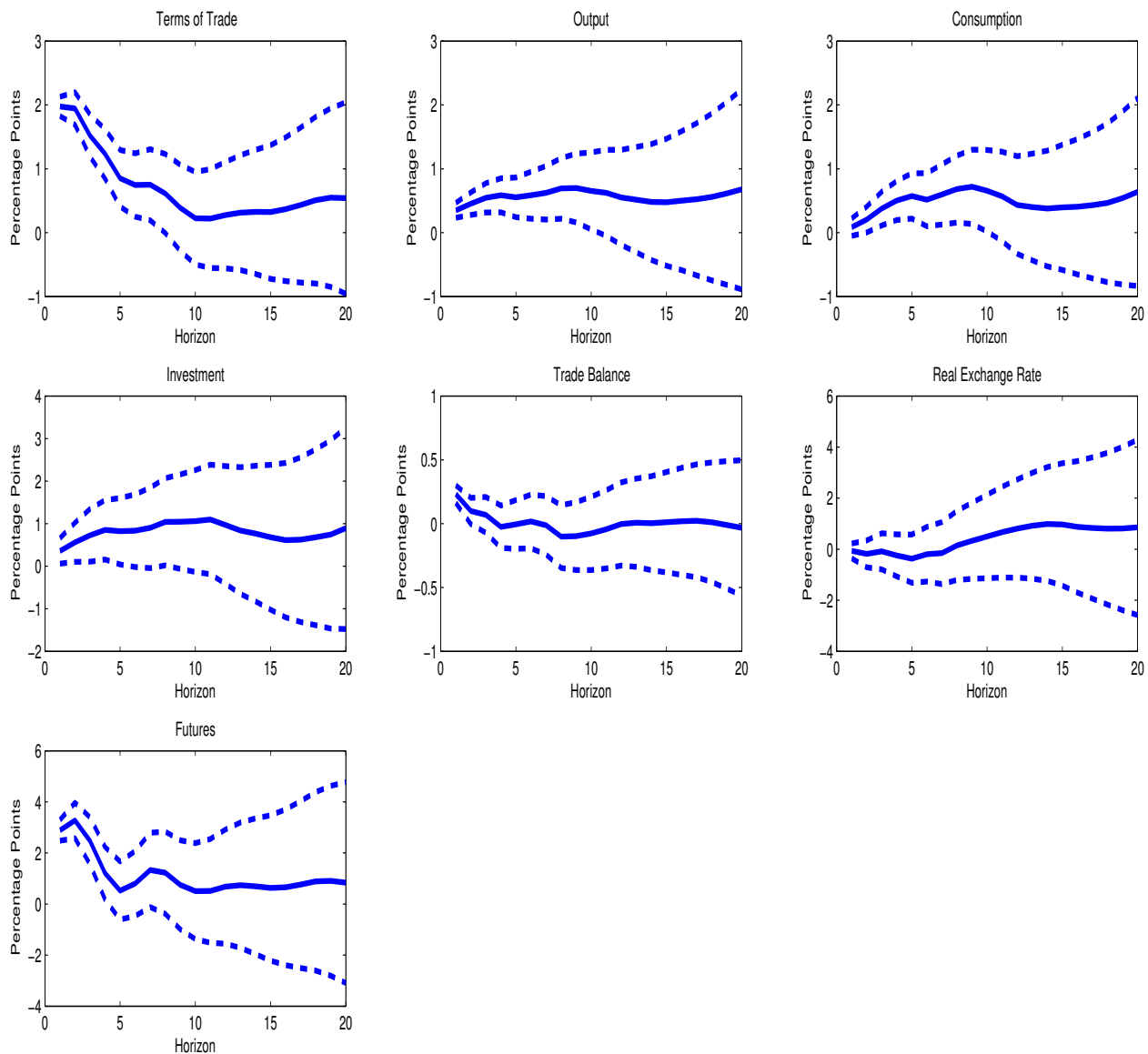

Notes: The solid lines are the average of the country-specific median responses to the TOT news shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the TOT news shock is identified in accordance with the MFEV estimation procedure described in Section 2. Horizon is in quarters.
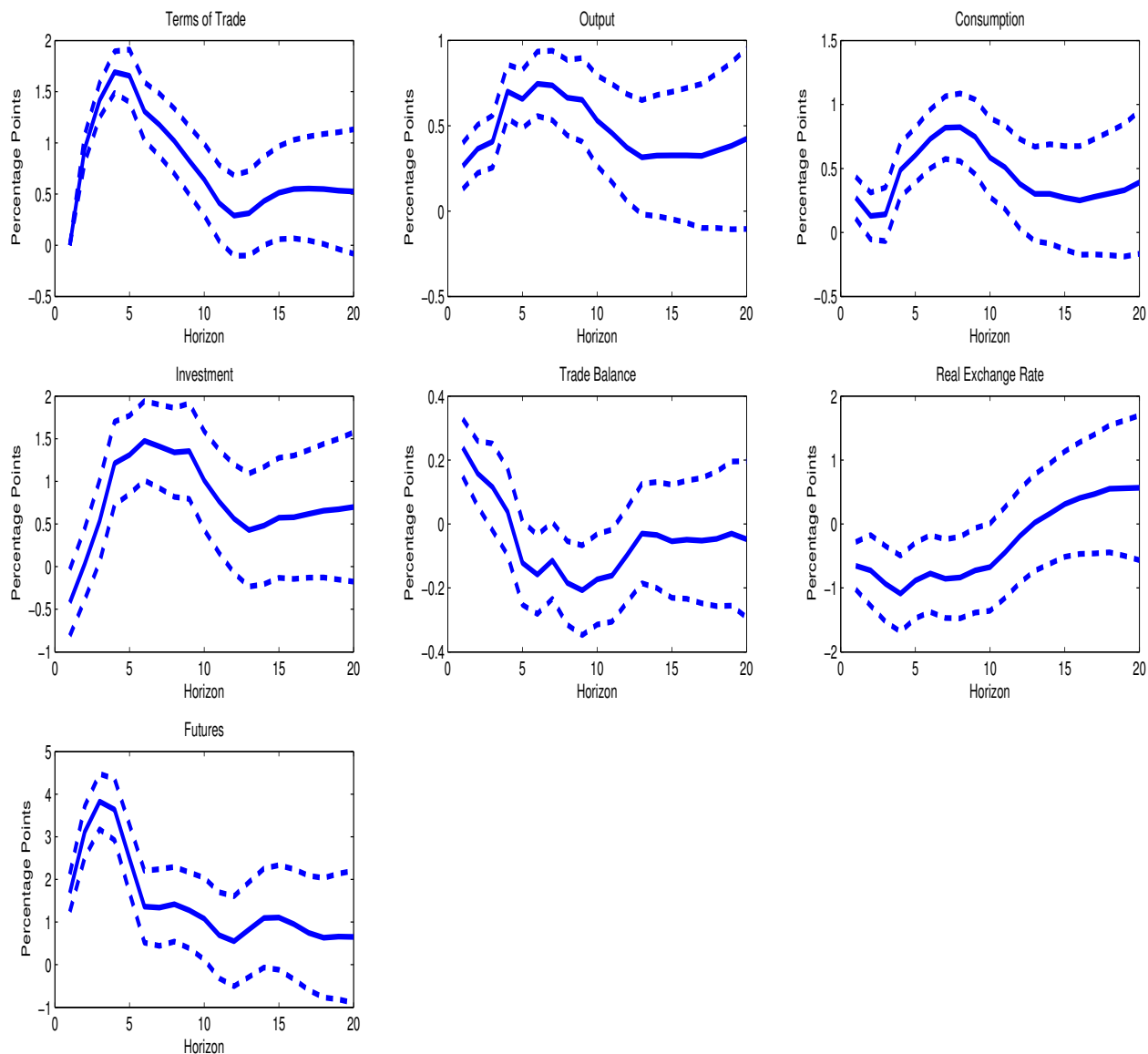
B.3 Federal Funds Rate

Figures 15 and 16 present the IRFs of the baseline SVAR that includes the Fed Funds rate as an exogenous variable in the system.

Figure 15: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock from VARs including Federal Funds rate (solid lines).**

Notes: The solid lines are the average of the country-specific median responses to the unanticipated TOT shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.

Figure 16: **Impulse Responses to a One Standard Deviation TOT News Shock from VARs including Federal Funds rate (solid lines).**
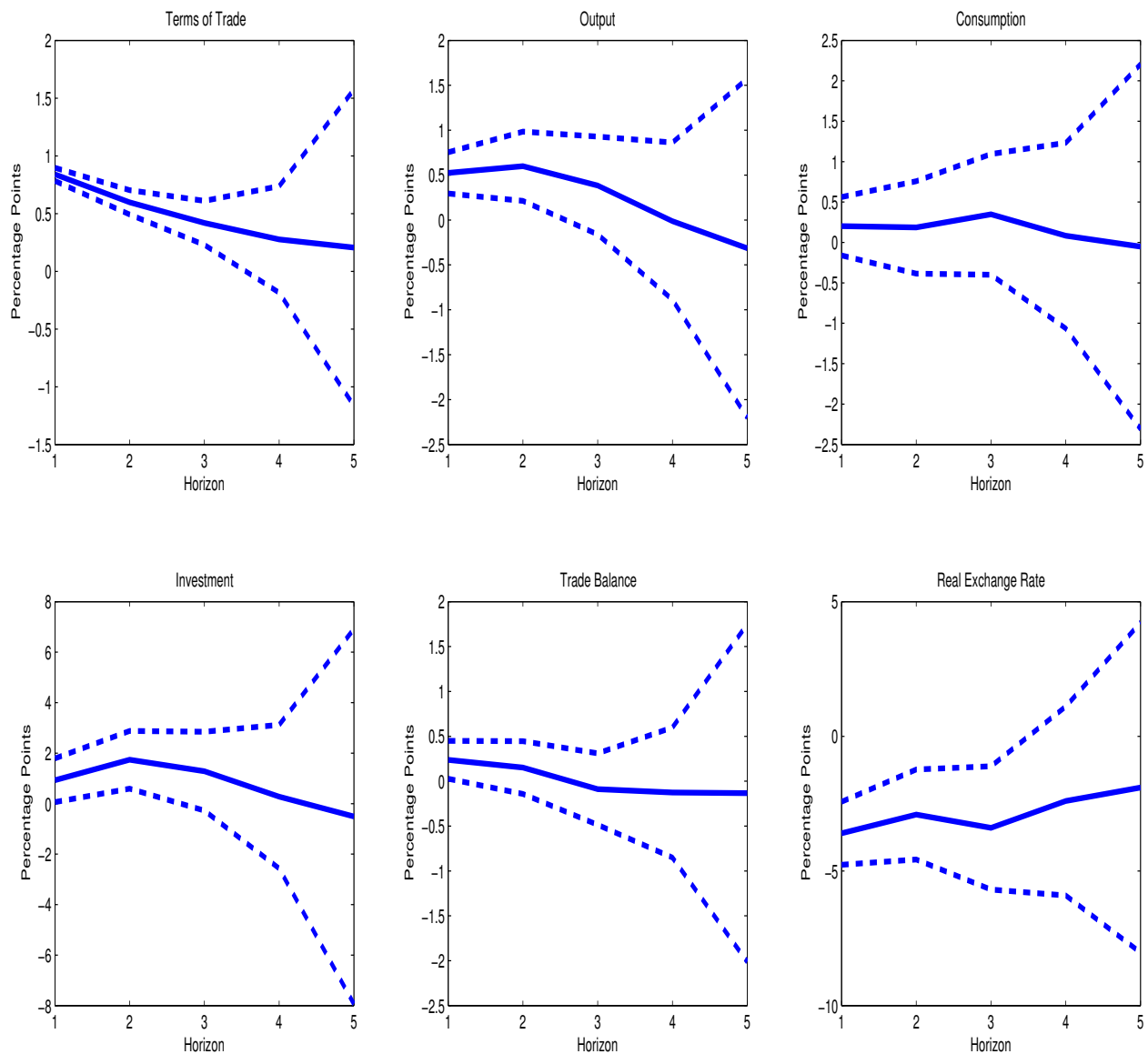

Notes: The solid lines are the average of the country-specific median responses to the TOT news shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the TOT news shock is identified in accordance with the MFEV estimation procedure described in Section 2. Horizon is in quarters.

