US Monetary Spillovers to Latin America: The Role of Long-Term Interest Rates

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Motivation

- Economic troubles in LATAM
  - End of commodity super cycle + anticipation of FED liftoff
  - Retreat of capital flows; NER depreciations; high inflation
  - Mounting inflationary pressures limit MP response to slower growth

  $\Rightarrow$ Imminent FED hike: important to assess further spillovers from US monetary conditions

- **This paper**:
  - Measure spillovers from US monetary conditions (short and long-term rates)
  - Countries: Brazil, Chile, Colombia, Mexico, Peru
  - Dimensions: activity (unemployment); inflation; asset prices

Motivation

- Key empirical challenges
  - Identification of US interest rate shocks
  - Interactions between LATAM countries

- **Our approach**: FAVAR model
  - FA: compute LATAM factors (unemployment factor, inflation factor, etc..); estimate country-specific loadings
  - VAR: model evolution of factors as VAR with exogenous US interest rate block

- Main advantages
  - Captures interactions between LATAM economies
  - Include wide range of variables, keeping problem dimensionality under control

Overview of Results

- Significant comovement within LATAM
  - Similar responses to US shocks (except Mexico)
- A shock to US 10 yr rates (full sample: 2003-15)
  - Increases unemployment
  - Depreciates exchange rates
  - Increases inflation
  - Lowers stock market returns
- Post 2009 sample
  - Large spillovers on LATAM long term rates
  - Weaker impact on other factors and countries

Literature

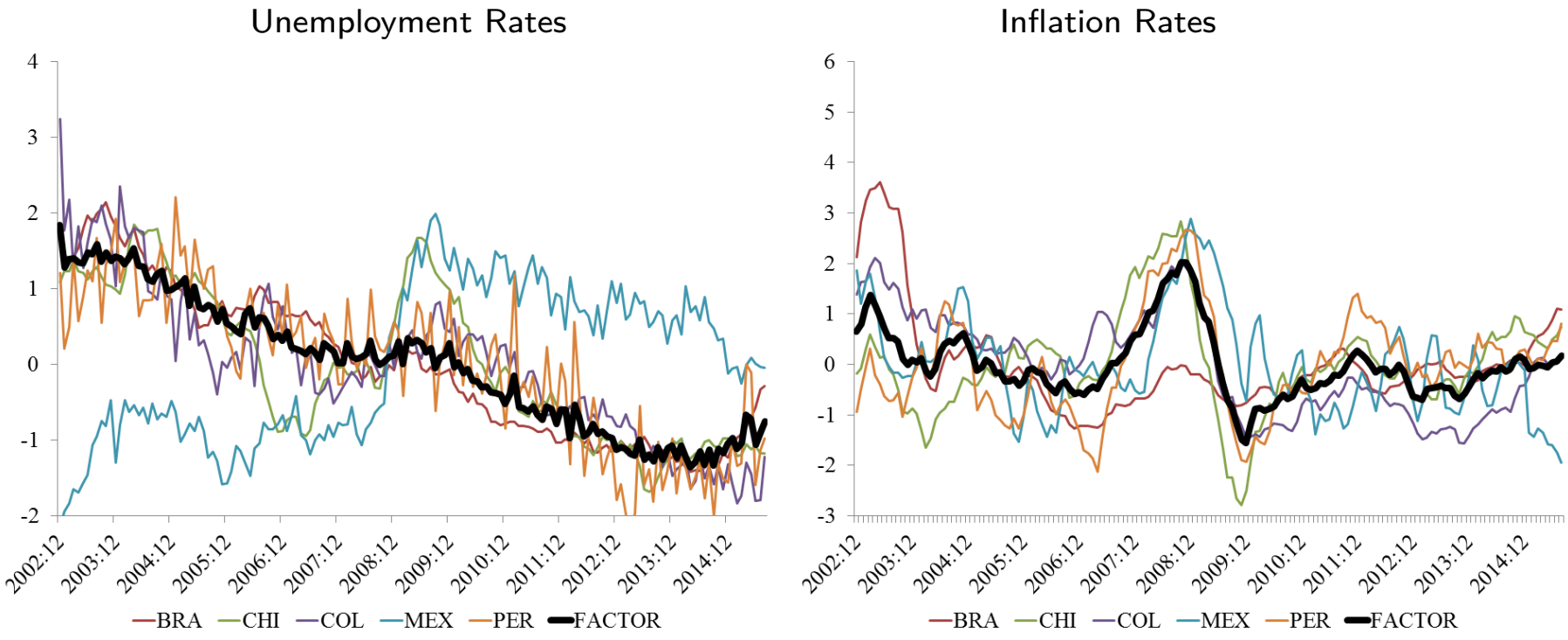
- US MP rates and risk-taking channel
  - Hanson and Stein (2015); Greenwood and Vayanos (2014); Krishnamurthy and Vissing-Jorgensen (2011)
- AE financial conditions and global financial cycles
  - Rey (2015); Bruno and Shin (2015); Ahmed and Zlate (2014); Obstfeldt (2015)
- US interest rate spillovers into EME
  - Gilchrist et al (2015); Hoffman and Takats (2015); BIS (2015); Miyajima et al. (2014); Albagli et al. (2015)
- Main differences
  - Focus on LATAM
  - Focus on wide range of variables, besides asset prices
  - Methodological approach (FAVAR model)

