

Supplementary Appendix to:  
“Uncertainty Shocks and the Cross-Border Funding of Banks:  
Unmasking Heterogeneity”

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The structure of this appendix is as follows. We report data sources and detail data construction in Section S1. Section S2 presents tabular and graphical evidence of the dynamic behavior of cross-border bank flows. We plot individual time-series for each country’s aggregate cross-border liabilities as well as cross-border funding vis-à-vis banks and vis-à-vis non-banks. This Section also illustrates cumulative distribution functions for average growth rates, standard deviations, and persistence of growth rates of cross-border liabilities. We also include tables of moments for funding growth. Here we plot dispersion as measured by the different quantiles over countries at each point in time and averages against a measure of turbulence, the correlation of each country’s international rank across the current and prior period. In Section S3, similarly, we report tabular and graphical evidence of the dynamic behavior of the uncertainty measures. We show a correlation matrix between our uncertainty measures and we plot cumulative distribution functions for the persistence of uncertainty as measured by the (i) auto-regressive coefficient and (ii) half-life coefficient. This section graphs dispersion and turbulence of uncertainty measures and reports a table of moments for uncertainty measures. Section S4 presents bivariate and multivariate regression results for the one period lag of uncertainty variables.

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## S1 Data Sources and Construction

### S1.1 Data Sources

To construct real GDP growth, we obtain data on GDP, exchange rates, GDP deflators, and CPI mostly from the IMF’s IFS.<sup>1</sup> We regress GDP deflators on CPI to extend GDP deflator series in some instances and use GDP deflators, along with bilateral exchange rates with respect to the US dollar, to convert nominal GDP to real GDP in billions of US dollars. For most countries we use seasonally unadjusted data and subsequently seasonally adjust with X12-ARIMA. Data on stock market capitalization is sourced from Bloomberg.<sup>2</sup> Inflation rates are based on CPI from Bloomberg. We use quarter-on-quarter growth in our analysis for real GDP growth, stock market growth, and the inflation rate. Monetary policy rates are sourced from Bloomberg, from BIS central bank policy rates, and by our calculations from national central bank websites. Data on exchange rates come from the IMF IFS, where we use nominal effective exchange rate growth in our analysis. Data on exchange rates come from the IMF IFS.<sup>3</sup> We investigate effective exchange rates in robustness checks. Credit growth is bank credit growth to the private non-financial sector and is sourced from BIS. We take external debt-to-GDP as outstanding debt securities from the BIS as a percentage of GDP. We restrict our sample to the core group of 24 countries over the period 2003Q1-2018Q4 to achieve a balanced sample. Table S1 lists these core countries.

Table S1: Stock Market Indexes For 24 Core Countries

Reporter	BBG Index	Reporter	BBG Index	Reporter	BBG Index
Australia	AS52	France	CAC	Portugal	BVLX
Austria	ATX	Germany	DAX	Singapore	STI
Belgium	BELPRC	India	SENSEX	Spain	IBEX
Brazil	IBOV	Ireland	ISEQ	Sweden	OMX
Canada	SPTSX	Italy	ITLMS	Switzerland	SPI
Chile	IGPA	Japan	NKY	Turkey	XU100
Denmark	KAX	Netherlands	AEX	UK	UKX
Finland	HEX	Norway	OSEBX	USA	SPX

*Notes:* We source data from Bloomberg. We use Bloomberg’s OVM function to compute implied volatility at the money for one- and three-month maturities and take the last value in each quarter. We use quarterly frequency US Dollar nominal price index data to build measures of realized volatility. The full BIS set of 48 reporting countries is the following: Australia, Austria, Bahamas, Bahrain, Belgium, Bermuda, Brazil, Canada, Cayman Islands, Chile, China, Curaçao, Cyprus, Denmark, Finland, France, Germany, Greece, Guernsey, Hong Kong, India, Indonesia, Ireland, Isle of Man, Italy, Japan, Jersey, Luxembourg, Macao, Malaysia, Mexico, Netherlands, Norway, Panama, Philippines, Portugal, Russia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Turkey, UK, and USA.

<sup>1</sup>In a few cases we source data from Bloomberg, OECD, St. Louis FRED, Eurostat, and national central bank websites.

<sup>2</sup>We extend the sample by interpolating annual data from the World Bank’s World Development Indicators.

<sup>3</sup>An increase in the exchange rate against the US dollar corresponds to a a weakening or depreciation of the local currency.

## S1.2 Construction

### Real GDP

Nominal GDP in domestic currency ( $GDP^{DC}$ ) is converted to real GDP in billions of US dollars ( $RGDP^{USD}$ ), where  $b = 2010Q3$  is the base period, using nominal exchange rate ( $E$ ) and price level ( $P$ ) through the equation

$$RGDP_t^{USD} = \frac{GDP_t^{DC} \times E_t}{\frac{P_t}{P_b} \frac{E_t}{E_b}}$$

### Monetary Policy Target Rates

*Australia*: RBA cash rate target [RBATCTR].

*Brazil*: Selic target rate [BZSTSETA].

*Canada*: Bank of Canada overnight lending rate [CABROVER].

*Chile*: monetary policy rate (TPM): [CHOVCHOV].

*Denmark*: repurchase rate repo [DERE].

*Euro area*: ECB main refinancing operation announcement rate [EURR002W].

*India*: Reserve Bank of India repurchase effective cut off rate [INRPYLD].

*Japan*: Bank of Japan unsecured overnight call rate [MUTKCALM].

*Norway*: deposit rate Norges bank announcement rate [NOBRDEPA].

*Singapore*: overnight rate: annualized rate of interest bank charges for lending or pay for borrowing a currency [SDDR1T].

*Sweden*: repo rate (decision rate) [SWRRATEI].

*Switzerland*: national bank Libor target [SZLTTR].

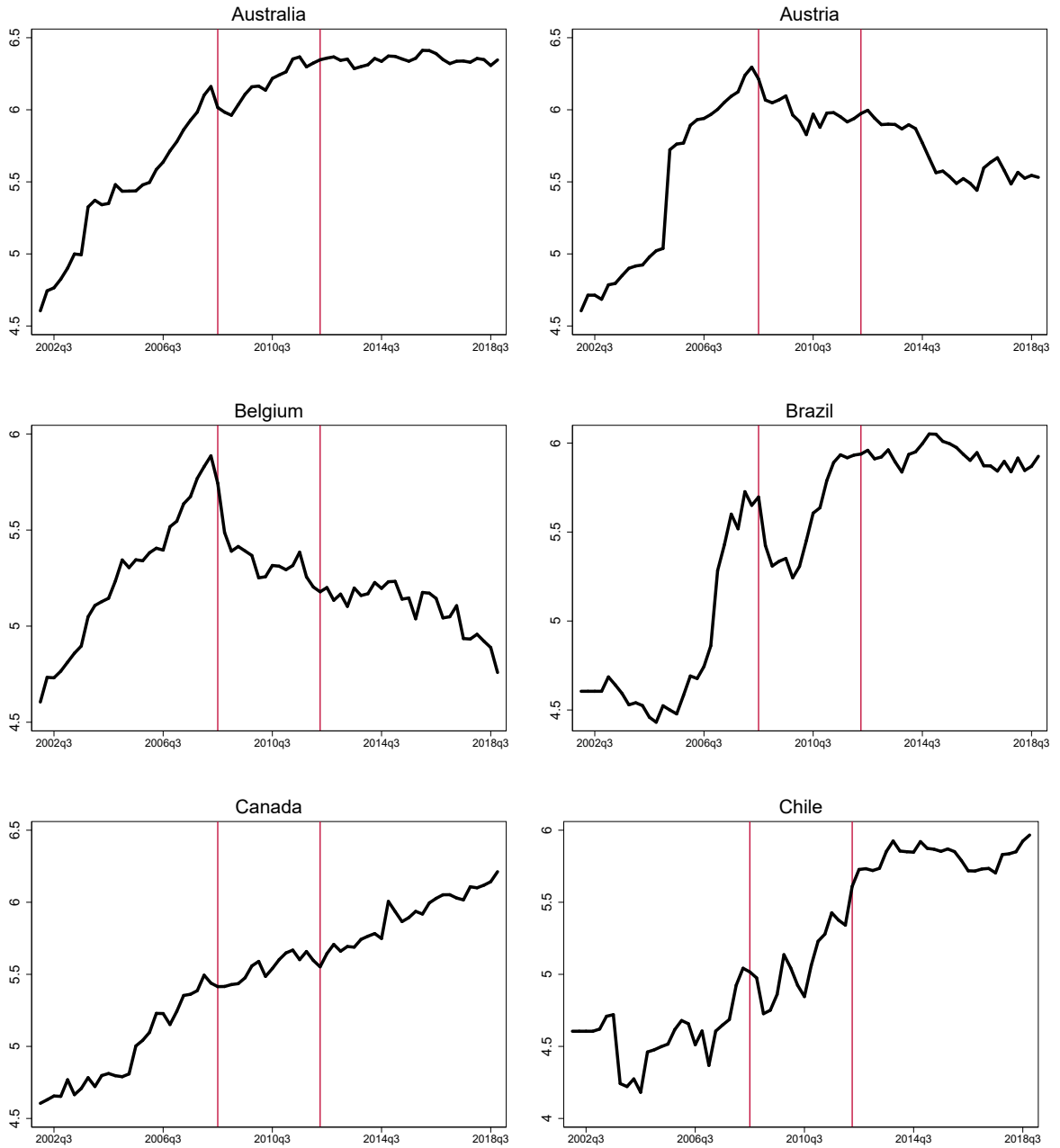
*Turkey*: 1 week repo announcement [TUBR1WRA].

*United Kingdom*: Bank of England official bank rate [UKBRBASE].

*United States*: US Fed target rate midpoint and US Fed Funds effective rate (source: BIS).

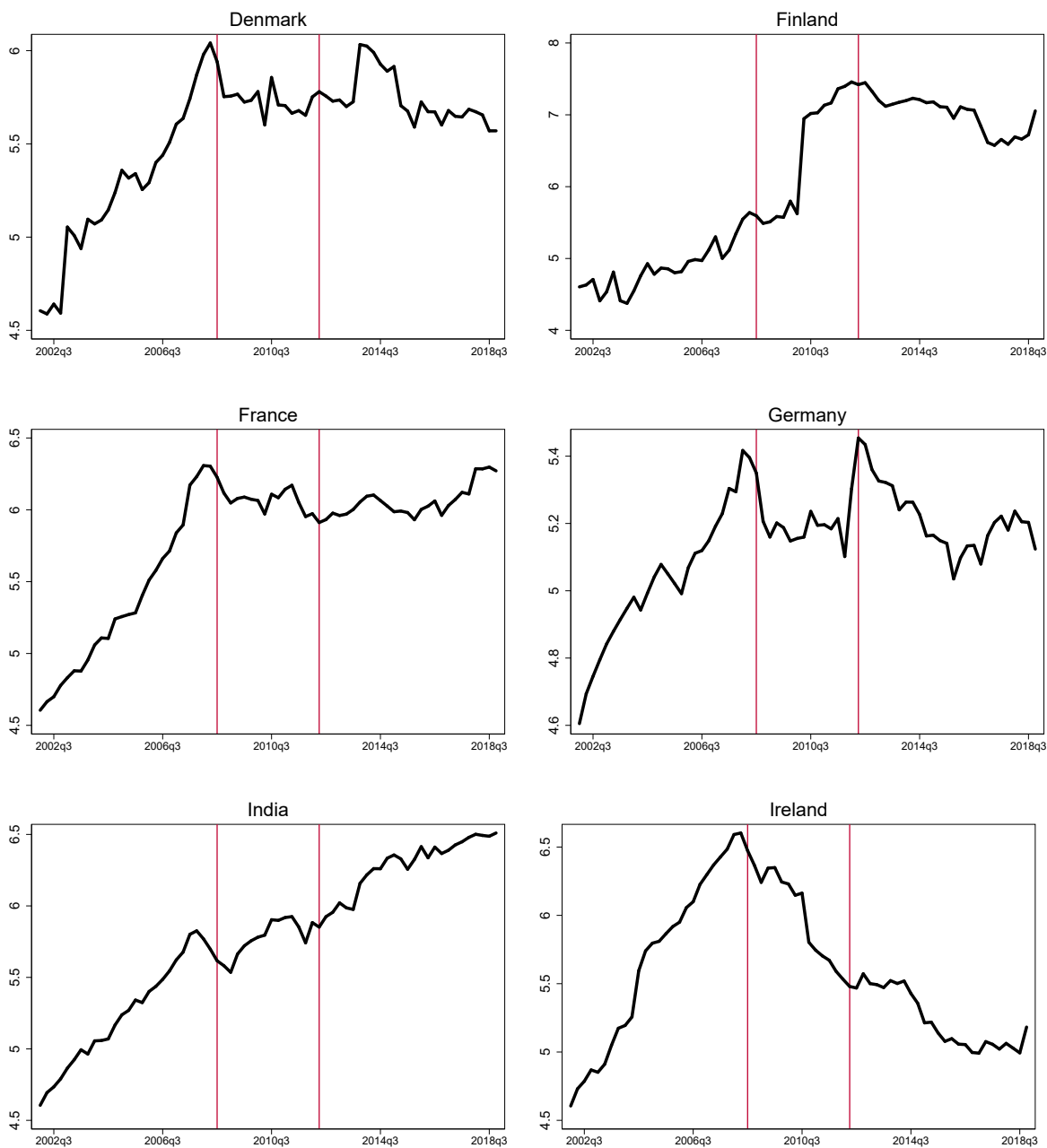
## S2 Dynamic Behavior of Cross-Border Liabilities