## B.4   Commodity-Based Terms of Trade

Figures 17 and 18 display the IRFs of the VAR using commodity-based terms of trade instead of the terms of trade variable. All the variables are expressed in annual frequency.

Figure 17: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock from VARs using Commodity Based Terms of Trade (solid lines).**

Notes: The solid lines are the average of the country-specific median responses to the unanticipated TOT shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in years.

Figure 18: **Impulse Responses to a One Standard Deviation TOT News Shock from VARs using Commodity Based Terms of Trade (solid lines).**
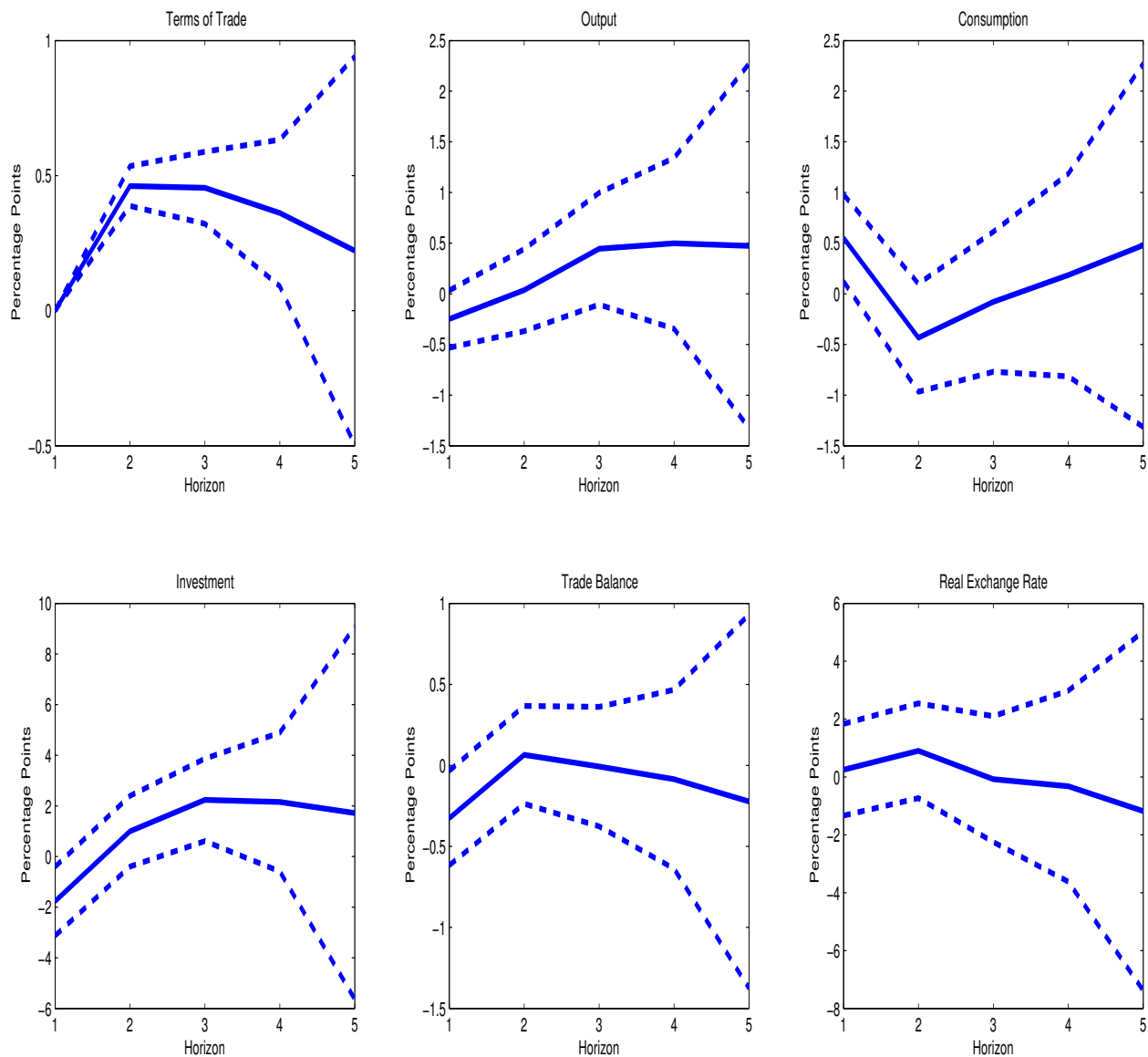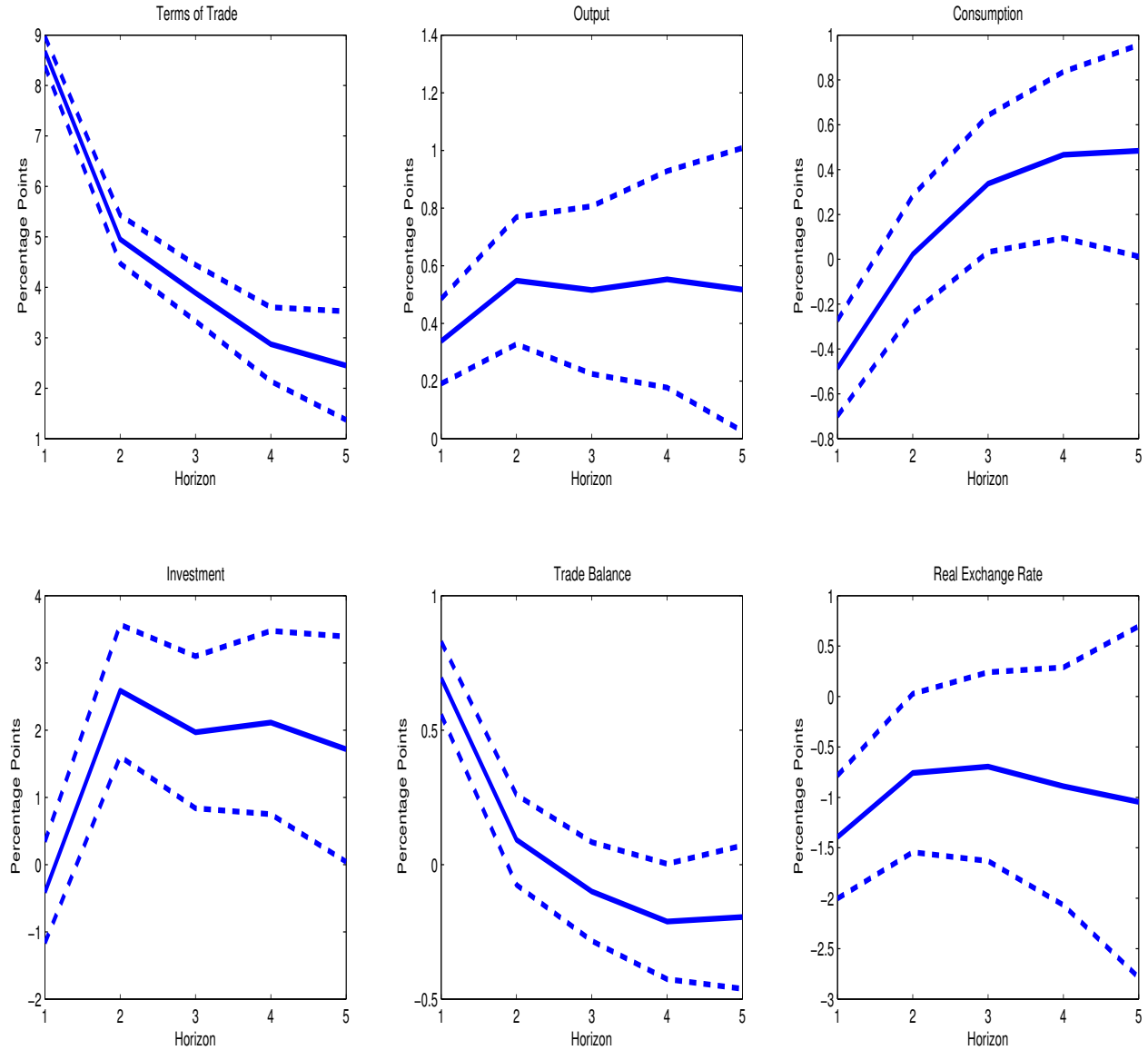

Notes: The solid lines are the average of the country-specific median responses to the TOT news shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the TOT news shock is identified in accordance with the MFEV estimation procedure described in Section 2. Horizon is in years.