Outline

Outline

LATAM Factors and Comovement

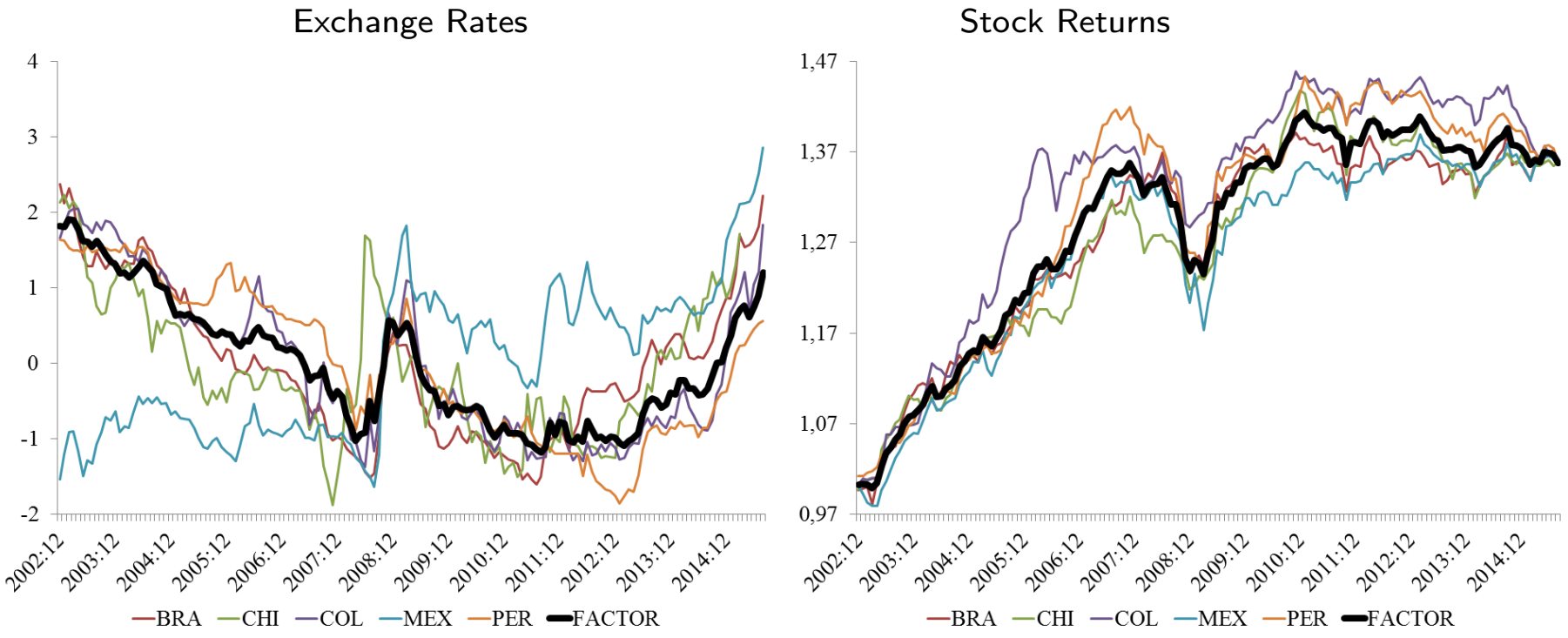
Figure: Comovement in economic fundamentals: Unemployment and Inflation



Note: Each chart of the figure shows the data across country (color lines) used to extract the first principal component or common factor (black line).