Figure S1: Cross-border liabilities



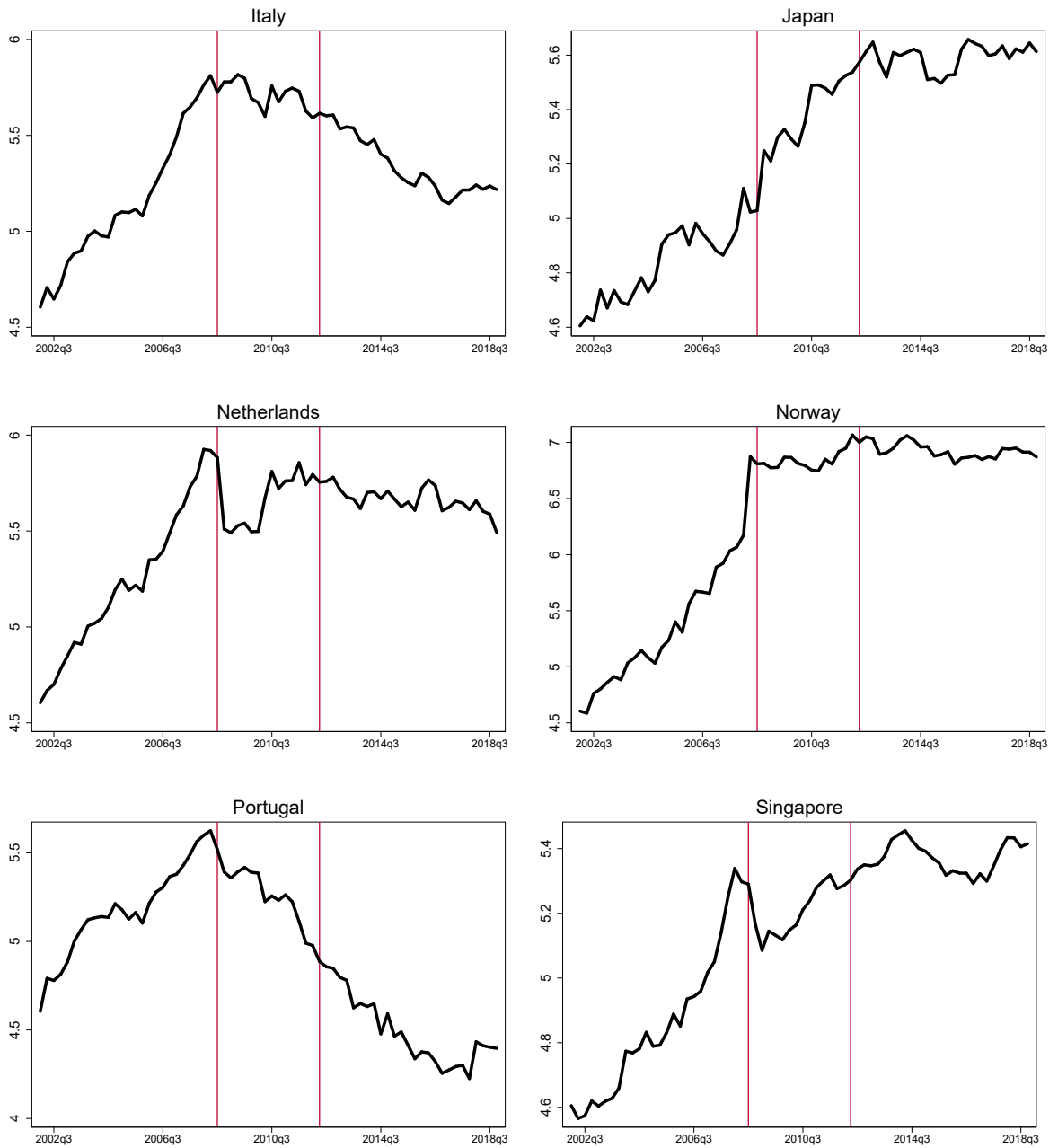
Notes: Total cross-border liabilities reported to BIS by country. Log-level of index=100 for 2002Q1.

Figure S2: Cross-border liabilities



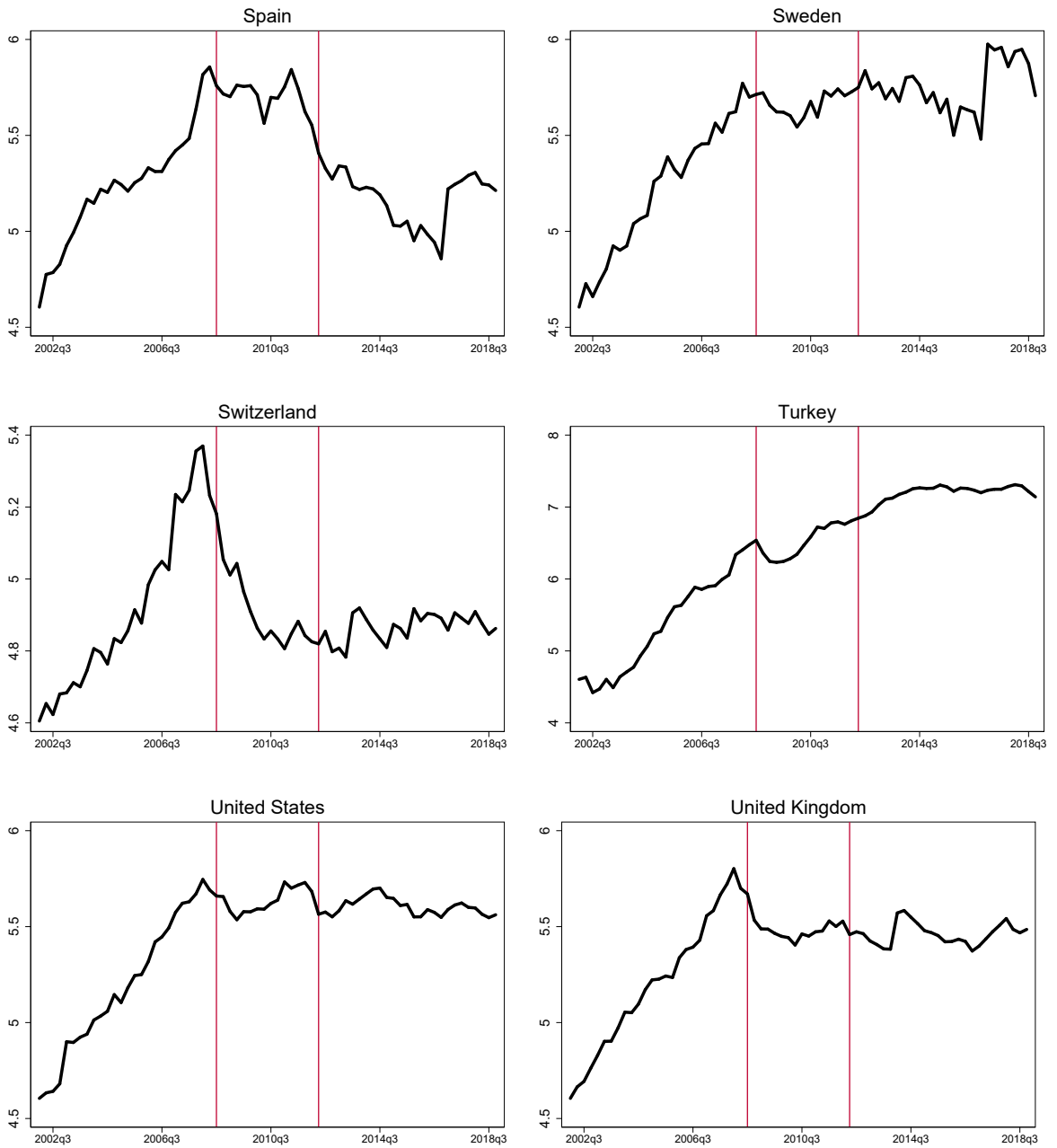
Notes: Total cross-border liabilities reported to BIS by country. Log-level of index=100 for 2002Q1.

Figure S3: Cross-border liabilities



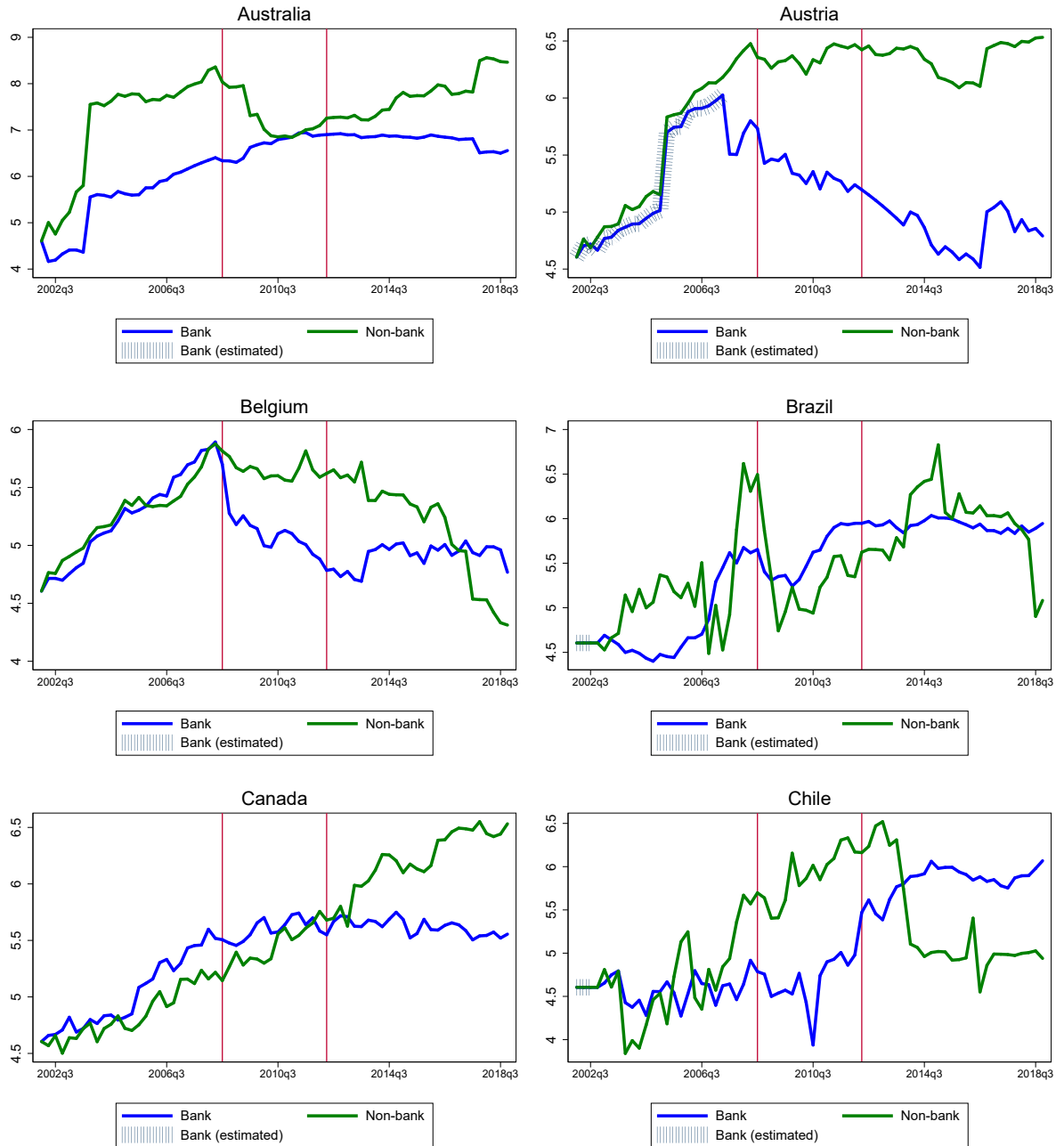
*Notes:* Total cross-border liabilities reported to BIS by country. Log-level of index=100 for 2002Q1.

Figure S4: Cross-border liabilities



Notes: Total cross-border liabilities reported to BIS by country. Log-level of index=100 for 2002Q1.

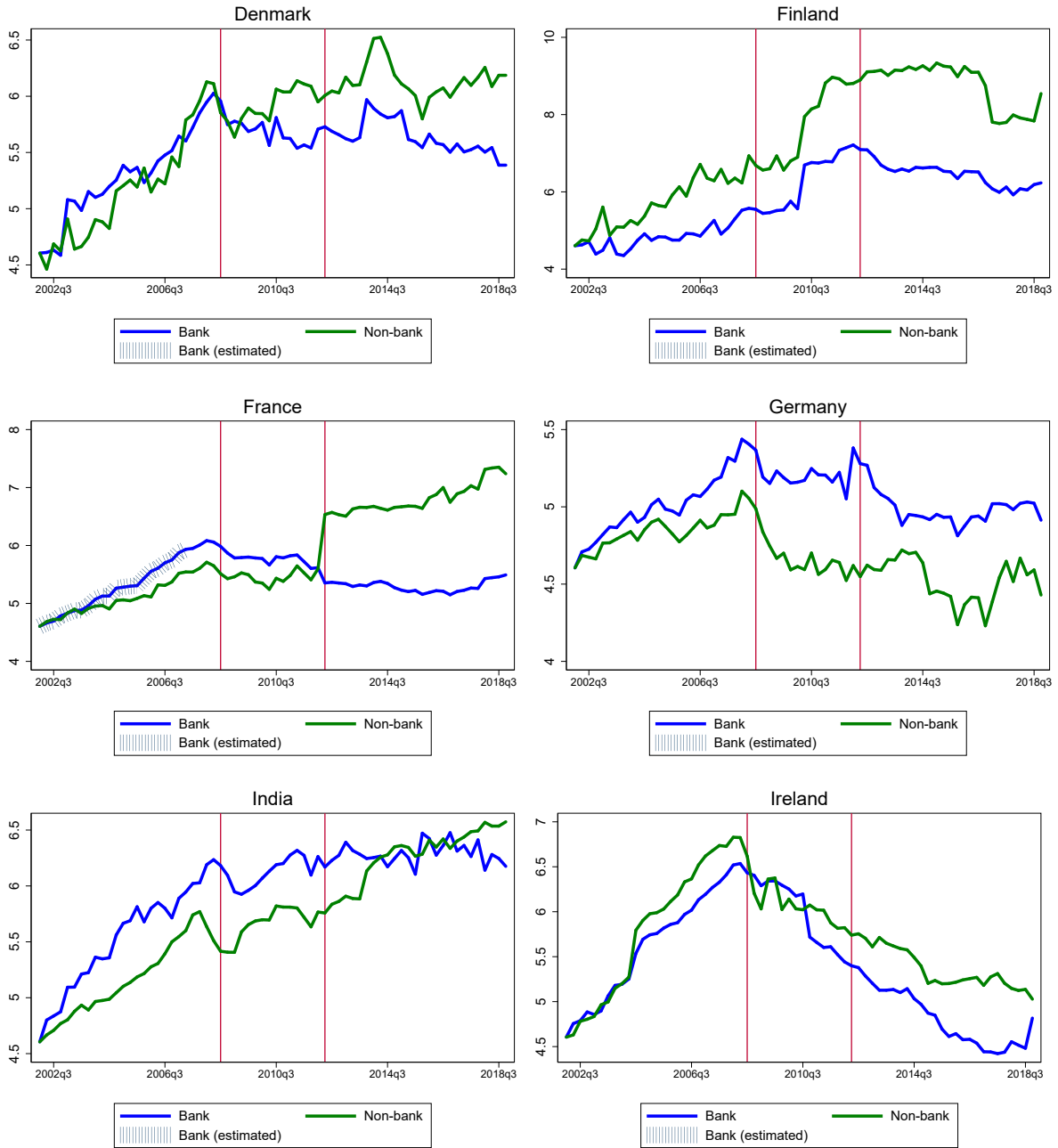
Figure S5: Cross-border liabilities vis-à-vis banks and non-banks



*Notes:* Total cross-border liabilities reported to BIS by country broken down between banks and non-banks. For cases where vis-à-vis bank data were not available, we compute it as the residual between total liabilities and liabilities vis-à-vis non-banks. These cases are indicated with green vertical lines for cases where this approach was followed to fill in missing data. Log-level of index=100 for 2002Q1.