B.5 The Schmitt-Grohe and Uribe (2015) Specification
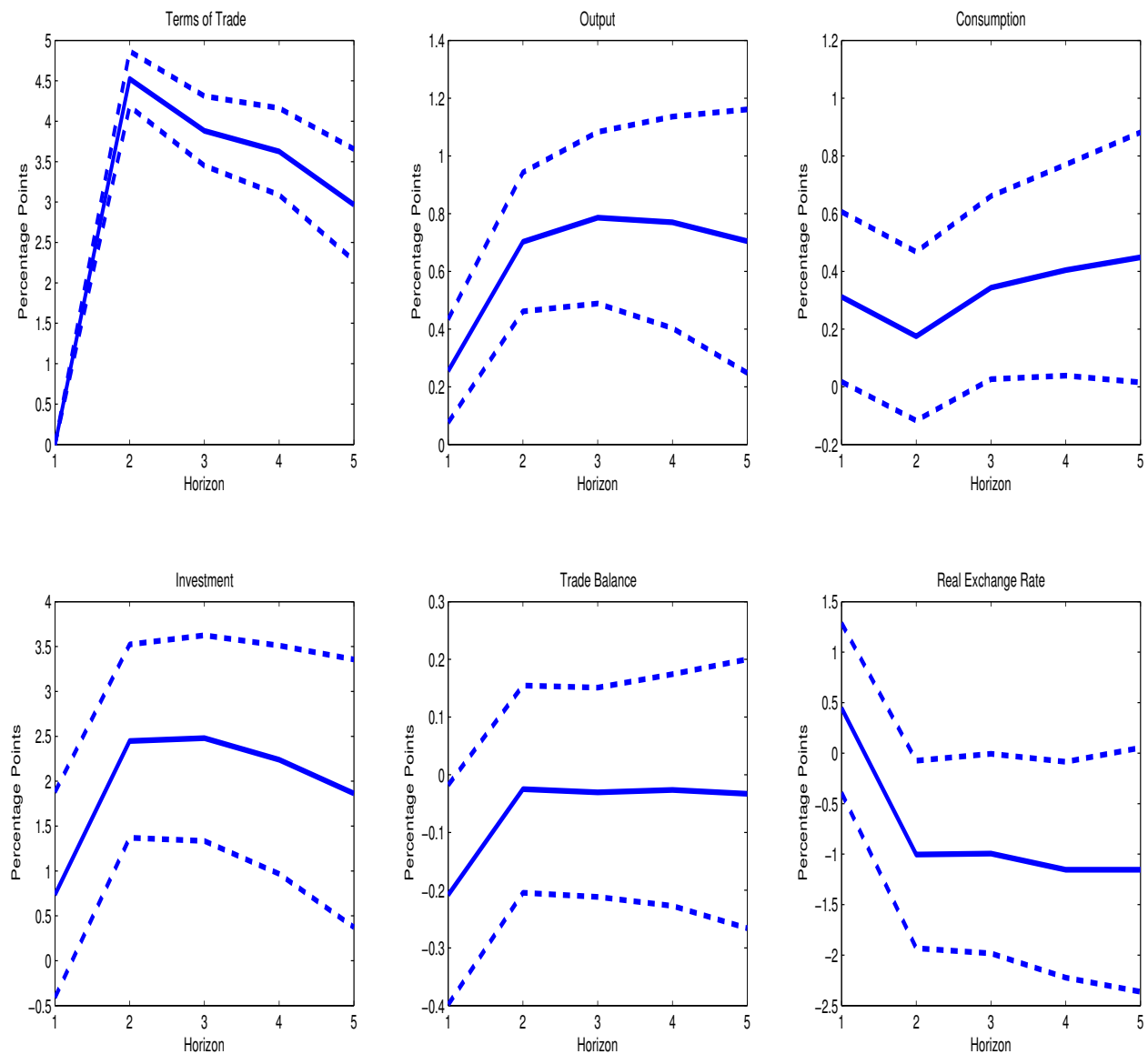
Figures 19 and 20 display the IRFs of the VAR following the Schmitt-Grohe and Uribe (2015) specification. All the variables are expressed in annual frequency. Figures 21 and 22 display the IRFs of the same specification but including only Latin American countries (Argentina, Bolivia, Brazil, Colombia, Mexico, Peru, and Uruguay).

Figure 19: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock from VARs following Schmitt-Grohe and Uribe (2015) Specification (solid lines).**
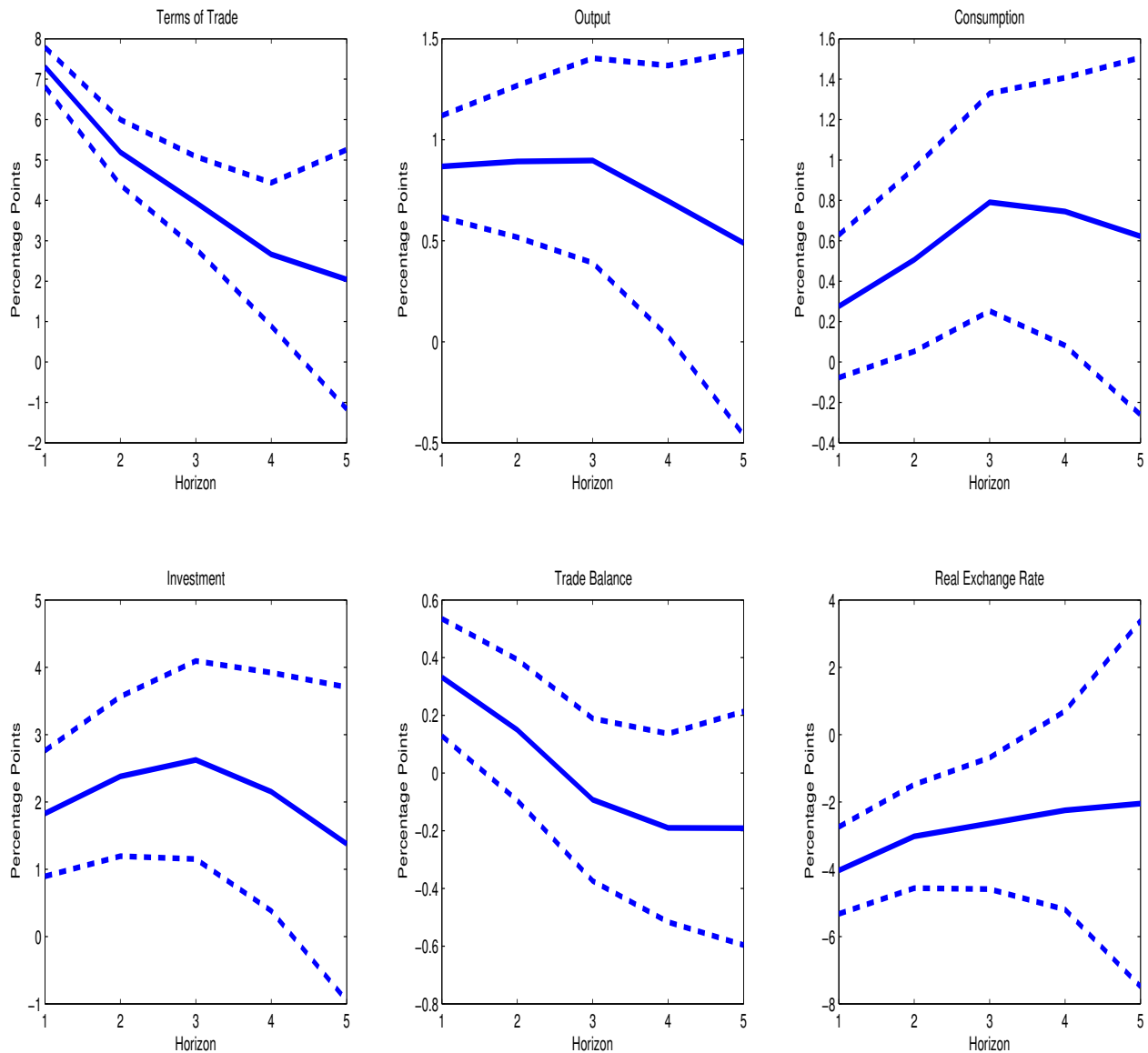

Notes: The solid lines are the average of the country-specific median responses to the unanticipated TOT shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in years.

Figure 20: **Impulse Responses to a One Standard Deviation TOT News Shock from VARs following Schmitt-Grohe and Uribe (2015) Specification (solid lines).**
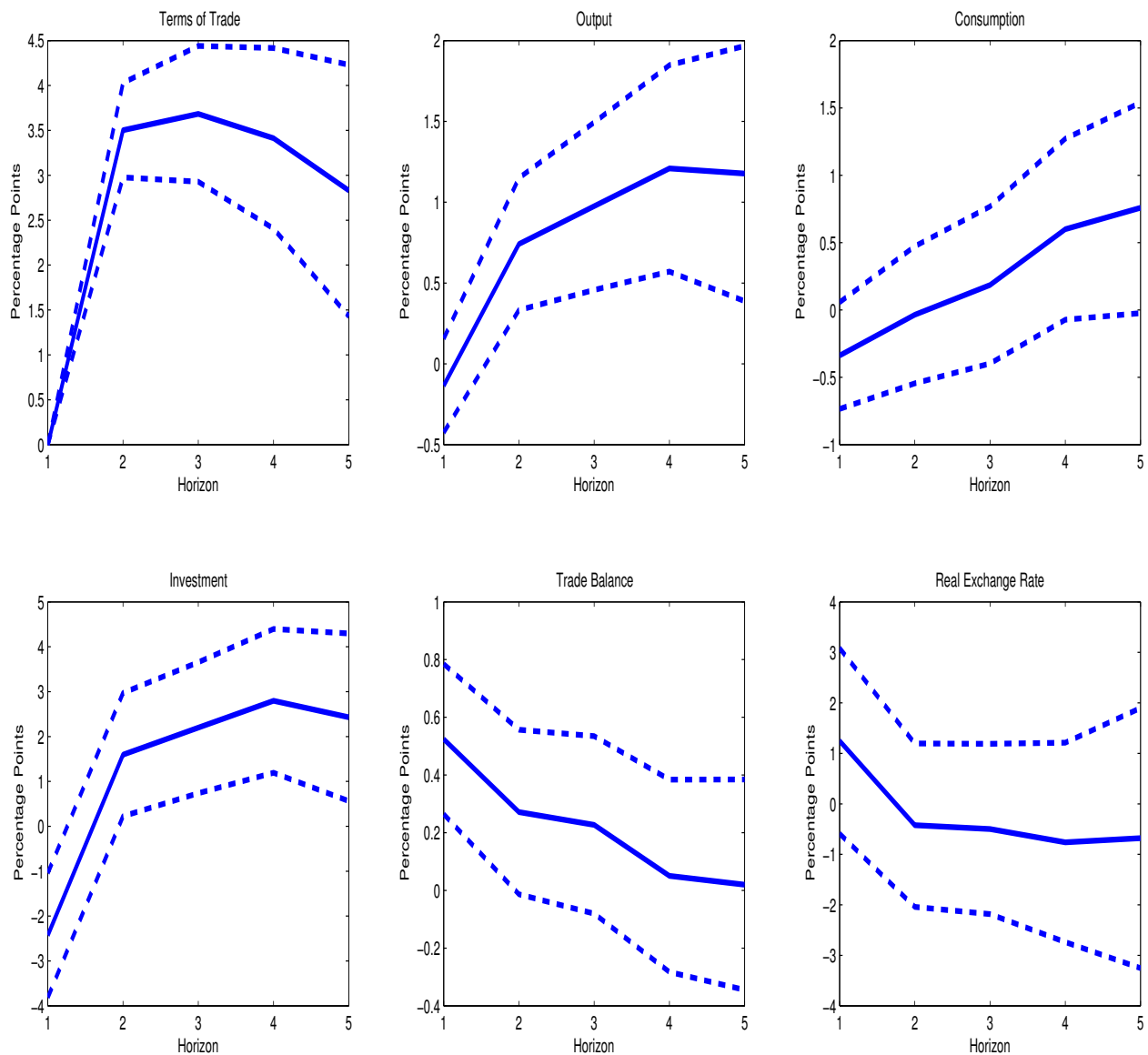

Notes: The solid lines are the average of the country-specific median responses to the TOT news shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the TOT news shock is identified in accordance with the MFEV estimation procedure described in Section 2. Horizon is in years.

Figure 21: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock from VARs following Schmitt-Grohe and Uribe (2015) Specification (solid lines)-Latin American Countries.**

Notes: The solid lines are the average of the country-specific median responses to the unanticipated TOT shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in years.

Figure 22: **Impulse Responses to a One Standard Deviation TOT News Shock from VARs following Schmitt-Grohe and Uribe (2015) Specification (solid lines)–Latin American Countries**.
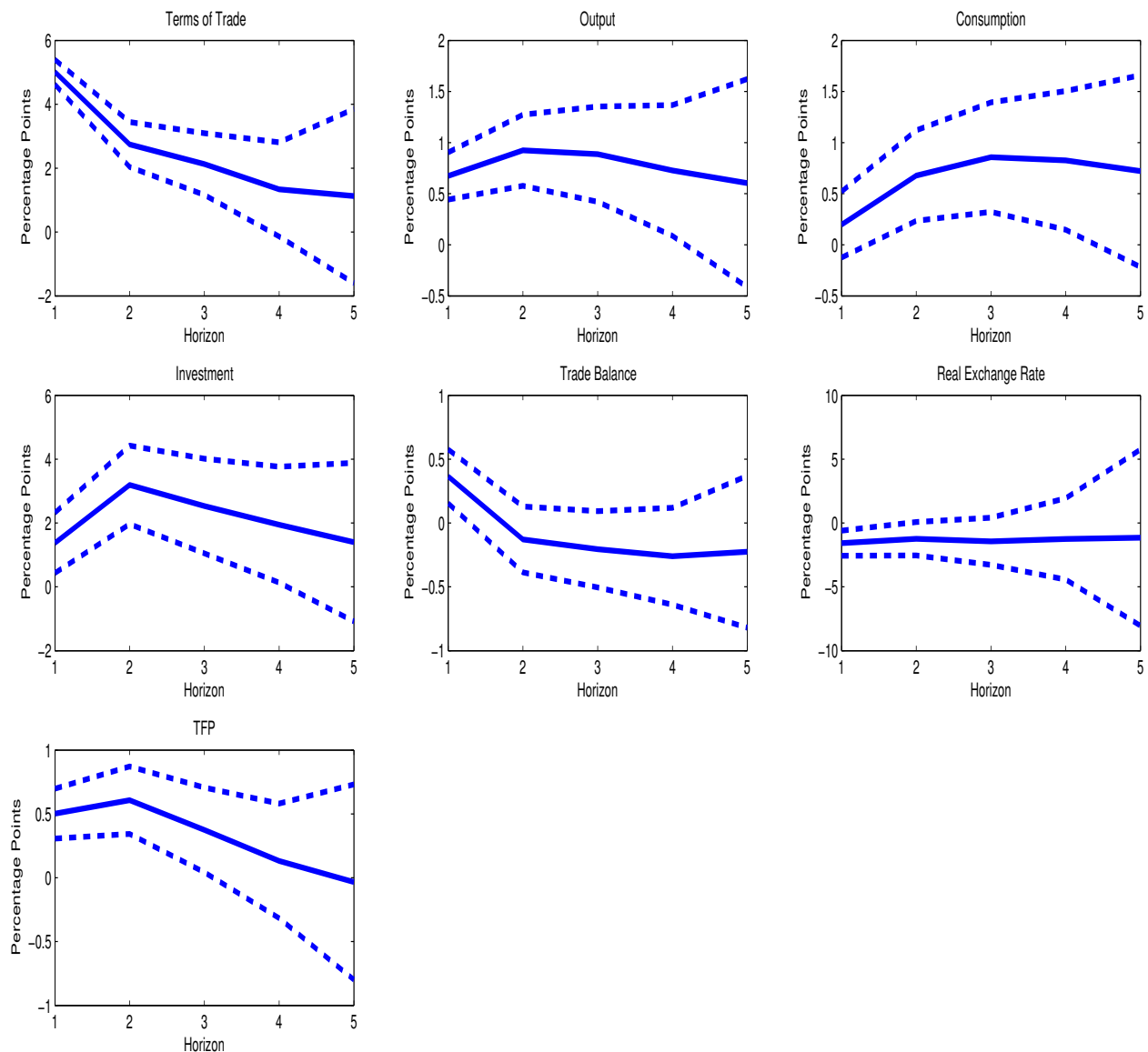

Notes: The solid lines are the average of the country-specific median responses to the TOT news shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the TOT news shock is identified in accordance with the MFEV estimation procedure described in Section 2. Horizon is in years.

B.6 TOT News and TFP Shocks

Figures 23 and 24 display the IRFs of the baseline VAR including TFP. All the variables are expressed in annual frequency.

Figure 23: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock from VARs including TFP.**

Notes: The solid lines are the average of the country-specific median responses to the unanticipated TOT shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in years.

Figure 24: **Impulse Responses to a One Standard Deviation TOT News Shock from VARs including TFP.**
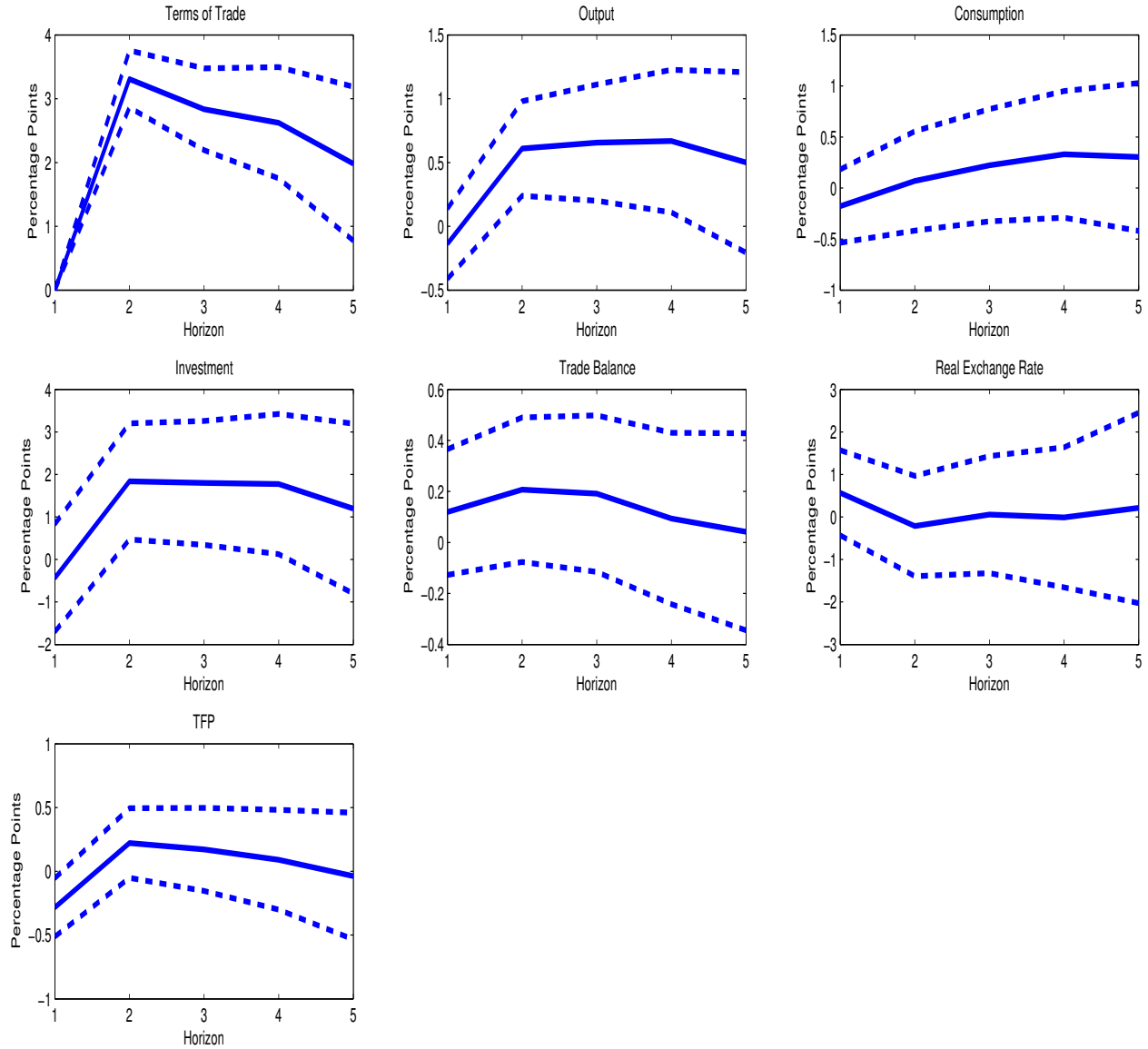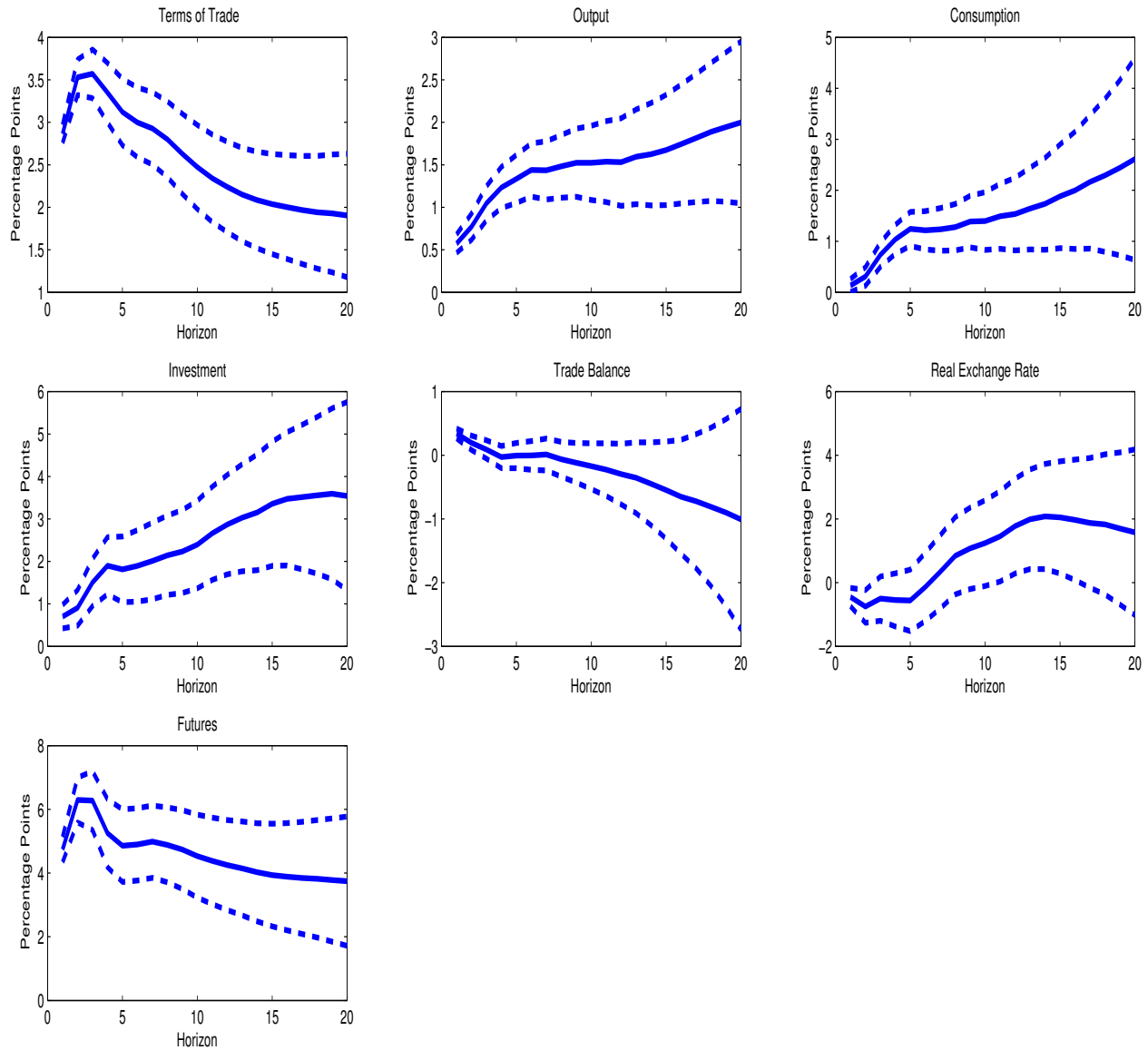