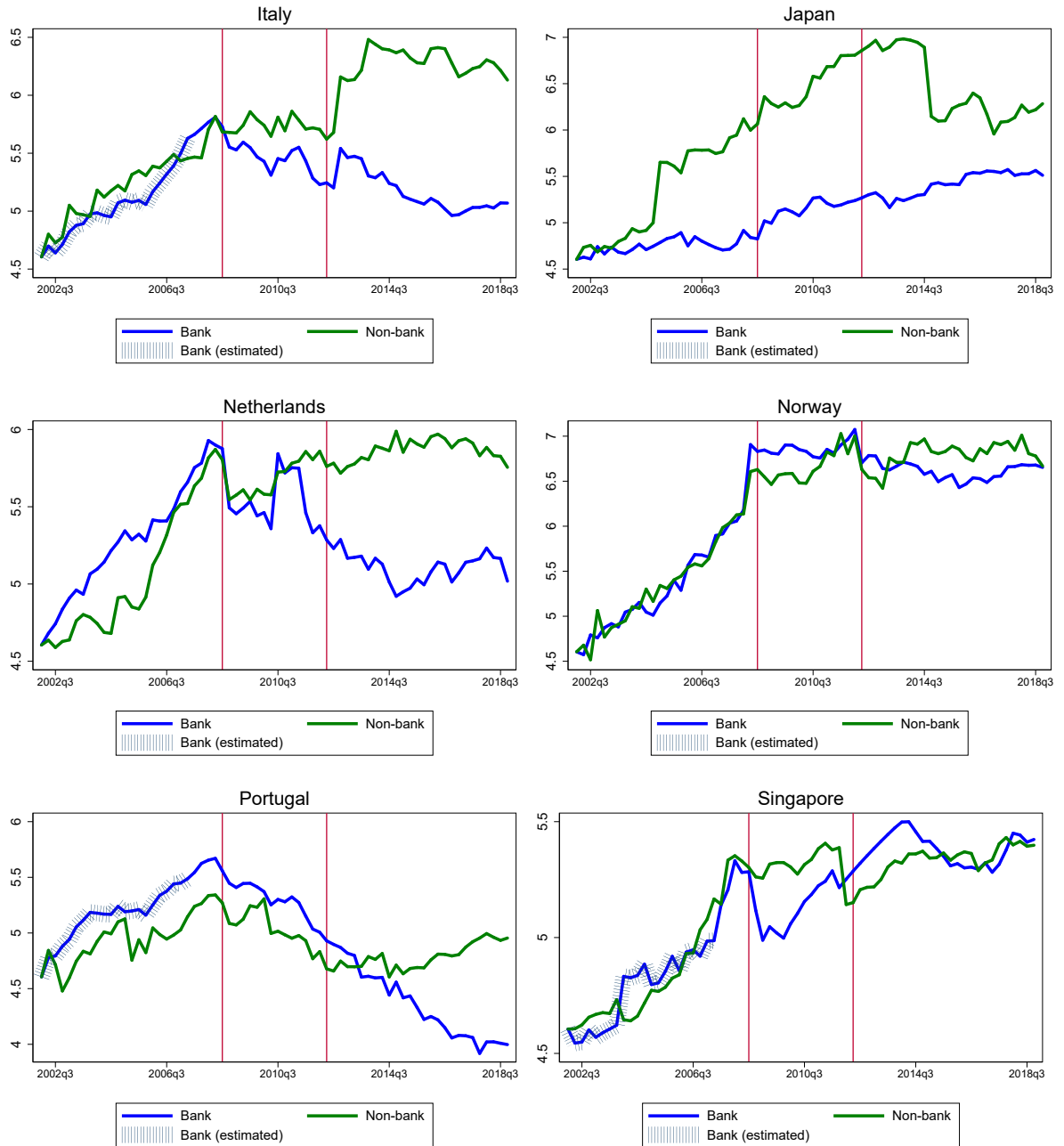


Figure S6: Cross-border liabilities vis-à-vis banks and non-banks



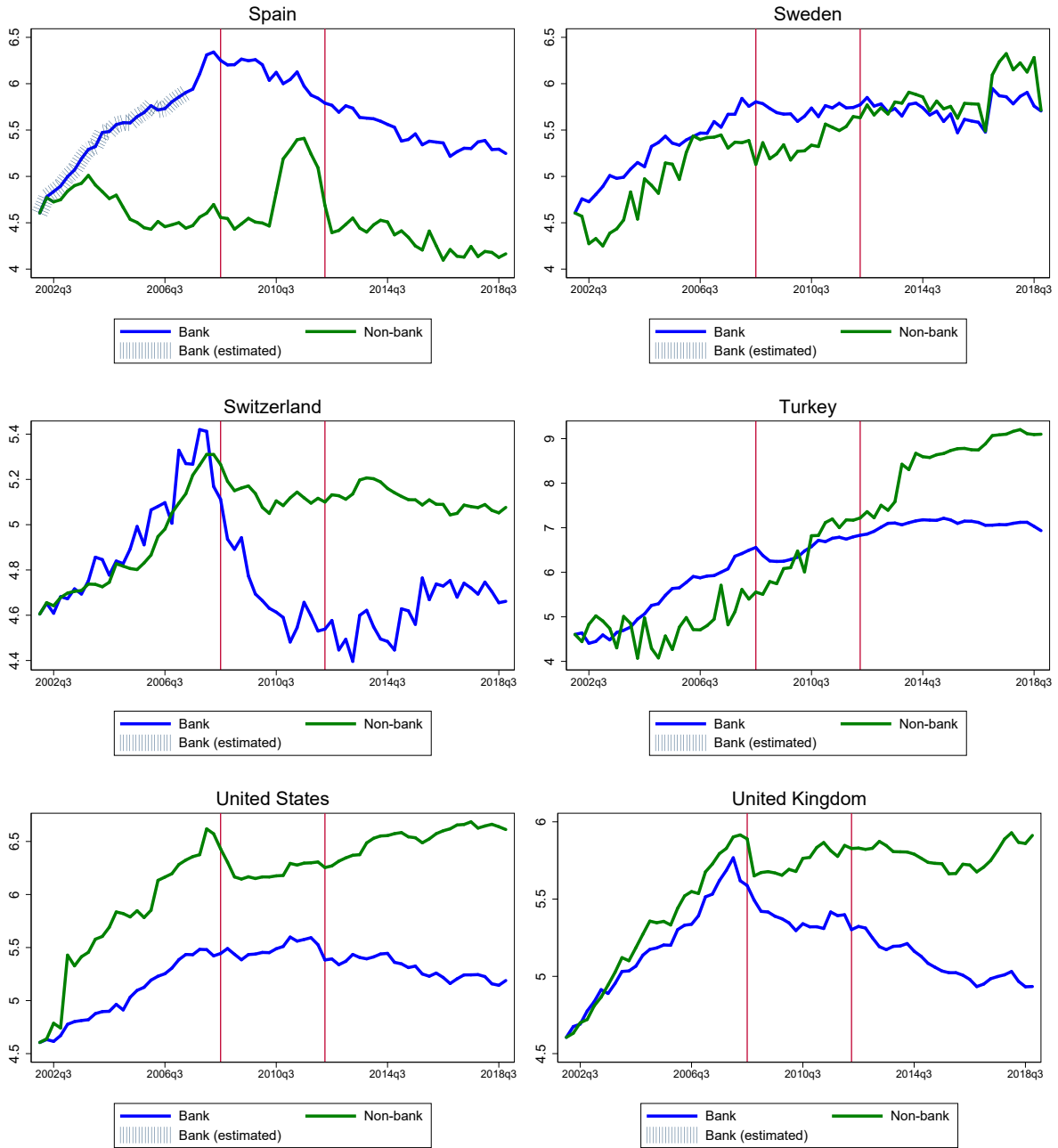
*Notes:* Total cross-border liabilities reported to BIS by country broken down between banks and non-banks. For cases where vis-à-vis bank data were not available, we compute it as the residual between total liabilities and liabilities vis-à-vis non-banks. These cases are indicated with green vertical lines for cases where this approach was followed to fill in missing data. Log-level of index=100 for 2002Q1.

Figure S7: Cross-border liabilities vis-à-vis banks and non-banks



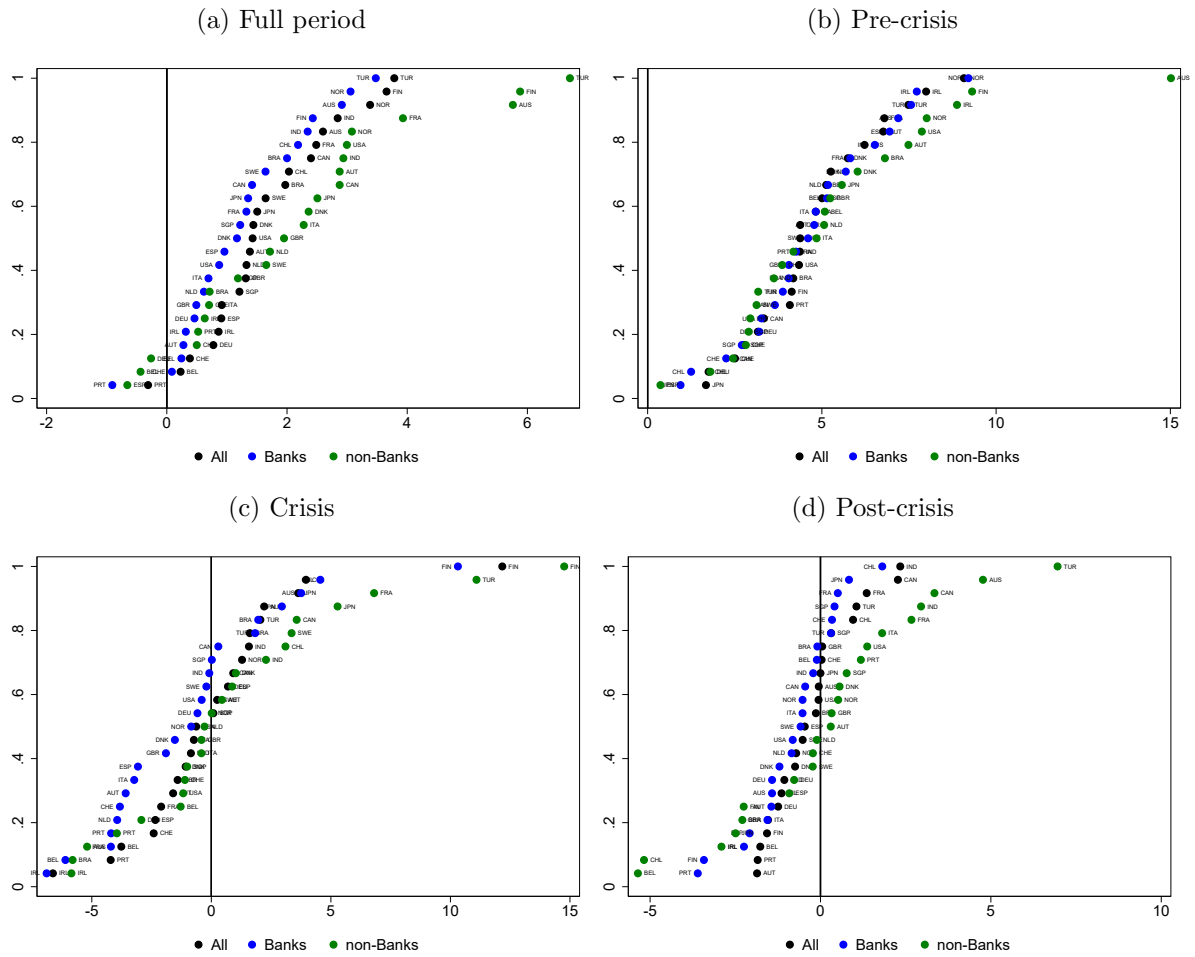
*Notes:* Total cross-border liabilities reported to BIS by country broken down between banks and non-banks. For cases where vis-à-vis bank data were not available, we compute it as the residual between total liabilities and liabilities vis-à-vis non-banks. These cases are indicated with green vertical lines for cases where this approach was followed to fill in missing data. Log-level of index=100 for 2002Q1.