Notes: The solid lines are the average of the country-specific median responses to the TOT news shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the TOT news shock is identified in accordance with the MFEV estimation procedure described in Section 2. Horizon is in years.

B.7 Exogeneity of TOT Shocks

Figures 25 and 26 display the IRFs of the alternative VAR framework in which the terms of trade and future prices are included in an exogenous block. As explained in section 3.4.7, the identification restriction of news shocks implies that only TOT and futures prices movements can affect the evolution of the terms of trade.

Figure 25: **Impulse Responses to a One Standard Deviation Unanticipated TOT Shock Identified in an Exogenous Block**

Notes: The solid lines are the average of the country-specific median responses to the unanticipated TOT shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the unanticipated TOT shock is identified as the VAR innovation in TOT. Horizon is in quarters.

Figure 26: **Impulse Responses to a One Standard Deviation TOT News Shock Identified in an Exogenous Block**
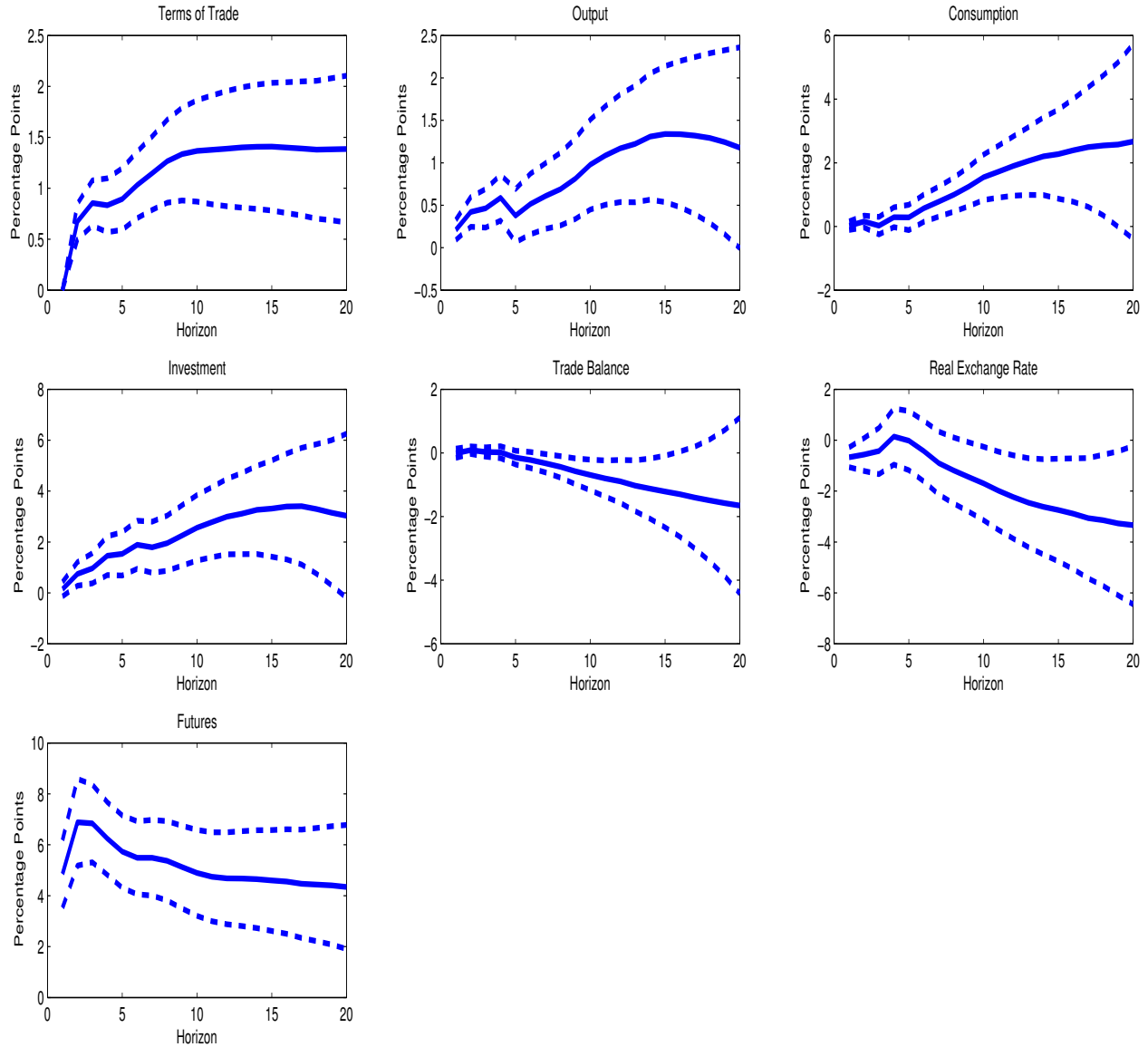
Notes: The solid lines are the average of the country-specific median responses to the TOT news shock. The dashed lines are one standard error bands computed as the square root of the average variance across countries. The underlying country-specific estimates are based on 1000 draws taken from the posterior distribution of the VAR parameters, where the TOT news shock is identified in accordance with the MFEV estimation procedure described in Section 2. Horizon is in quarters.

Appendix C   Monte Carlo exercise

Figures 27, 28, 29, 30, 31, 32, 33, and 34 display the results from MC exercise for Argentina, Chile, Colombia, and Peru, respectively.

Figure 27: **The SVAR Impulse Responses, Monte Carlo Estimated Mean Impulse Responses, and the Theoretical Impulse Responses to the TOT Unanticipated Shock for Argentina.**
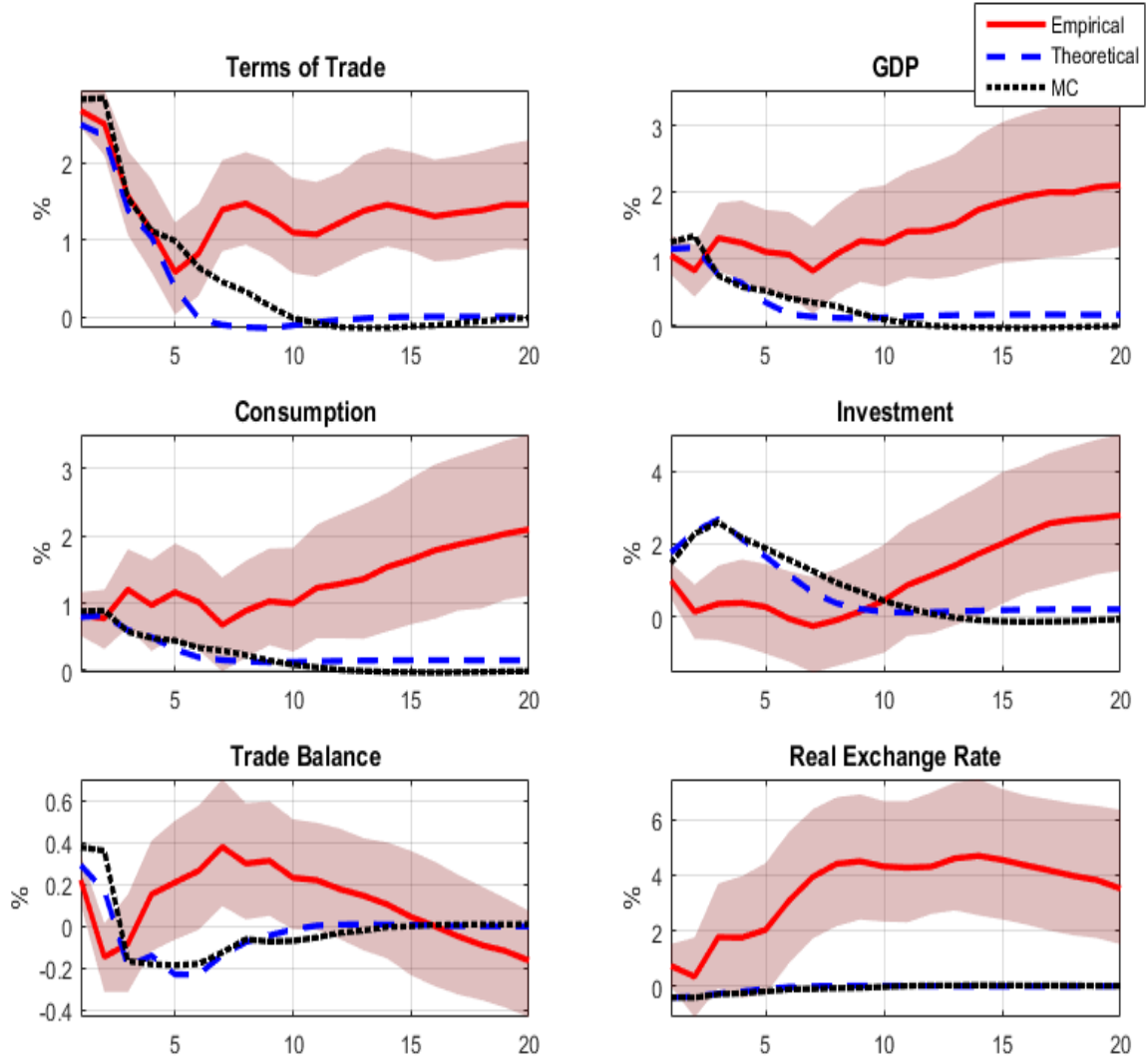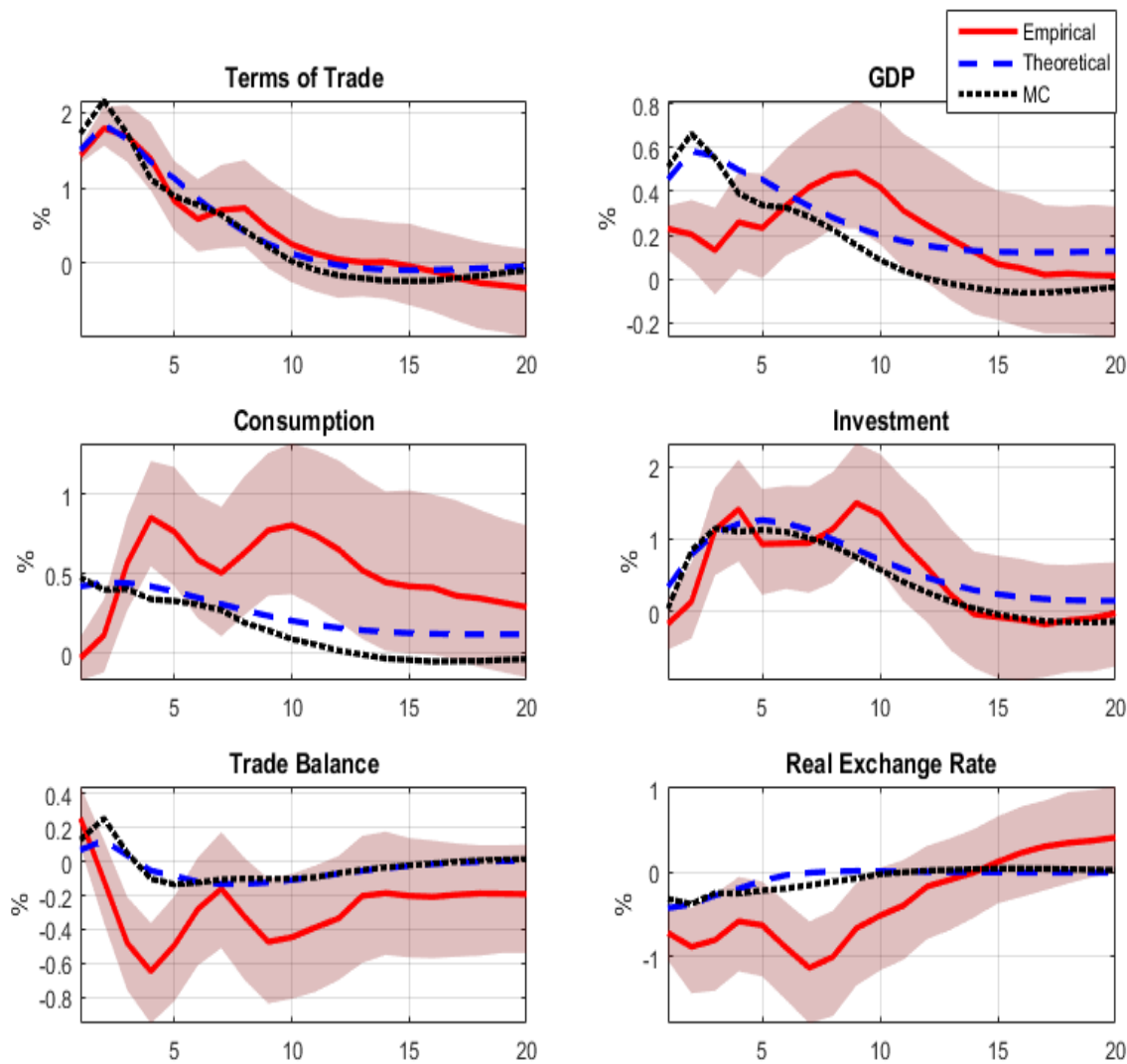

Notes: The figure displays the SVAR IRF (in continuous line) with one standard error confidence bands, the theoretical IRF (in dashed line), and the MC estimated mean IRF (dotted line) for Argentina to an unanticipated TOT shock. MC responses are based on 1000 Monte Carlo simulations of the model of Section 4 for Argentina, where in each simulation the impulse responses to the unanticipated and news shock were identified as the median values of impulse responses based on 1000 draws from the posterior distribution of the VAR parameters.

Figure 28: **The SVAR Impulse Responses, Monte Carlo Estimated Mean Impulse Responses, and the Theoretical Impulse Responses to the TOT News Shock for Argentina.**
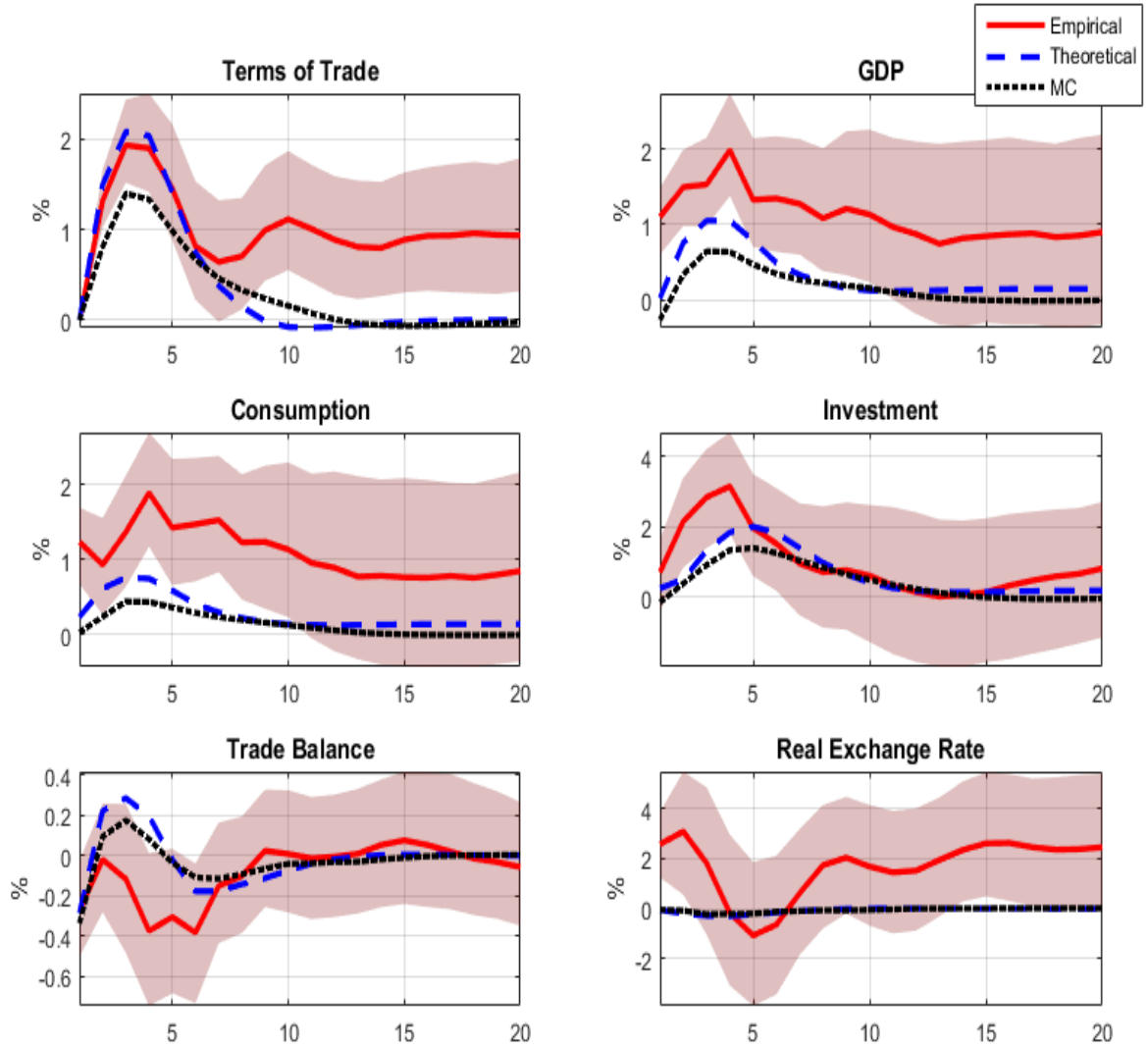
Notes: The figure displays the SVAR IRF (in continuous line) with one standard error confidence bands, the theoretical IRF (in dashed line), and the MC estimated mean IRF (dotted line) for Argentina to a news TOT shock. MC responses are based on 1000 Monte Carlo simulations of the model of Section 4 for Argentina, where in each simulation the impulse responses to the unanticipated and news shock were identified as the median values of impulse responses based on 1000 draws from the posterior distribution of the VAR parameters.