Figure S8: Cross-border liabilities vis-à-vis banks and non-banks



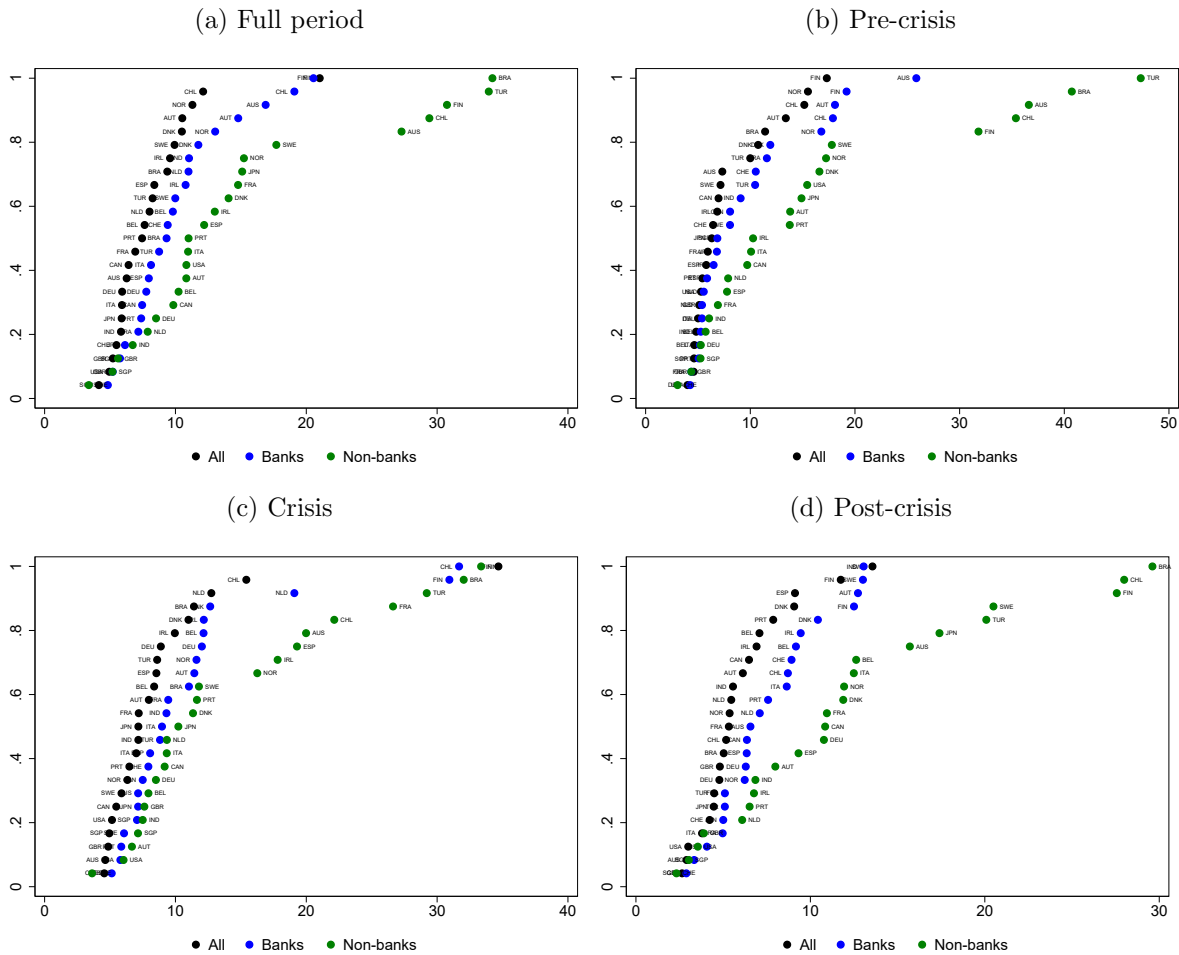
*Notes:* Total cross-border liabilities reported to BIS by country broken down between banks and non-banks. For cases where vis-à-vis bank data were not available, we compute it as the residual between total liabilities and liabilities vis-à-vis non-banks. These cases are indicated with green vertical lines for cases where this approach was followed to fill in missing data. Log-level of index=100 for 2002Q1.

Figure S9: Cross-border liabilities: average growth rates



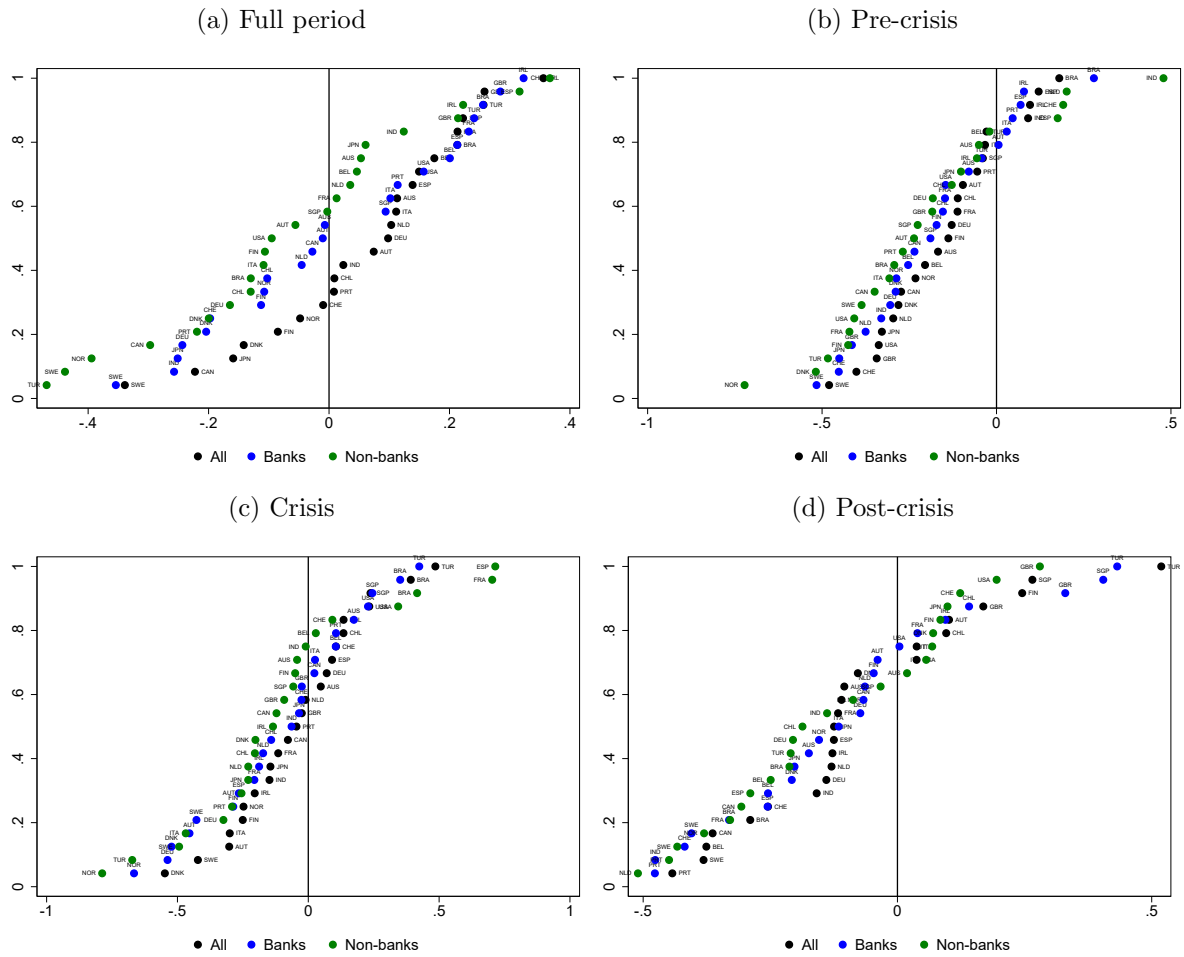
*Notes:* Cumulative distribution of country-specific quarter-on-quarter average growth rates. Full period 2002Q1-2018Q4 and sub periods before, during, and after the Global Financial Crisis reported in panels (a), (b), (c), and (d). Horizontal axis report average growth rates. Vertical axis shows the cumulative distribution. Black filled markers represent cross-border liabilities vis-à-vis all sectors. Blue filled markers show cross-border liabilities vis-à-vis banks, while blue markers are liabilities vis-à-vis non-banks.

Figure S10: Cross-border liabilities: standard deviation



*Notes:* Cumulative distribution of country-specific standard deviations computed using quarter-on-quarter growth rates. Full period 2002Q1-2018Q4 and sub periods before, during, and after the Global Financial Crisis reported in panels (a), (b), (c), and (d). Horizontal axis report standard deviations. Vertical axis shows the cumulative distribution. Black filled markers represent cross-border liabilities vis-à-vis all sectors. Blue filled markers show cross-border liabilities vis-à-vis banks, while blue markers are liabilities vis-à-vis non-banks.

Figure S11: Cross-border liabilities: persistence of growth rates



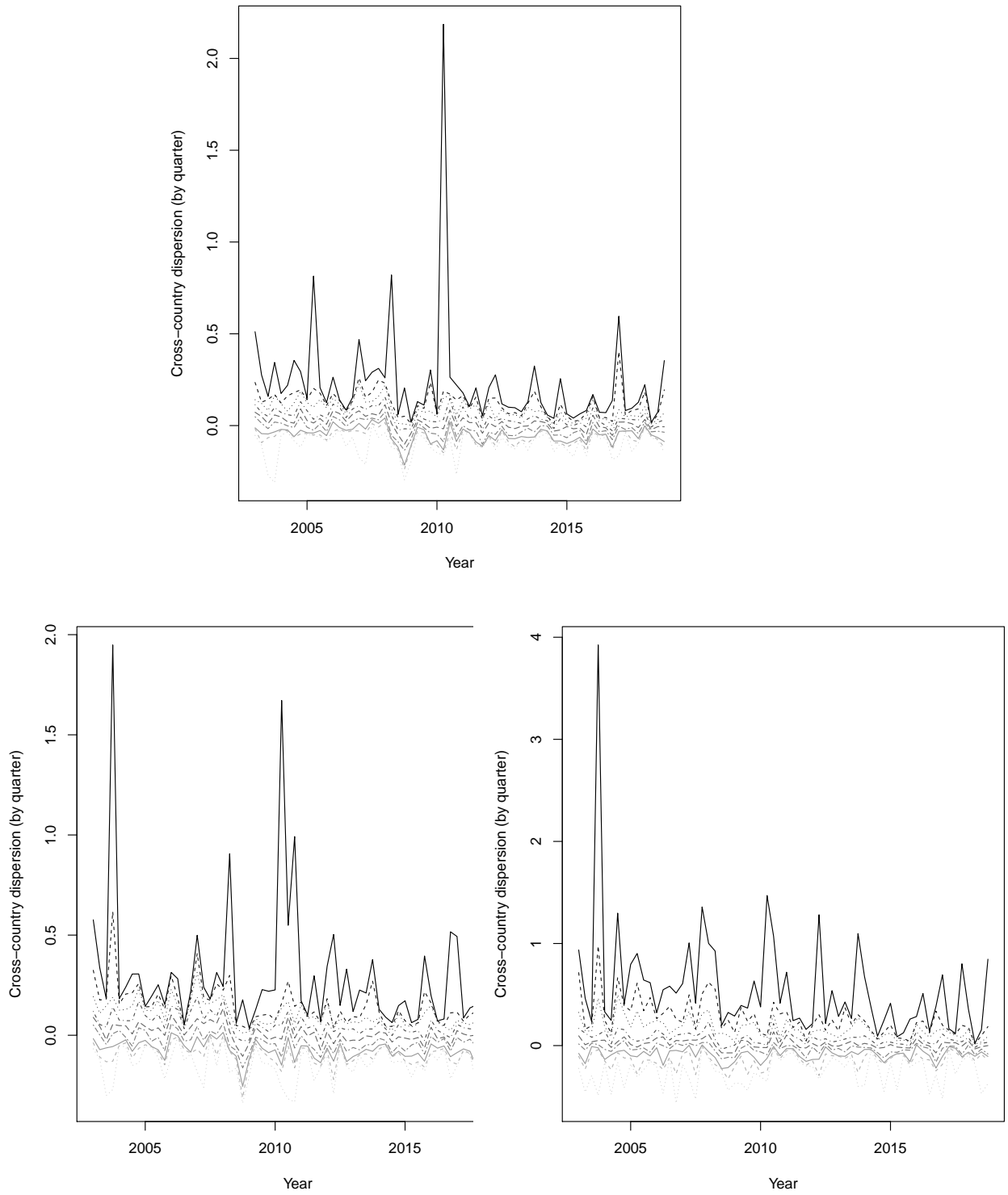
*Notes:* Cumulative distribution of country-specific autoregressive coefficients computed by running a linear regression model of bank liabilities quarter-on-quarter growth rates in its first lag and a constant. Full period 2002Q1-2018Q4 and sub periods before, during, and after the Global Financial Crisis, reported in panels (a), (b), (c), and (d). Horizontal axis report the autoregressive coefficients. Vertical axis shows the cumulative distribution. Black filled markers represent cross-border liabilities vis-à-vis all sectors. Blue filled markers show cross-border liabilities vis-à-vis banks, while blue markers are liabilities vis-à-vis non-banks.

Table S2: Moments for Cross-Border Flows of Liabilities

	Mean		Median		Standard Deviation		Skewness		Kurtosis	
	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>
<i>Overall</i>										
All	6.17	2.11	3.92	0.90	51.06	25.96	0.64	0.43	7.32	5.00
Pre-2008Q3	26.71	9.95	23.45	5.61	44.79	24.10	0.78	0.44	5.01	3.24
2008Q3-2012Q2	-9.55	-5.52	-8.43	-3.95	52.81	26.73	-0.14	-0.36	3.87	3.59
Non-Crisis	11.44	4.50	7.26	1.62	46.44	27.56	0.85	0.37	6.38	4.10
Post-2008Q3	-4.59	-3.11	-4.51	-2.97	49.39	30.22	0.27	0.12	5.68	4.28
Post-2012Q2	-0.07	-0.54	-3.33	-2.64	43.56	26.84	0.53	0.24	4.28	3.09
Post-2012Q2/Crisis	0.01*	0.10	0.39	0.67	0.83	1.00	-3.70***	-0.68*	1.11	0.86
<i>Banks</i>										
All	0.29	0.19	0.51	0.35	39.08	31.37	0.25	0.37	7.53	5.60
Pre-2008Q3	23.80	10.02	22.93	6.59	37.40	21.22	0.44	0.19	4.09	2.85
2008Q3-2012Q2	-10.20	-4.16	-8.42	-2.56	43.28	26.88	-0.18	-0.19	4.54	3.38
Non-Crisis	4.40	2.18	2.39	0.59	34.53	23.42	0.58	0.52	6.40	4.70
Post-2008Q3	-6.54	-2.99	-6.08	-3.16	36.44	25.13	-0.09	0.08	6.96	5.24
Post-2012Q2	-3.20	-1.01	-3.88	-1.92	26.01	20.56	0.13	0.12	4.22	3.12
Post-2012Q2/Crisis	0.31	0.24	0.46	0.75	0.60*	0.76	-0.76	-0.64	0.93	0.92
<i>Non-Banks</i>										
All	2.56	0.62	1.57	0.20	18.89	8.46	0.11	0.02	8.57	6.41
Pre-2008Q3	7.39	1.31	5.97	1.31	13.29	4.91	0.82	0.76	4.78	4.02
2008Q3-2012Q2	-0.82	-0.19	-0.36	0.04	19.45	9.38	-0.13	-0.11	5.29	3.74
Non-Crisis	4.02	0.96	2.60	0.47	17.62	8.82	0.37	0.06	7.65	6.36
Post-2008Q3	0.04	0.06	0.05	-0.22	19.82	10.14	-0.17	-0.34	7.38	6.07
Post-2012Q2	0.82	-0.10	0.63	-0.22	19.29	9.09	0.14	0.12	5.08	3.34
Post-2012Q2/Crisis	-0.99	0.51	-1.76	-5.88	0.99	0.97	-1.06	-1.13	0.96	0.89

*Notes:* Each *Mean-Median* column pair present the mean and median of the moment in question across the core 24 countries and over the period corresponding to that row. See Table 2 in the main paper for the list of the 24 core countries. Periods are indicated in each row, where All denotes full sample (2003Q1–2018Q4), Non-Crisis denotes the subset of the full sample that excludes 2008Q3–2012Q2, and Crisis denotes the period 2008Q3–2012Q2. In the Post-2012Q2/Crisis rows, we test the statistical difference between the post-crisis period (2012Q3–2018Q4) and the crisis period (2008Q3–2012Q2). \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Significance corresponds to the Welch test for group differences between means and the Mood's test for group differences between medians. Cross-border flows are in growth rates, where, for example, -4 means -4%.