Figure 29: **The SVAR Impulse Responses, Monte Carlo Estimated Mean Impulse Responses, and the Theoretical Impulse Responses to the TOT Unanticipated Shock for Chile.**
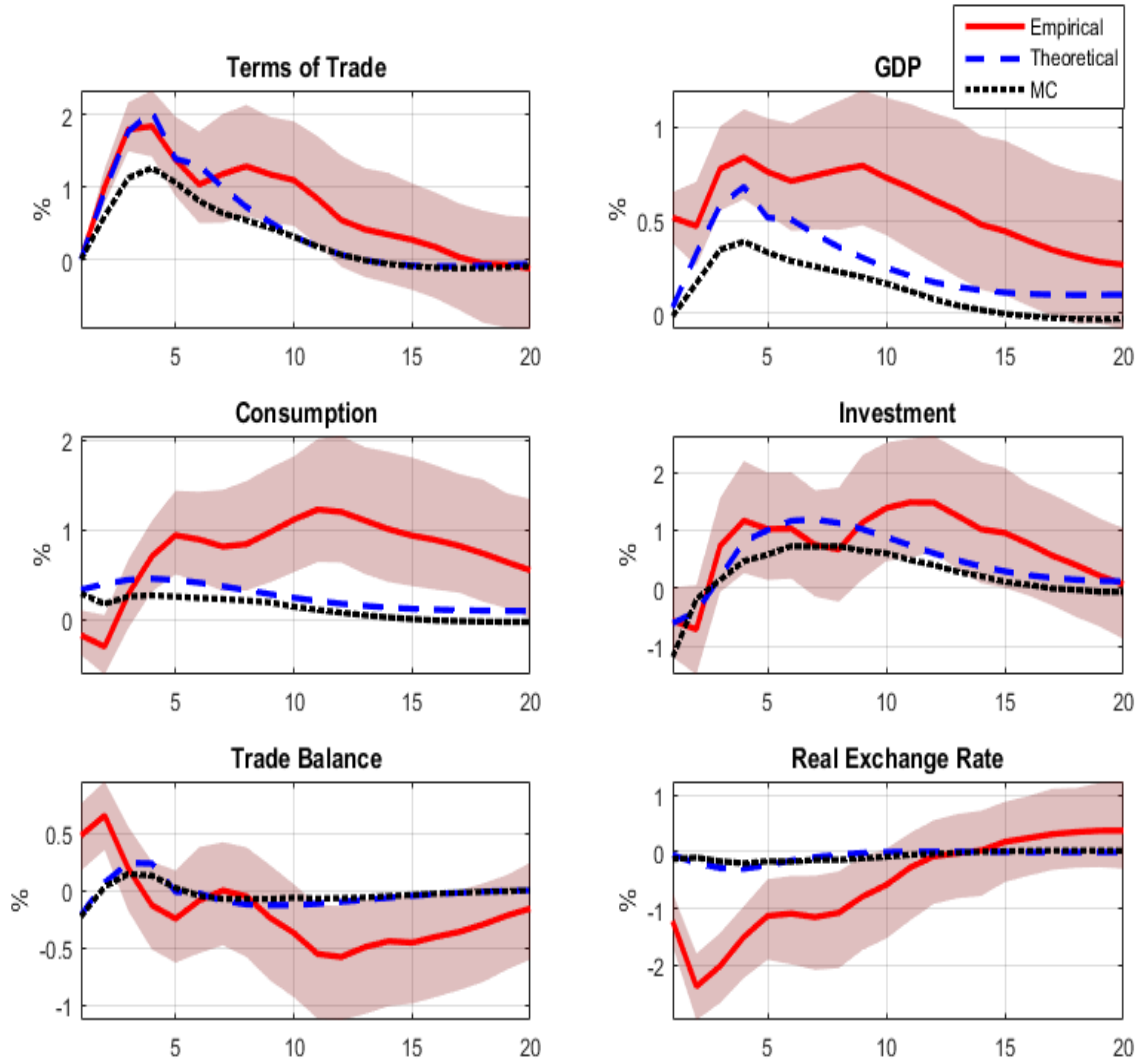
Notes: The figure displays the SVAR IRF (in continuous line) with one standard error confidence bands, the theoretical IRF (in dashed line), and the MC estimated mean IRF (dotted line) for Chile to an unanticipated TOT shock. MC responses are based on 1000 Monte Carlo simulations of the model of Section 4 for Chile, where in each simulation the impulse responses to the unanticipated and news shock were identified as the median values of impulse responses based on 1000 draws from the posterior distribution of the VAR parameters.

38

Figure 30: **The SVAR Impulse Responses, Monte Carlo Estimated Mean Impulse Responses, and the Theoretical Impulse Responses to the TOT News Shock for Chile.**

Notes: The figure displays the SVAR IRF (in continuous line) with one standard error confidence bands, the theoretical IRF (in dashed line), and the MC estimated mean IRF (dotted line) for Chile to a news TOT shock. MC responses are based on 1000 Monte Carlo simulations of the model of Section 4 for Chile, where in each simulation the impulse responses to the unanticipated and news shock were identified as the median values of impulse responses based on 1000 draws from the posterior distribution of the VAR parameters.
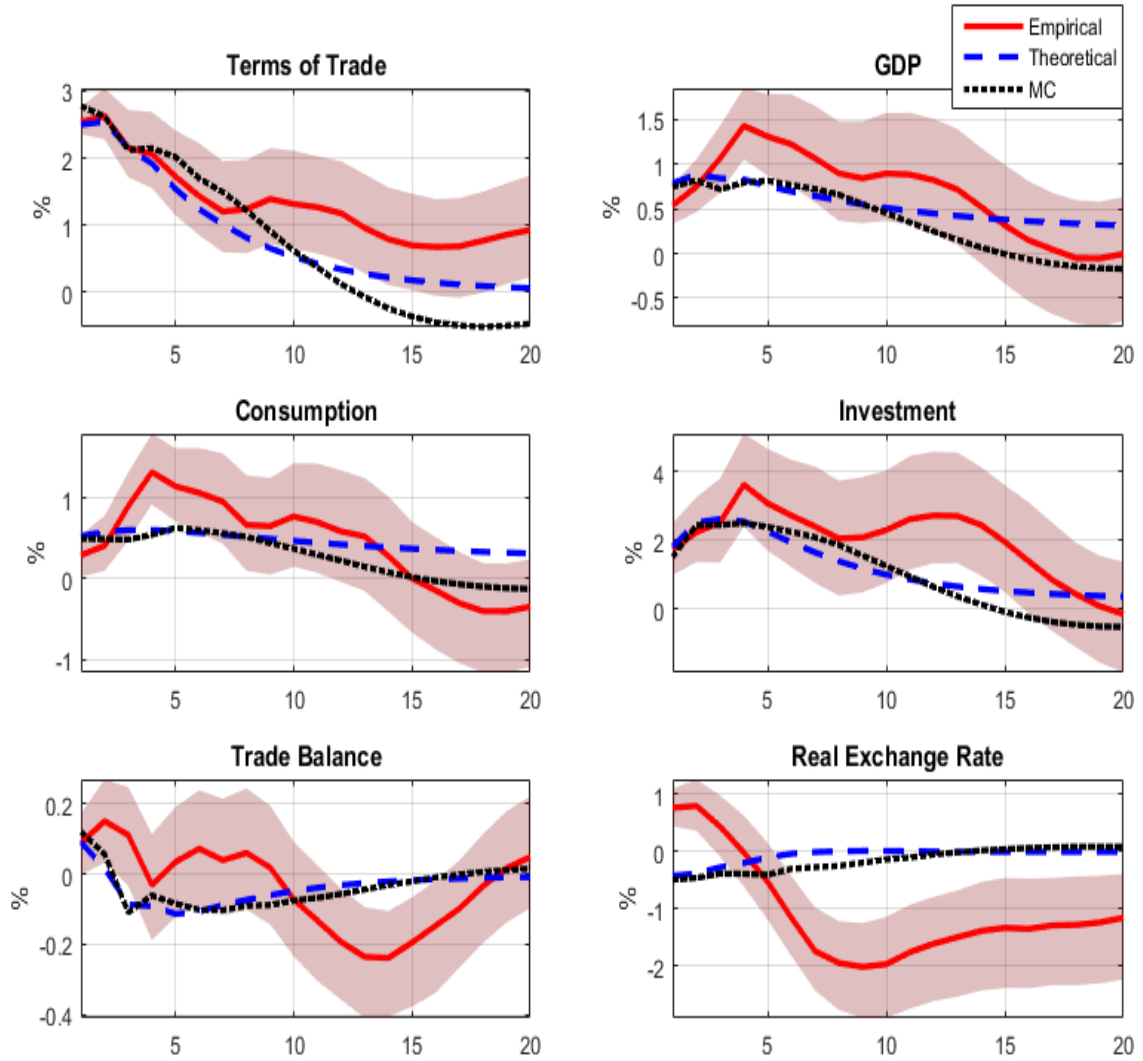
Figure 31: **The SVAR Impulse Responses, Monte Carlo Estimated Mean Impulse Responses, and the Theoretical Impulse Responses to the TOT Unanticipated Shock for Colombia.**