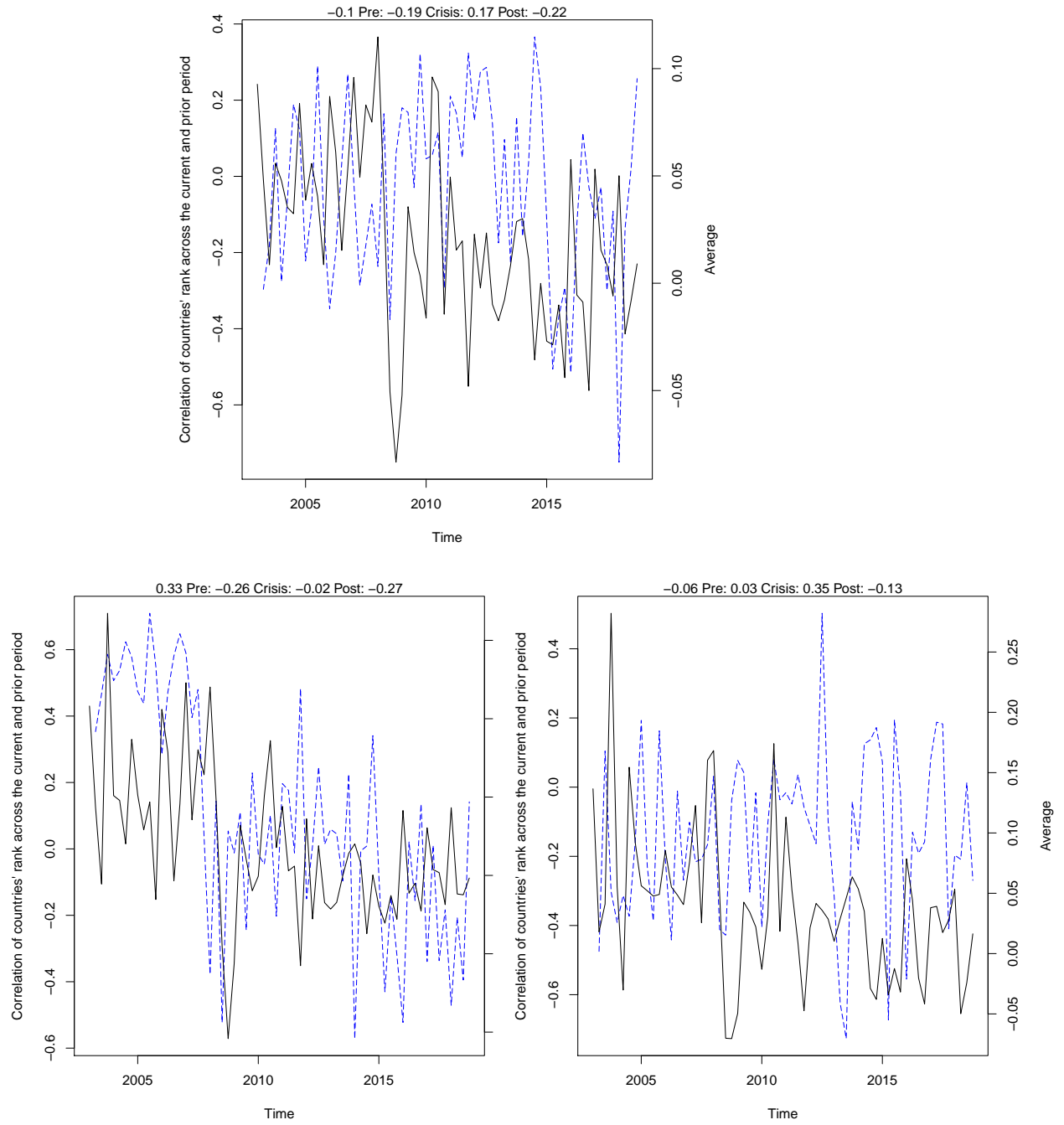
Figure S12: Dispersion of Cross-Border Flows of Liabilities



*Notes:* Top: overall cross-border flows. Bottom left: bank cross-border flows. Bottom right: non-bank cross-border flows. Cross-border flows are in growth rates, where, for example,  $-0.05$  means  $-5\%$ .



Figure S13: Turbulence of Cross-Border Flows of Liabilities



Notes: Black line: cross-country average, blue dotted line: correlation of countries' rank across the current and prior year. Top: overall cross-border flows. Bottom left: bank cross-border flows. Bottom right: non-bank cross-border flows. Cross-border flows are in growth rates, where, for example, -0.05 means -5%.

### S3 Dynamic Behavior of Uncertainty Measures

Table S3: Correlation Matrix Between Uncertainty Measures

Uncertainty	IV3	IV1	RV	EPU	WUI	FD
IV3	1.0000	0.8779	0.1698	0.0940	-0.0172	0.0307
IV1	0.8779	1.0000	0.1711	0.0203	-0.0060	-0.0012
RV	0.1698	0.1711	1.0000	0.0244	0.0007	-0.0552
EPU	0.0940	0.0203	0.0244	1.0000	0.1513	-0.1632
WUI	-0.0172	-0.0060	0.0007	0.1513	1.0000	-0.1909
FD	0.0307	-0.0012	-0.0552	-0.1632	-0.1909	1.0000

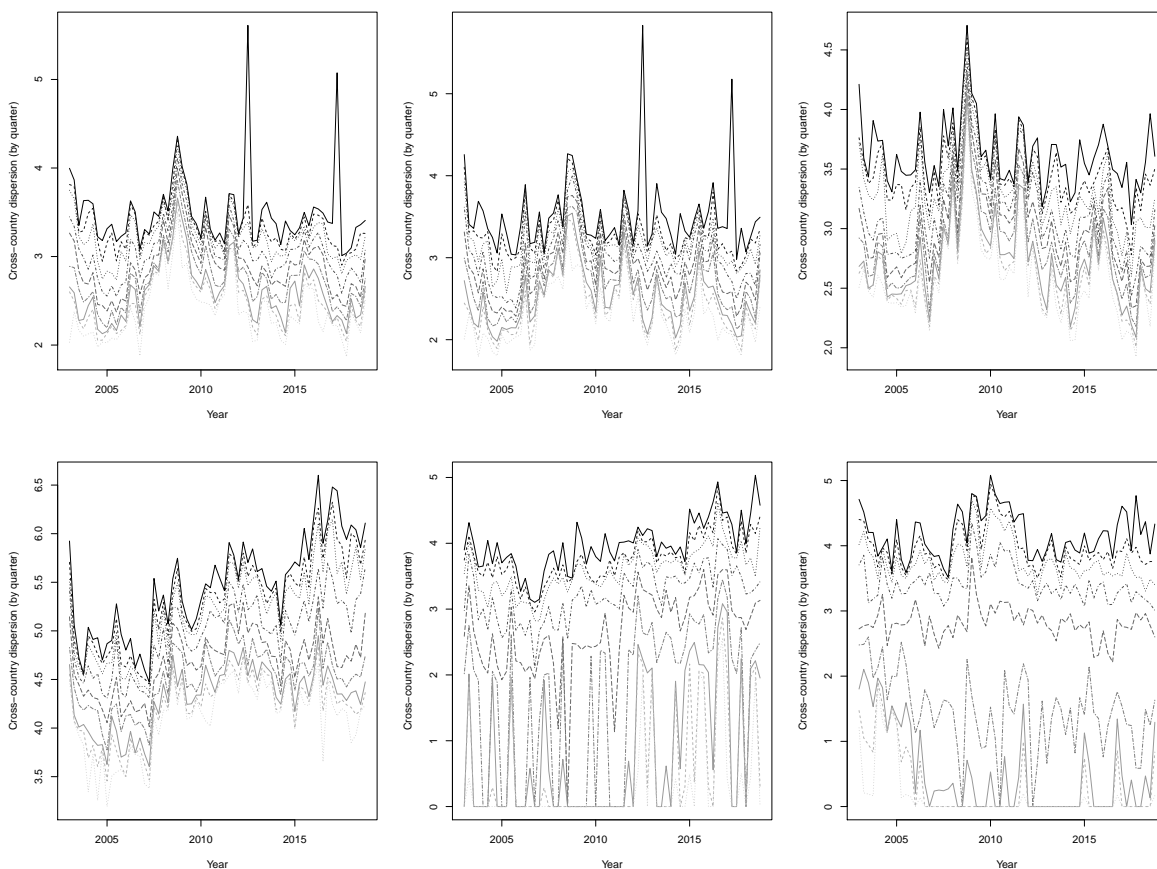
*Notes:* Correlation matrix for uncertainty measures: implied volatility at three- and one-month maturities, realized volatility, EPU, WUI, and forecast dispersion.

Table S4: Moments for Uncertainty Measures

	Mean		Median		Standard Deviation		Skewness		Kurtosis	
	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>
<i>IV3</i>										
All	2.91	2.93	2.87	2.89	0.37	0.36	0.72	0.70	3.98	3.31
Pre-2008Q3	2.81	2.79	2.79	2.74	0.33	0.34	0.42	0.46	2.46	2.31
2008Q3-2012Q2	3.12	3.19	3.02	3.03	0.38	0.37	0.83	0.67	3.23	2.85
Non-Crisis	2.81	2.82	2.78	2.77	0.31	0.30	0.42	0.36	3.18	2.55
Post-2008Q3	2.96	2.97	2.91	2.93	0.37	0.34	0.93	0.84	4.06	3.46
Post-2012Q2	2.81	2.79	2.76	2.74	0.27	0.26	0.43	0.31	2.78	2.09
Post-2012Q2/Crisis	0.90***	0.87***	0.91***	0.90***	0.69	0.70***	0.52***	0.46***	0.86	0.73***
<i>IV1</i>										
All	2.86	2.88	2.82	2.86	0.42	0.40	0.61	0.48	3.56	2.94
Pre-2008Q3	2.75	2.73	2.70	2.66	0.38	0.39	0.52	0.45	2.68	2.53
2008Q3-2012Q2	3.07	3.15	2.99	3.00	0.42	0.39	0.63	0.53	2.81	2.38
Non-Crisis	2.76	2.75	2.72	2.67	0.37	0.36	0.53	0.47	3.43	2.79
Post-2008Q3	2.91	2.92	2.86	2.86	0.41	0.38	0.74	0.62	3.51	3.04
Post-2012Q2	2.76	2.72	2.72	2.67	0.33	0.32	0.61	0.47	3.30	2.61
Post-2012Q2/Crisis	0.90***	0.86***	0.91***	0.89***	0.80**	0.83**	0.98	0.89	1.17	1.10
<i>Realized Volatility</i>										
All	3.01	3.01	2.96	2.92	0.39	0.41	0.78	0.74	3.88	3.68
Pre-2008Q3	2.93	2.87	2.88	2.84	0.29	0.30	0.79	0.77	3.16	2.90
2008Q3-2012Q2	3.30	3.32	3.21	3.21	0.40	0.40	0.82	0.86	3.41	3.31
Non-Crisis	2.89	2.85	2.86	2.82	0.30	0.30	0.43	0.34	3.06	2.96
Post-2008Q3	3.06	3.06	3.02	3.00	0.42	0.43	0.67	0.69	3.69	3.55
Post-2012Q2	2.83	2.79	2.80	2.74	0.29	0.29	0.28	0.30	2.91	2.71
Post-2012Q2/Crisis	0.86***	0.84***	0.87***	0.85***	0.74***	0.74***	0.34**	0.35***	0.86**	0.82**
<i>EPU</i>										
All sample	4.74	4.70	4.76	4.69	0.45	0.47	-0.03	0.02	2.63	2.55
Pre-2008Q3	4.37	4.37	4.35	4.36	0.37	0.35	0.59	0.64	3.59	3.59
2008Q3-2012Q2	4.94	4.93	4.94	4.92	0.31	0.34	-0.03	-0.07	2.40	2.25
Non-Crisis	4.68	4.65	4.70	4.64	0.47	0.50	0.11	0.10	2.61	2.67
Post-2008Q3	4.94	4.83	4.93	4.85	0.35	0.35	0.10	0.14	2.74	2.71
Post-2012Q2	4.94	4.81	4.95	4.84	0.33	0.33	0.20	0.14	2.89	2.72
Post-2012Q2/Crisis	1.00	0.98	1.00	0.98	1.09	0.98	-5.89*	-2.12	1.21**	1.21***
<i>WUI</i>										
All sample	2.43	2.48	2.72	2.77	1.20	1.24	-0.89	-1.08	3.34	3.09
Pre-2008Q3	2.07	2.19	2.25	2.35	1.14	1.20	-0.58	-0.64	2.64	2.36
2008Q3-2012Q2	2.31	2.35	2.54	2.74	1.24	1.28	-0.80	-0.70	3.45	2.06
Non-Crisis	2.53	2.55	2.79	2.83	1.15	1.14	-0.91	-1.02	3.33	2.96
Post-2008Q3	2.62	2.65	2.85	2.98	1.18	1.19	-1.19	-1.33	4.24	3.93
Post-2012Q2	2.90	2.96	3.11	3.21	0.93	0.93	-1.10	-1.26	4.48	3.74
Post-2012Q2/Crisis	1.26***	1.26***	1.23**	1.17**	0.75***	0.72**	1.37	1.79	1.30	1.82**
<i>Forecast Dispersion</i>										
All sample	2.48	3.01	2.37	2.89	0.70	0.64	0.18	0.26	2.65	2.36
Pre-2008Q3	2.75	2.91	2.78	2.81	0.62	0.57	-0.12	-0.19	2.31	2.26
2008Q3-2012Q2	2.46	3.09	2.24	3.03	0.68	0.67	0.35	0.30	2.76	2.27
Non-Crisis	2.45	2.82	2.50	2.81	0.68	0.61	-0.01	-0.03	2.40	2.20
Post-2008Q3	2.36	3.00	2.19	2.99	0.67	0.67	0.42	0.37	3.03	2.78
Post-2012Q2	2.27	2.73	2.14	2.84	0.61	0.55	0.20	0.20	2.52	2.42
Post-2012Q2/Crisis	0.92	0.88	0.95	0.94	0.90	0.83	0.58	0.67	0.91	1.06

*Notes:* See notes to Table S2. To ensure consistency across uncertainty measures throughout the analysis, we use  $\ln(\text{EPU} + 1)$  for EPU. Similarly, denoting WUI and the forecast-based measures by  $x$ , we transform  $x$  to  $\ln(100x + 1)$ .

Figure S14: Dispersion of Uncertainty Measures

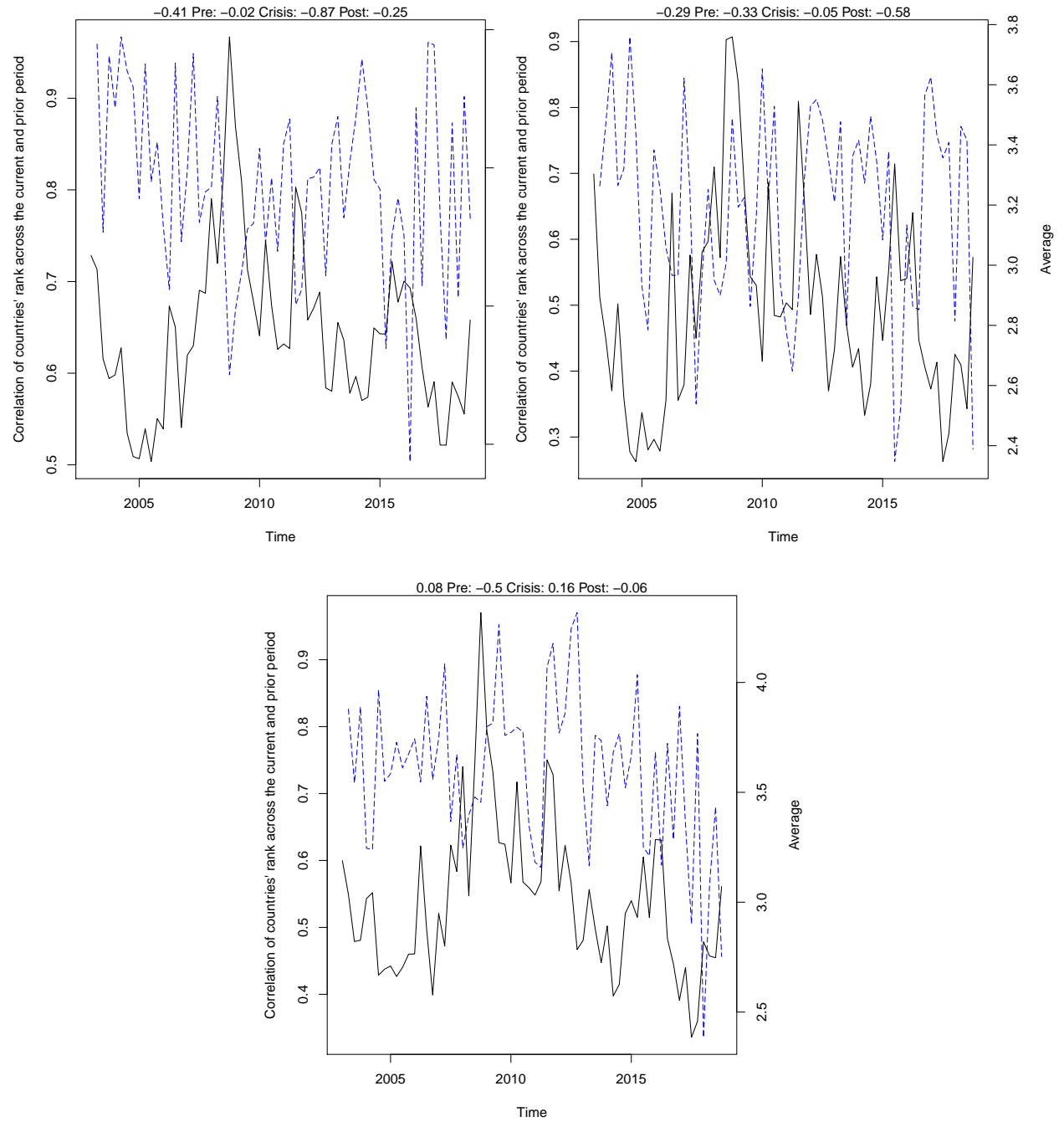


*Notes:* Top row from left to right: implied-volatility at 3 month maturity (IV3), implied-volatility at 1 month maturity (IV1), realized volatility (RV). Bottom row from left to right: economic policy uncertainty (EPU) index, world uncertainty index (WUI), forecast dispersion. See Section 2 in the main paper for detailed description of uncertainty measures.

## **Turbulence of Uncertainty Measures**

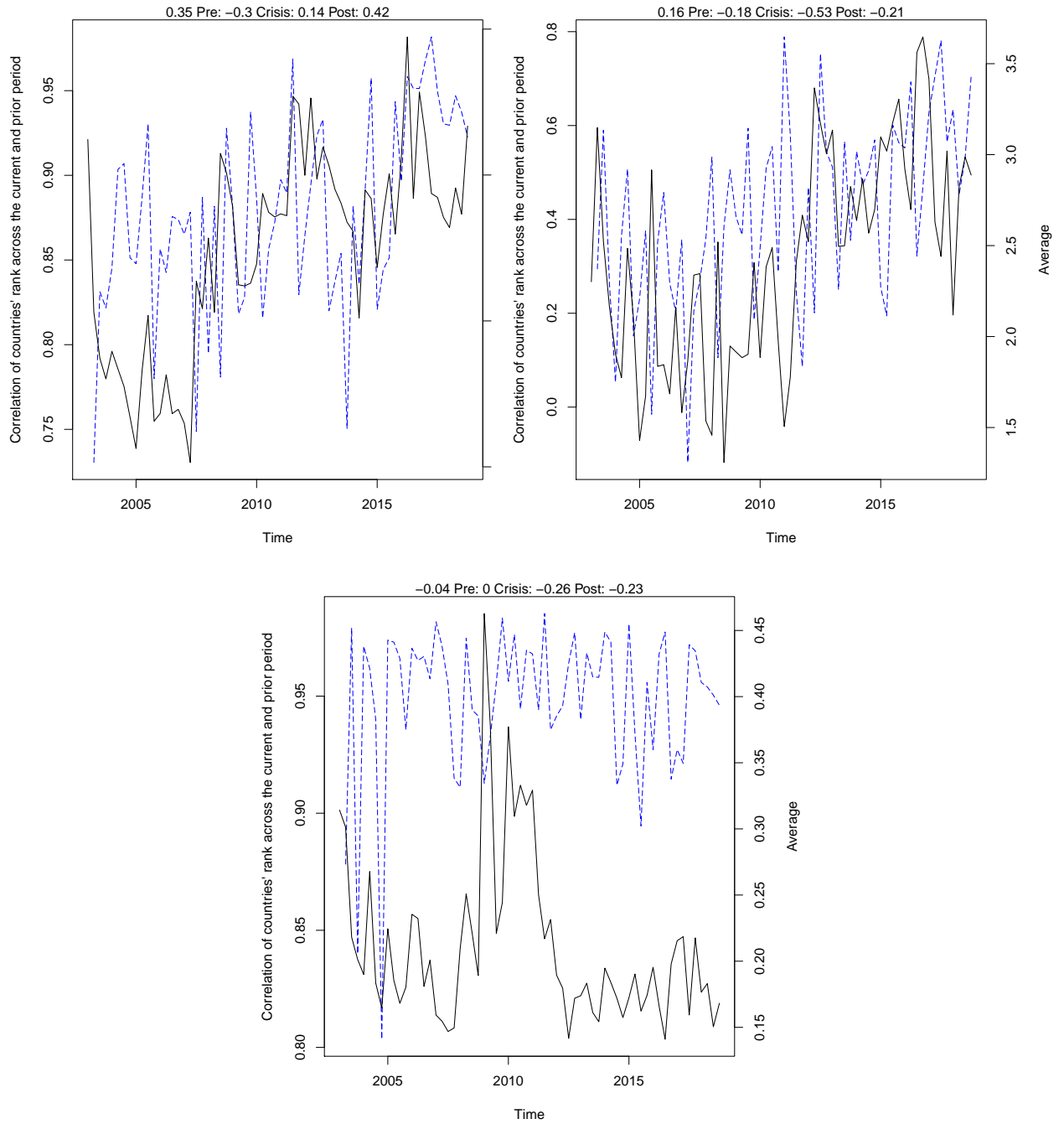
Turbulence is negatively correlated with averages for measures of realized volatility, EPU, WUI, and bank flows of liabilities. That is, there is little turbulence when these variables are high. In contrast, turbulence is strong when the following variables are high: implied volatility, forecast dispersion, and overall and non-bank flows of liabilities. Sub-samples display heterogeneity. Serial correlation of countries' rank is positive (low turbulence) with large differences over time for realized volatility, implied volatility, and WUI. Turbulence for realized volatility and implied volatility displays a modest increase during the crisis, while turbulence marginally decreases over time for WUI. Turbulence displays no discernible patterns being roughly constant with small changes for EPU and forecast-based measures of uncertainty. With banking flows, large changes occur in the serial correlation of countries' rank over time. For overall and non-bank flows of liabilities, serial correlation of countries' rank is weakly positive (some turbulence), with large, regular, seesaw-like oscillations over time akin to white noise. For bank flows of liabilities, this rank order correlation becomes negative (strong turbulence) from the crisis onward.

Figure S15: Turbulence of Uncertainty Measures – 1 of 2



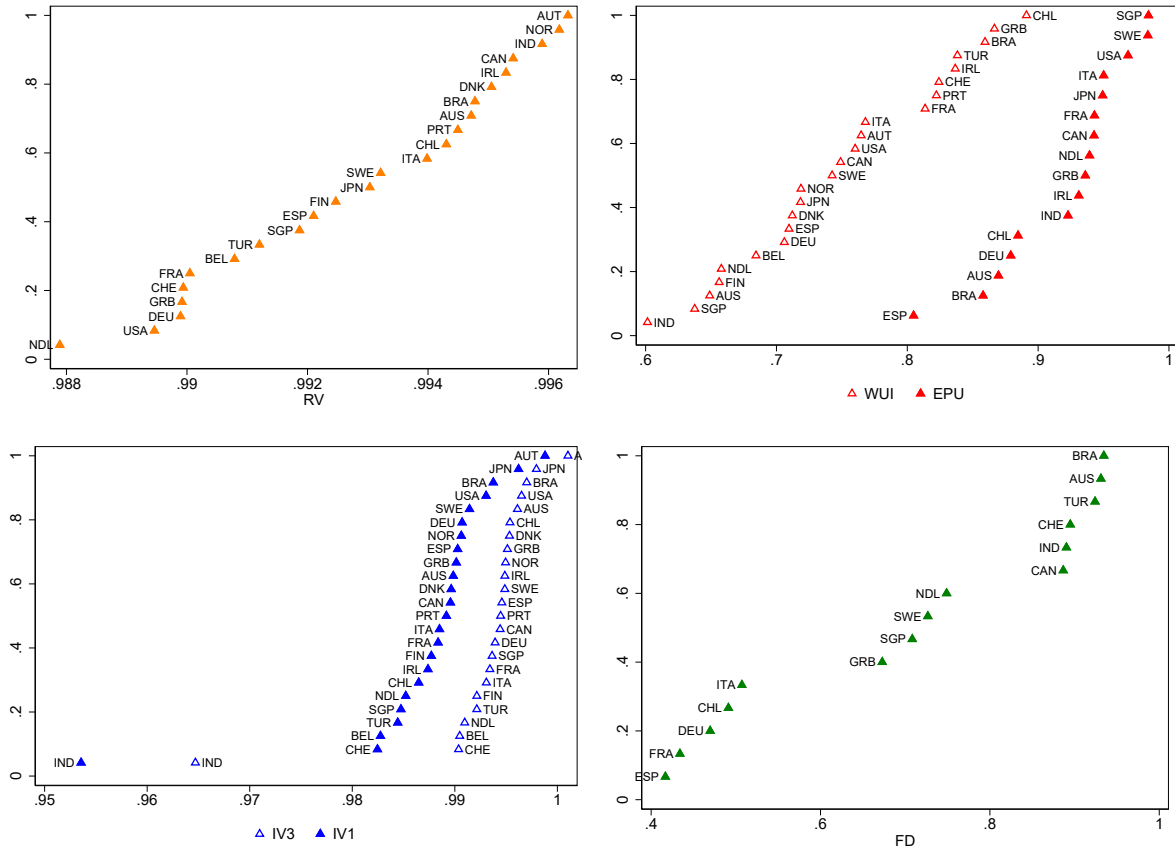
*Notes:* Black line: cross-country average, blue dotted line: correlation of countries' rank across the current and prior year. Top left: implied volatility at 3 month maturity (IV3). Top right: implied volatility at 1 month maturity (IV1). Bottom: realized volatility (RV). See Section 2 in the main paper for detailed description of uncertainty measures.