Notes: The figure displays the SVAR IRF (in continuous line) with one standard error confidence bands, the theoretical IRF (in dashed line), and the MC estimated mean IRF (dotted line) for Colombia to an unanticipated TOT shock. MC responses are based on 1000 Monte Carlo simulations of the model of Section 4 for Colombia, where in each simulation the impulse responses to the unanticipated and news shock were identified as the median values of impulse responses based on 1000 draws from the posterior distribution of the VAR parameters.
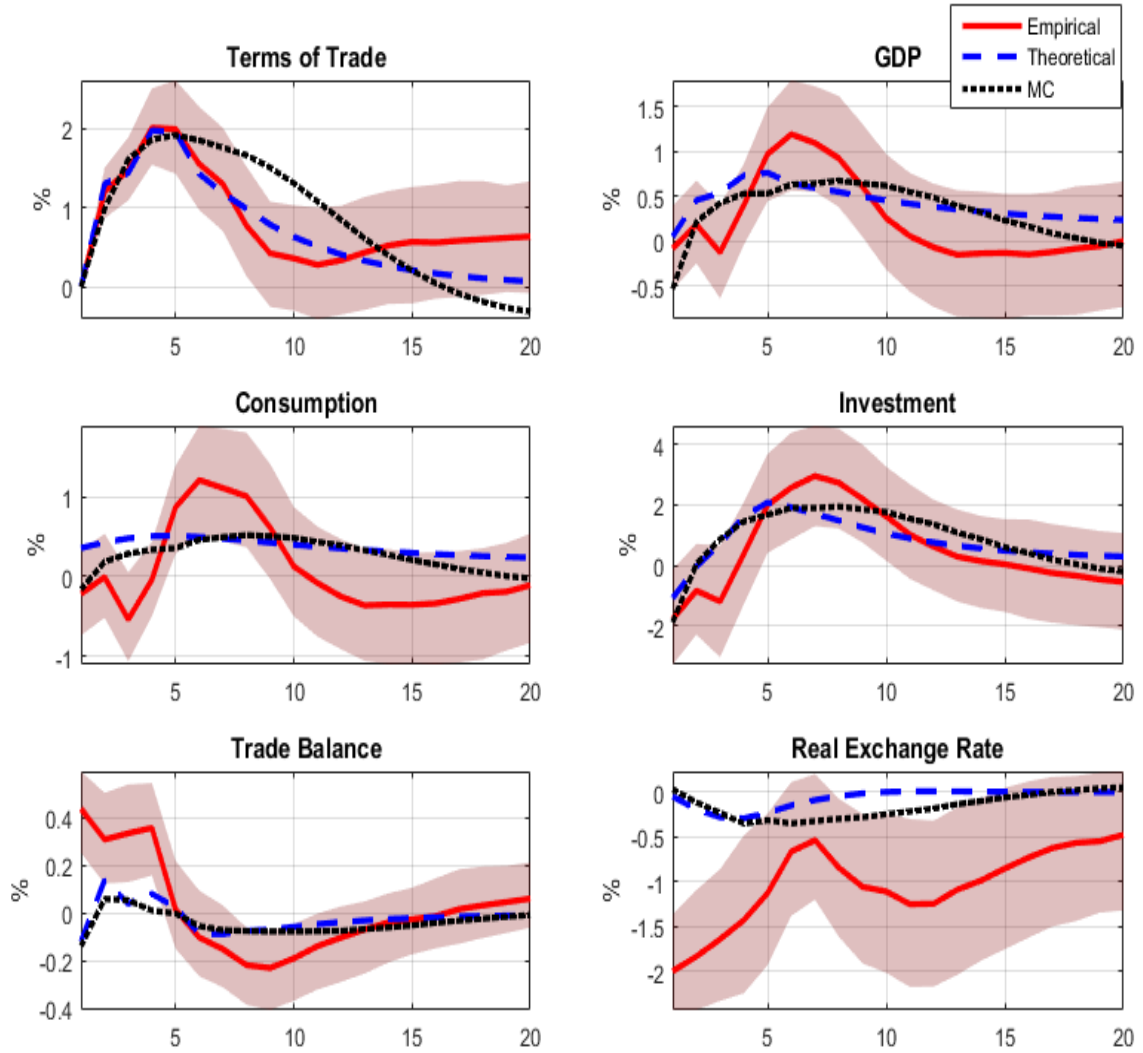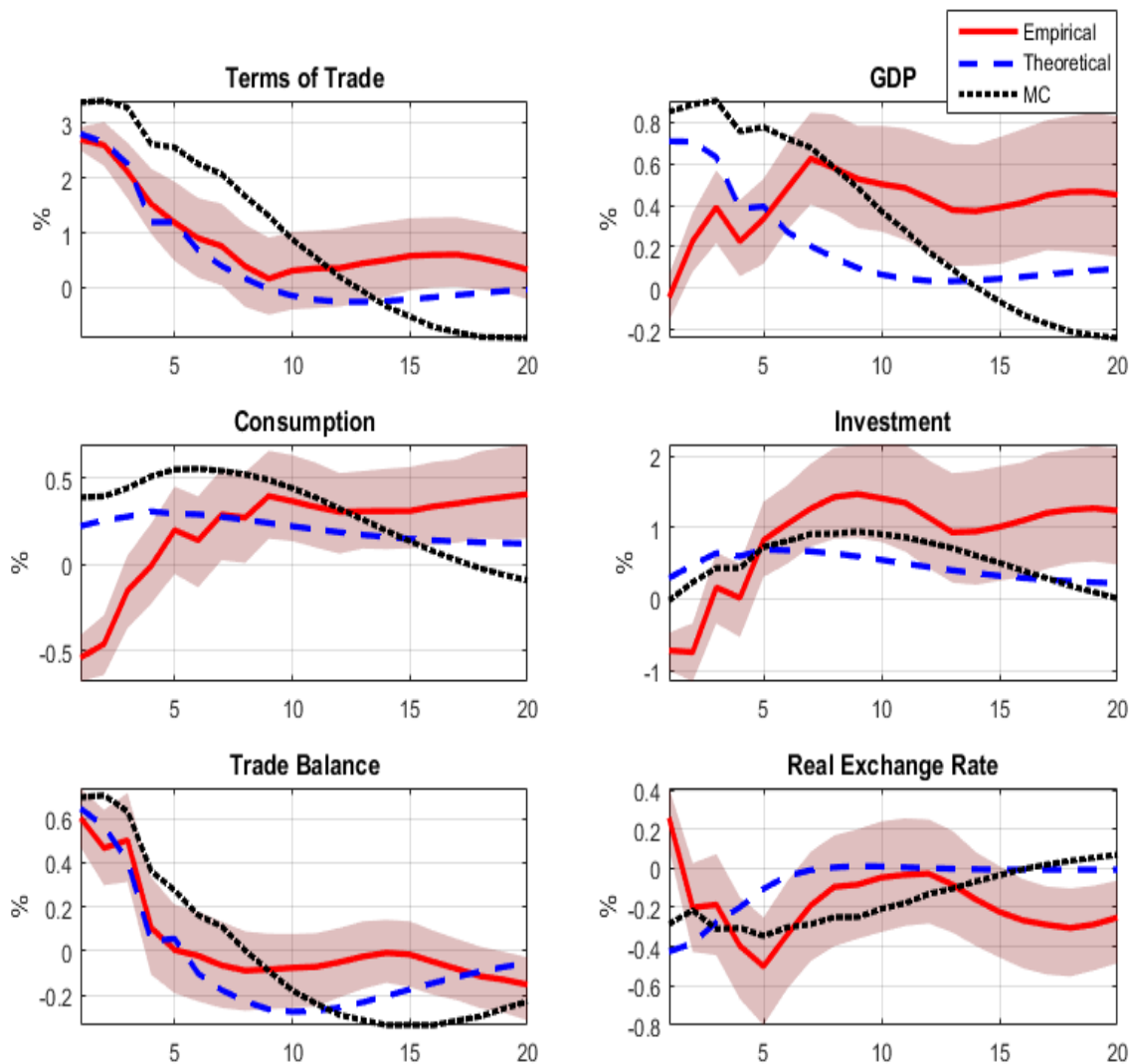
Figure 32: **The SVAR Impulse Responses, Monte Carlo Estimated Mean Impulse Responses, and the Theoretical Impulse Responses to the TOT News Shock for Colombia.**
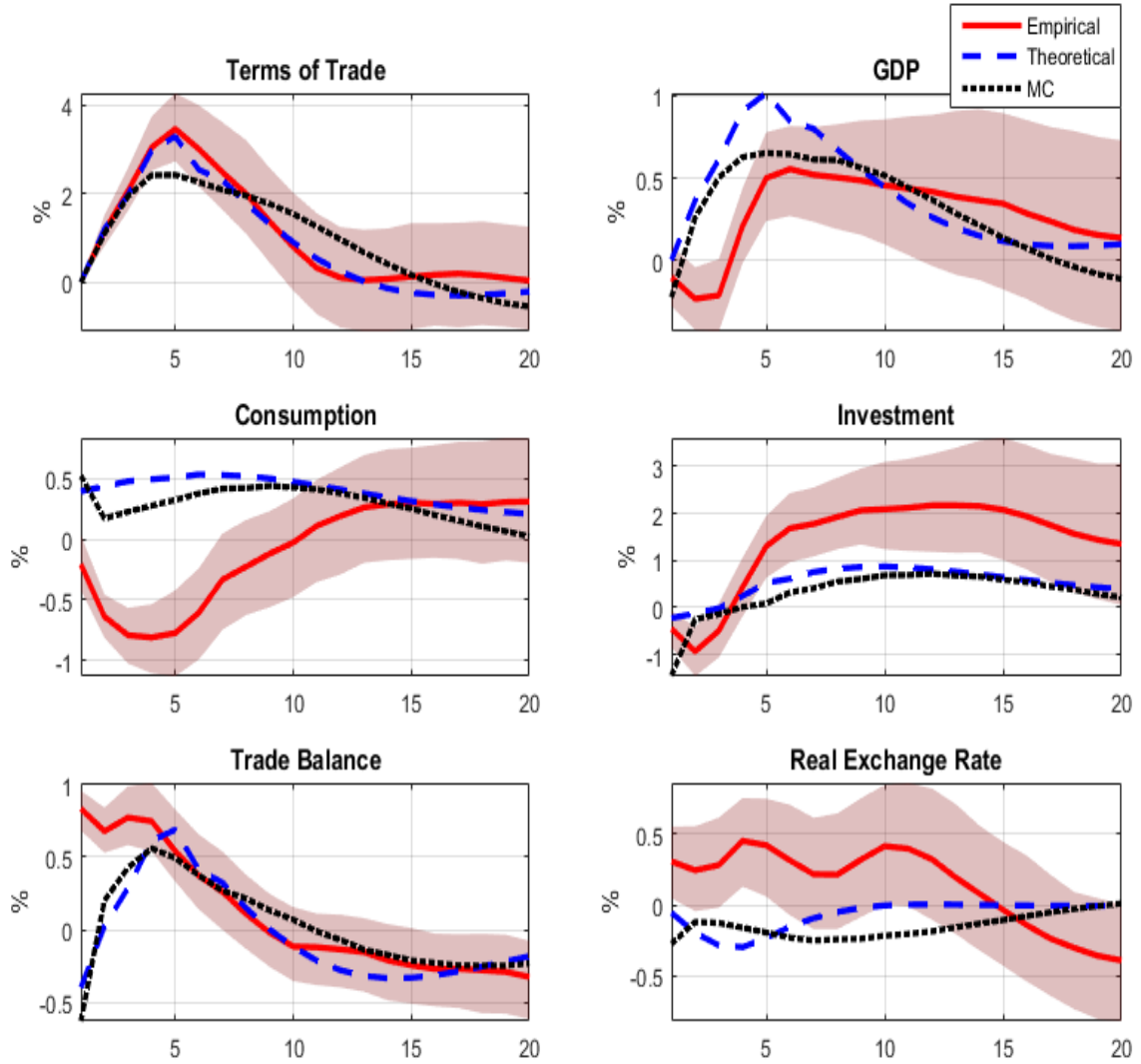

Notes: The figure displays the SVAR IRF (in continuous line) with one standard error confidence bands, the theoretical IRF (in dashed line), and the MC estimated mean IRF (dotted line) for Colombia to a news TOT shock. MC responses are based on 1000 Monte Carlo simulations of the model of Section 4 for Colombia, where in each simulation the impulse responses to the unanticipated and news shock were identified as the median values of impulse responses based on 1000 draws from the posterior distribution of the VAR parameters.

Figure 33: **The SVAR Impulse Responses, Monte Carlo Estimated Mean Impulse Responses, and the Theoretical Impulse Responses to the TOT Unanticipated Shock for Peru.**

Notes: The figure displays the SVAR IRF (in continuous line) with one standard error confidence bands, the theoretical IRF (in dashed line), and the MC estimated mean IRF (dotted line) for Peru to an unanticipated TOT shock. MC responses are based on 1000 Monte Carlo simulations of the model of Section 4 for Peru, where in each simulation the impulse responses to the unanticipated and news shock were identified as the median values of impulse responses based on 1000 draws from the posterior distribution of the VAR parameters.

Figure 34: **The SVAR Impulse Responses, Monte Carlo Estimated Mean Impulse Responses, and the Theoretical Impulse Responses to the TOT News Shock for Peru.**

Notes: The figure displays the SVAR IRF (in continuous line) with one standard error confidence bands, the theoretical IRF (in dashed line), and the MC estimated mean IRF (dotted line) for Peru to a news TOT shock. MC responses are based on 1000 Monte Carlo simulations of the model of Section 4 for Peru, where in each simulation the impulse responses to the unanticipated and news shock were identified as the median values of impulse responses based on 1000 draws from the posterior distribution of the VAR parameters.

References

SCHMITT-GROHE, S., AND M. URIBE (2015): "How Important Are Terms Of Trade Shocks?," Working Paper 21253, National Bureau of Economic Research.