Figure S16: Turbulence of Uncertainty Measures – 2 of 2



*Notes:* Black line: cross-country average, blue dotted line: correlation of countries' rank across the current and prior year. Top left: economic policy uncertainty (EPU) index. Top right: world uncertainty index (WUI). Bottom: forecast dispersion. See Section 2 in the main paper for detailed description of uncertainty measures.

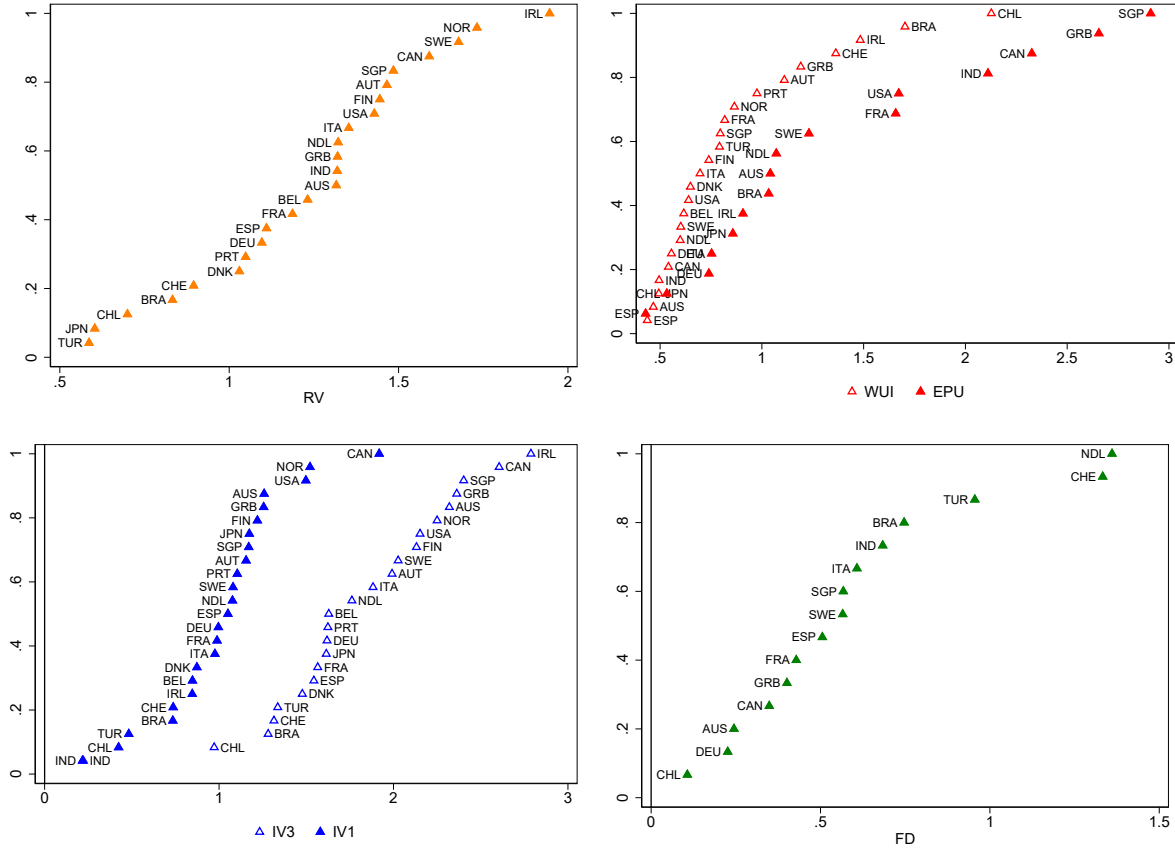
Figure S17: AR(1) Persistence of Uncertainty



Notes: Cumulative distributions of AR(1) coefficients ( $\rho$ ) from  $\Delta UNC_t = \rho UNC_{t-1} + \epsilon_t$ . Results are robust to the inclusion of the constant term. Top left: realized volatility (RV). Top right: world uncertainty index (WUI) and economic policy uncertainty (EPU) index. Bottom left: implied volatility at 3 and 1 month maturities (IV3 and IV1). Bottom right: forecast dispersion (FD). See Section 2 in the main paper for detailed description of uncertainty measures.



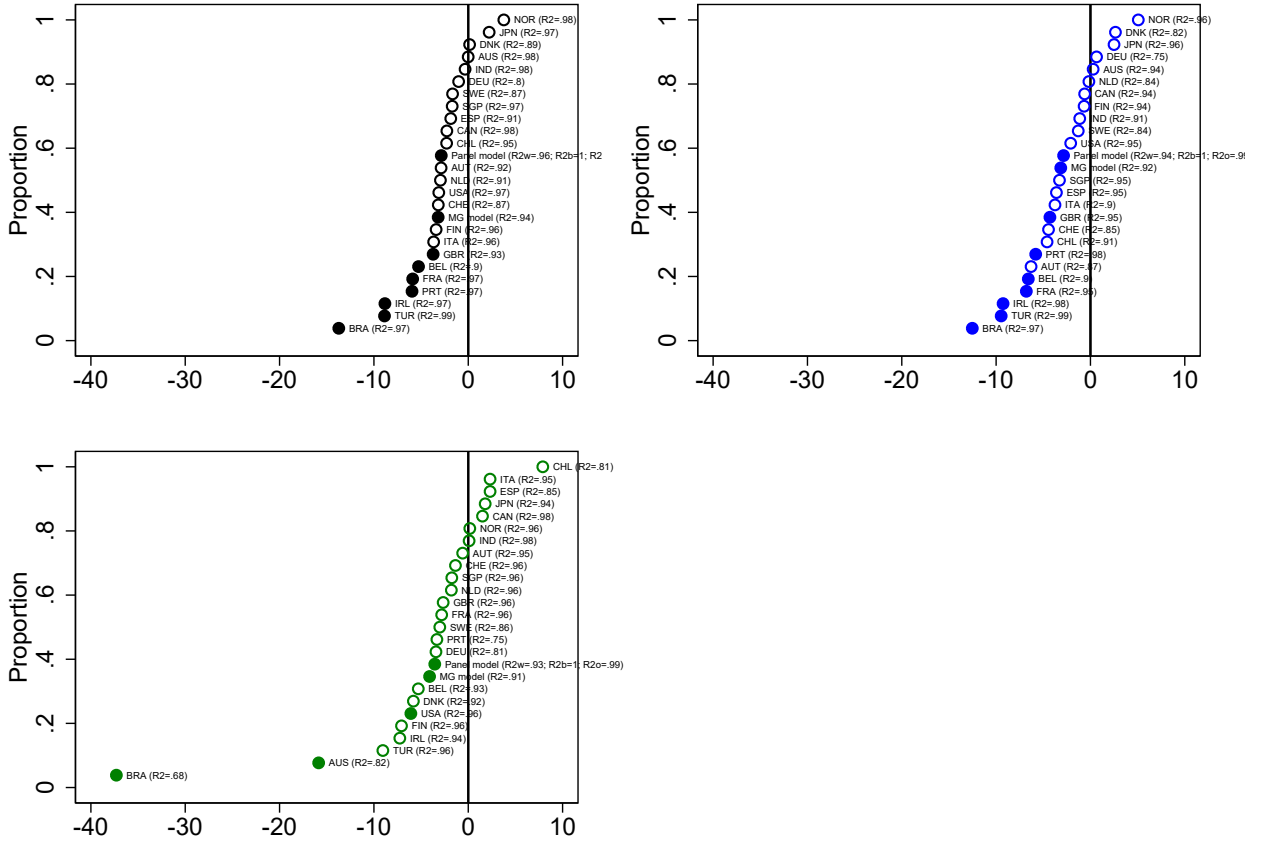
Figure S18: Half-Life Persistence of Uncertainty



Notes: cumulative distributions of half-life coefficients ( $\hat{h}$ ) from  $\Delta UNC_t = \rho UNC_{t-1} + \epsilon_t$  as computed by  $\hat{h} = \frac{\ln(0.5)}{\ln(\hat{\gamma})}$ , where  $\hat{\gamma} = 1 + \hat{\rho} > 0$  is a complete scalar measure of persistence. Under mean reversion a proportion  $\hat{\gamma}^n$  of any shock will remain after  $n$  periods. Results are robust to the inclusion of the constant term. Top left: realized volatility (RV). Top right: world uncertainty index (WUI) and economic policy uncertainty (EPU) index. Bottom left: implied volatility at three- and one-month maturities (IV3 and IV1). Bottom right: forecast dispersion (FD). See Section 2 in the main paper for detailed description of uncertainty measures.

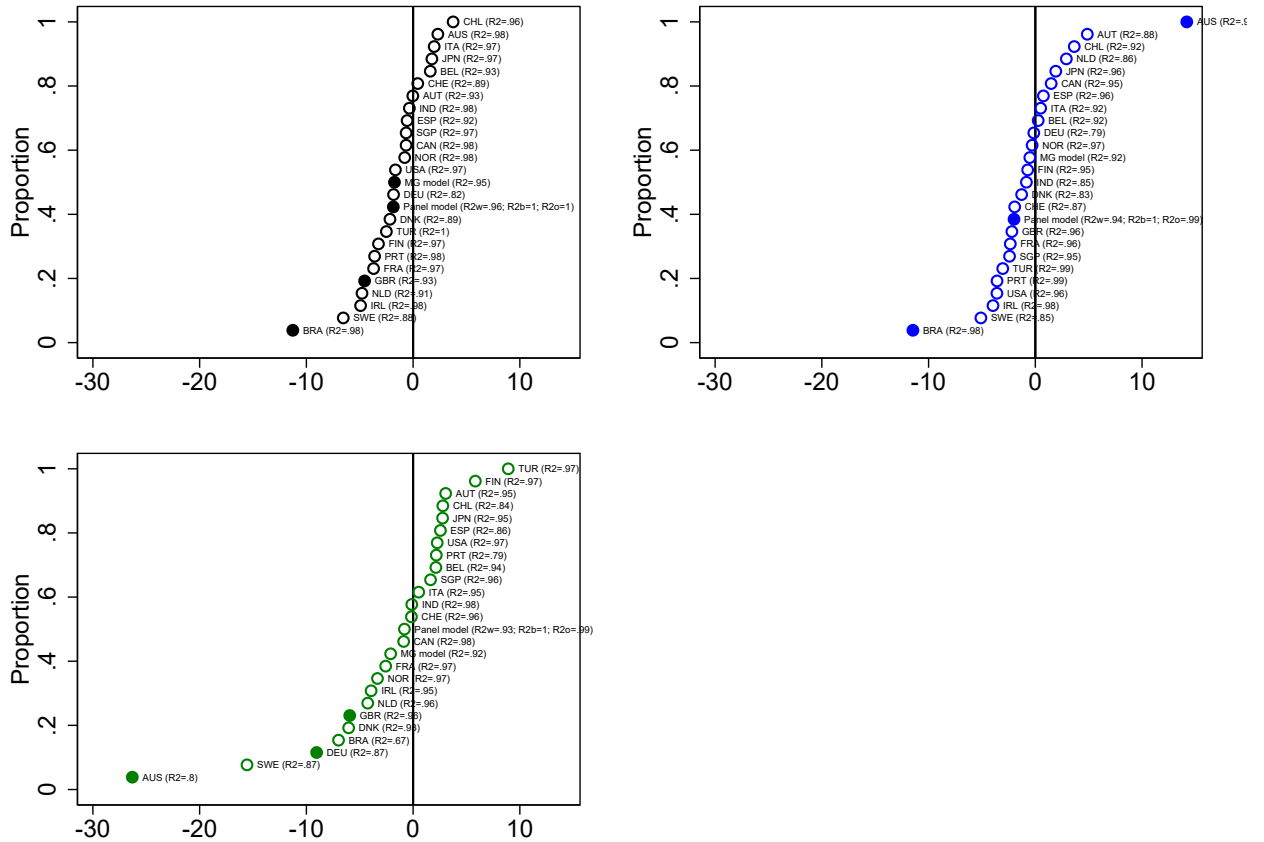
## S4 Lagged Uncertainty Variables

Figure S19: Bivariate models.  
 Uncertainty measure: three-month implied volatility in  $t - 1$ .



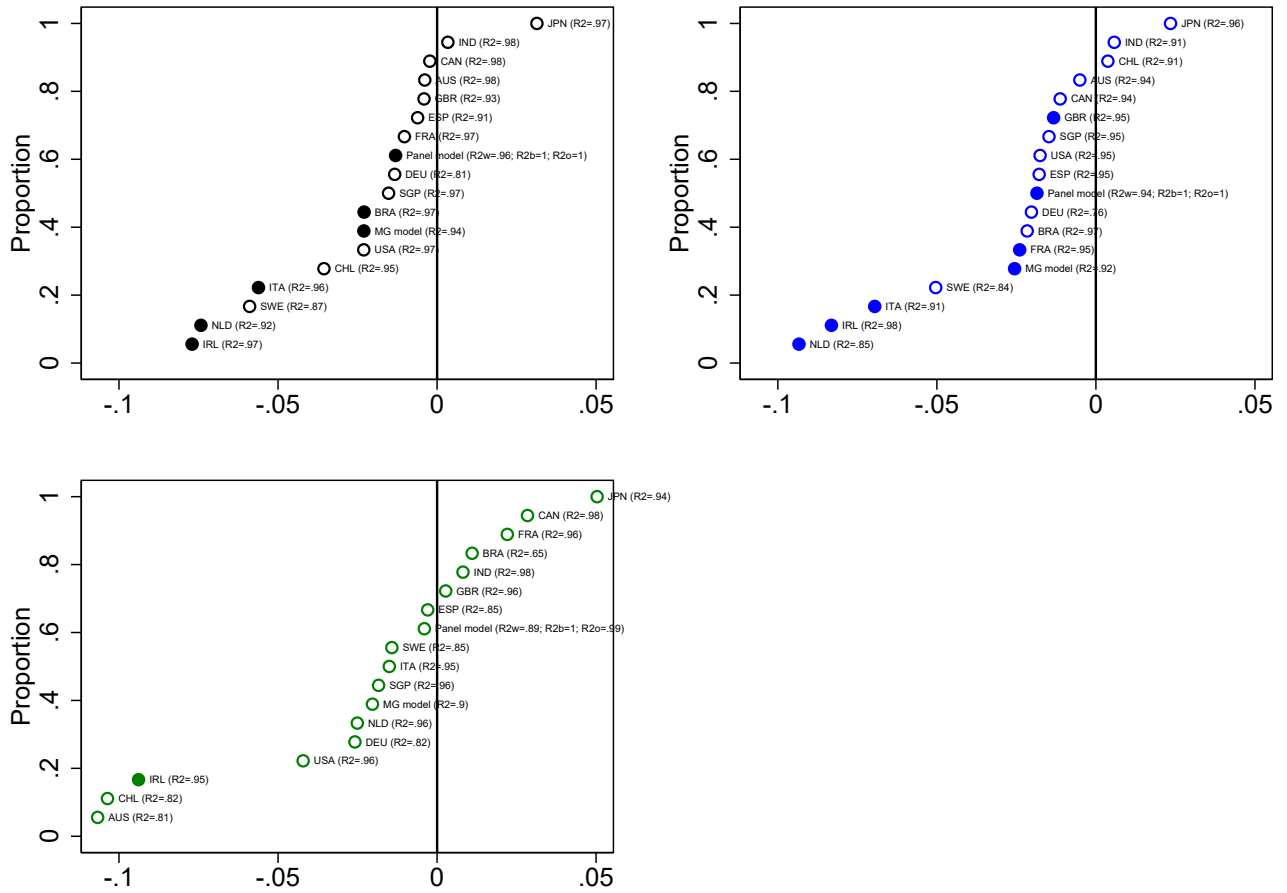
*Notes:* Point estimates from bivariate regression models from equation (1) in the paper for the log-level of cross-border bank liabilities vis-à-vis all **all** counterparties, **banks**, and **non-banks**. The explanatory variable is the logarithm of uncertainty lagged one quarter, captured by implied volatility based on three-month option prices. All models include a constant and the lagged dependent variable. In addition to country-specific regression models, these figures include the point estimates of bivariate models obtained from Pesaran and Smith (1995)’s mean group estimator and a panel model with country fixed effects. The size of these coefficients is measured on the x-axis. The vertical axis captures the proportion of countries in the cumulative distribution of coefficients. All models are estimated using the full time period: 2003Q1–2018Q4. Filled circles represent statistically significant coefficient estimates based on 2 standard deviation error bands. Country-specific estimates are identified with ISO3 codes.  $R^2$ s for each regression reported in parenthesis. For the mean group estimator, we report the average  $R^2$ s across all countries. For the panel data model, we report within, between, and overall  $R^2$ s.

Figure S20: Multivariate models.  
 Uncertainty measure: one-month implied volatility in t-1.



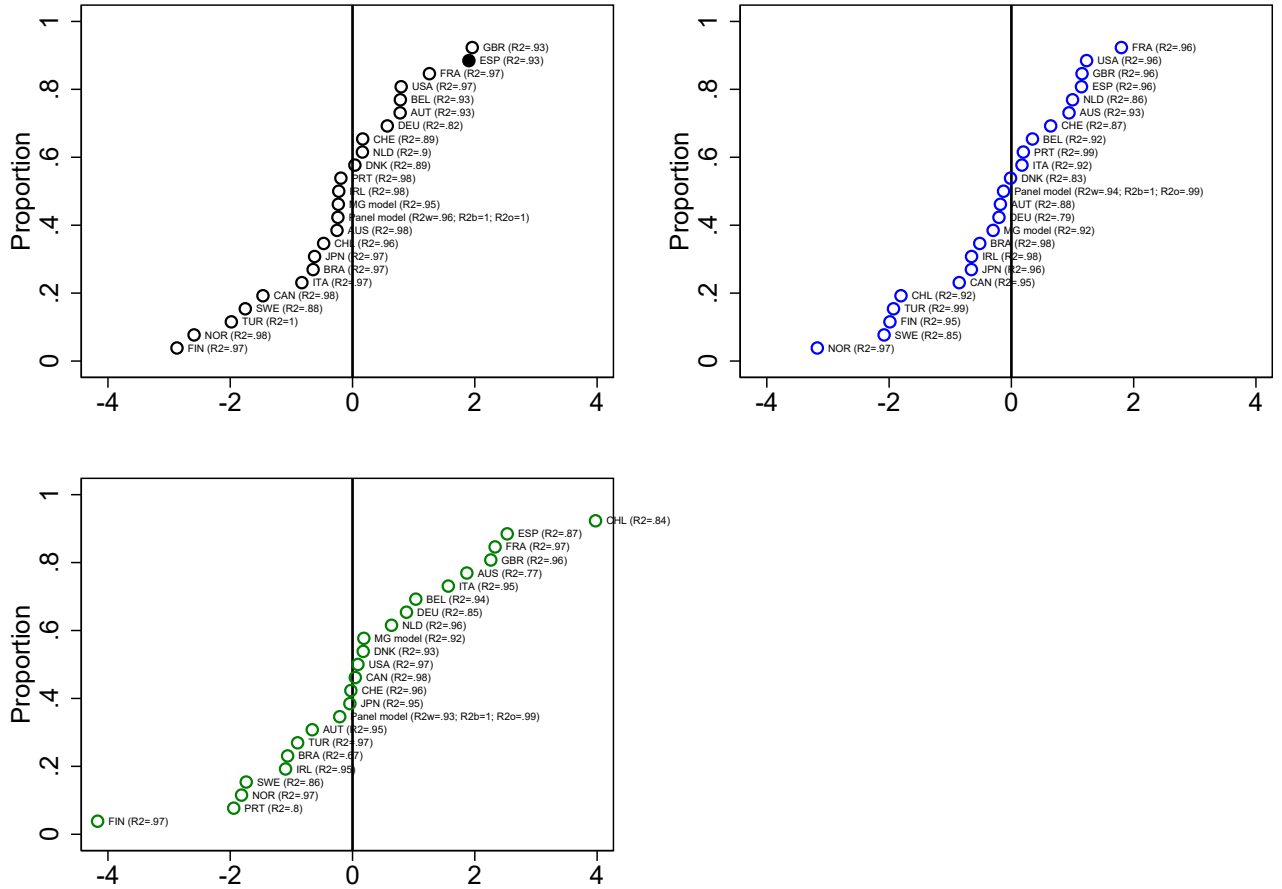
Notes: Point estimates from bivariate regression models from equation (1) in the paper for the log-level of cross-border bank liabilities vis-à-vis **all** counterparties, **banks**, and **non-banks**. The explanatory variable is the logarithm of uncertainty lagged one quarter, captured by the EPU index. All models include a constant and the lagged dependent variable. In addition to country-specific regression models, these figures include the point estimates of bivariate models obtained from Pesaran and Smith (1995)'s mean group estimator and a panel model with country fixed effects. The size of these coefficients is measured on the x-axis. The vertical axis captures the proportion of countries in the cumulative distribution of coefficients. All models are estimated using the full time period: 2003Q1–2018Q4. Filled circles represent statistically significant coefficient estimates based on 2 standard deviation error bands. Country-specific estimates are identified with ISO3 codes.  $R^2$ s for each regression reported in parenthesis. For the mean group estimator, we report the average  $R^2$ s across all countries. For the panel data model, we report within, between, and overall  $R^2$ s.

Figure S21: Bivariate models.  
 Uncertainty measure: Economic Policy Uncertainty in t-1.



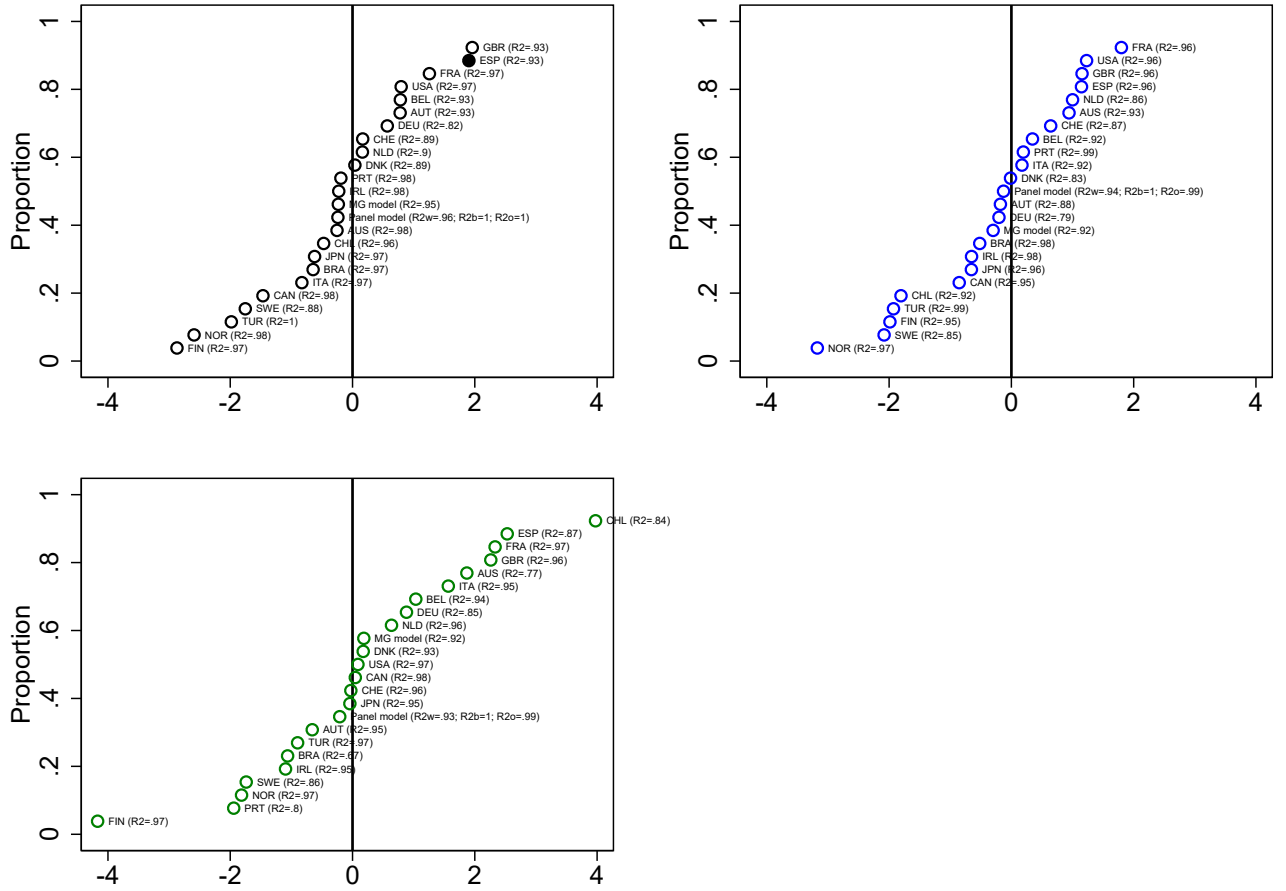
*Notes:* Point estimates from bivariate regression models from equation (1) in the paper for the log-level of cross-border bank liabilities vis-à-vis **all** counterparties, **banks**, and **non-banks**. The explanatory variable is the logarithm of uncertainty lagged one quarter, captured by realized volatility. All models include a constant and the lagged dependent variable. In addition to country-specific regression models, these figures include the point estimates of bivariate models obtained from [Pesaran and Smith \(1995\)](#)'s mean group estimator and a panel model with country fixed effects. The size of these coefficients is measured on the x-axis. The vertical axis captures the proportion of countries in the cumulative distribution of coefficients. All models are estimated using the full time period: 2003Q1–2018Q4. Filled circles represent statistically significant coefficient estimates based on 2 standard deviation error bands. Country-specific estimates are identified with ISO3 codes.  $R^2$ s for each regression reported in parenthesis. For the mean group estimator, we report the average  $R^2$ s across all countries. For the panel data model, we report within, between, and overall  $R^2$ s.

Figure S22: Multivariate models.  
 Uncertainty measure: World Uncertainty Index in t-1.



Notes: Point estimates from bivariate regression models from equation (1) in the paper for the log-level of cross-border bank liabilities vis-à-vis **all** counterparties, **banks**, and **non-banks**. The explanatory variable is the logarithm of uncertainty lagged one quarter, captured by the World Uncertainty Index (WUI). All models include a constant and the lagged dependent variable. In addition to country-specific regression models, these figures include the point estimates of bivariate models obtained from [Pesaran and Smith \(1995\)](#)'s mean group estimator and a panel model with country fixed effects. The size of these coefficients is measured on the x-axis. The vertical axis captures the proportion of countries in the cumulative distribution of coefficients. All models are estimated using the full time period: 2003Q1–2018Q4. Filled circles represent statistically significant coefficient estimates based on 2 standard deviation error bands. Country-specific estimates are identified with ISO3 codes.  $R^2$ s for each regression reported in parenthesis. For the mean group estimator, we report the average  $R^2$ s across all countries. For the panel data model, we report within, between, and overall  $R^2$ s.

Figure S23: Multivariate models.  
 Uncertainty measure: Forecast Dispersion in t-1.



*Notes:* Point estimates from bivariate regression models from equation (1) in the paper for the log-level of cross-border bank liabilities vis-à-vis **all** counterparties, **banks**, and **non-banks**. The explanatory variable is the logarithm of uncertainty lagged one quarter, captured by the professional forecast survey dispersion (FD). All models include a constant and the lagged dependent variable. In addition to country-specific regression models, these figures include the point estimates of bivariate models obtained from [Pesaran and Smith \(1995\)](#)'s mean group estimator and a panel model with country fixed effects. The size of these coefficients is measured on the x-axis. The vertical axis captures the proportion of countries in the cumulative distribution of coefficients. All models are estimated using the full time period: 2003Q1–2018Q4. Filled circles represent statistically significant coefficient estimates based on 2 standard deviation error bands. Country-specific estimates are identified with ISO3 codes.  $R^2$ s for each regression reported in parenthesis. For the mean group estimator, we report the average  $R^2$ s across all countries. For the panel data model, we report within, between, and overall  $R^2$ s.

## References

- PESARAN, M. H. and SMITH, R. (1995). Estimating Long-Run Relationships from Dynamic Heterogeneous Panels. *Journal of Econometrics*, **68** (1), 79–113.