LATAM Factors and Comovement

Figure: Exchange Rates and Stock Markets



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LATAM Factors and Comovement

Table: Fraction of country-specific variables explained by common factors

	UR	INF	EXC	STO
BRA	0,93	0,16	0,79	0,73
CHI	0,74	0,53	0,83	0,58
COL	0,82	0,64	0,96	0,52
MEX	0,44	0,35	0,08	0,71
PER	0,82	0,58	0,84	0,64

Outline

FAVAR Model

- FA: Estimate Factor Loadings of Economic Variables

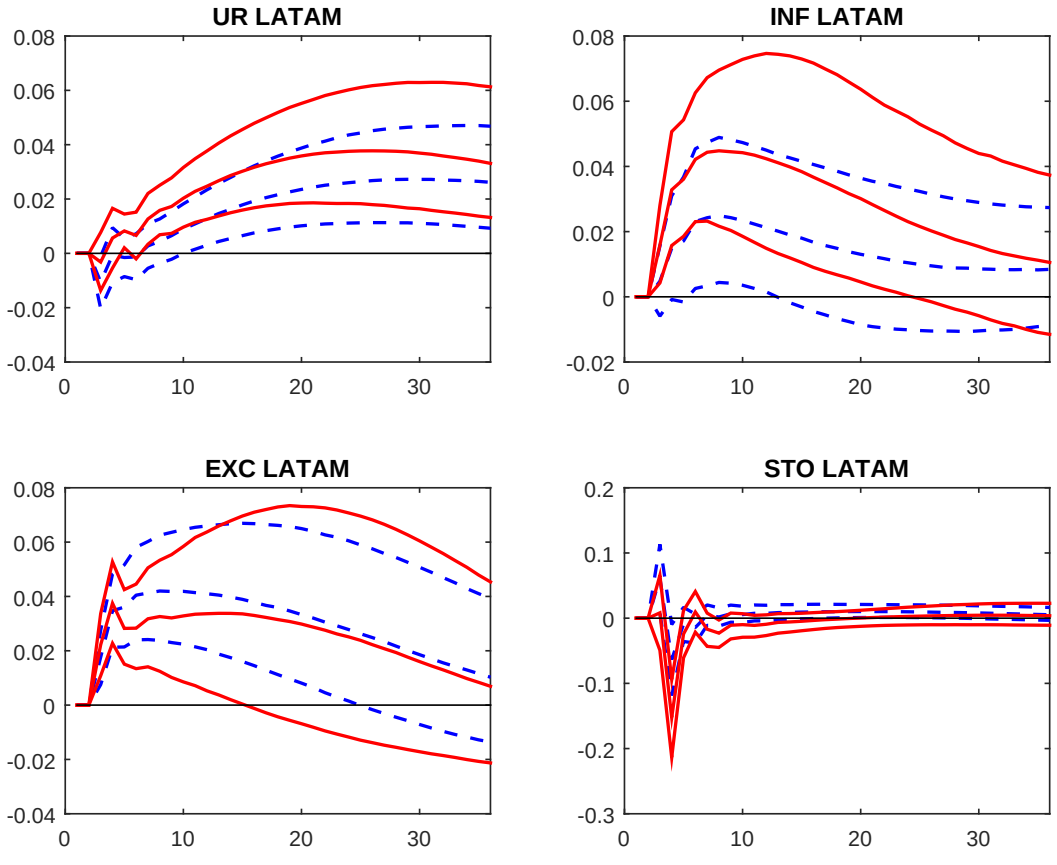
$$\begin{bmatrix} X_t \\ r^h_{US,t} \end{bmatrix} = \begin{bmatrix} \Lambda^f & \Lambda^r \\ 0 & I \end{bmatrix} \begin{bmatrix} F_t \\ r^h_{US,t} \end{bmatrix} + \begin{bmatrix} \varepsilon_t \\ 0 \end{bmatrix}, \quad \varepsilon_t \sim N(0, \Omega)$$

  - $X_t = (Y_{BRA,t}, Y_{CHI,t}, Y_{COL,t}, Y_{MEX,t}, Y_{PER,t})'$, with $Y_{i,t} = (u_{i,t}, \pi_{i,t}, \chi_{i,t}, p_{i,t})'$
  - Monthly frequency; Dec. 2002 – Aug. 2015
- VAR: Estimate Dynamics of Factors and US interest rates

$$\begin{bmatrix} F_t \\ r^h_{US,t} \end{bmatrix} = \begin{bmatrix} \Psi_f(L) & \Psi_{f,US}(L) \\ 0 & \Psi_{US}(L) \end{bmatrix} \begin{bmatrix} F_{t-1} \\ r^h_{US,t-1} \end{bmatrix} + \begin{bmatrix} e_{f,t} \\ e_{US,t} \end{bmatrix}, \quad e_t \sim N(0, \Sigma)$$

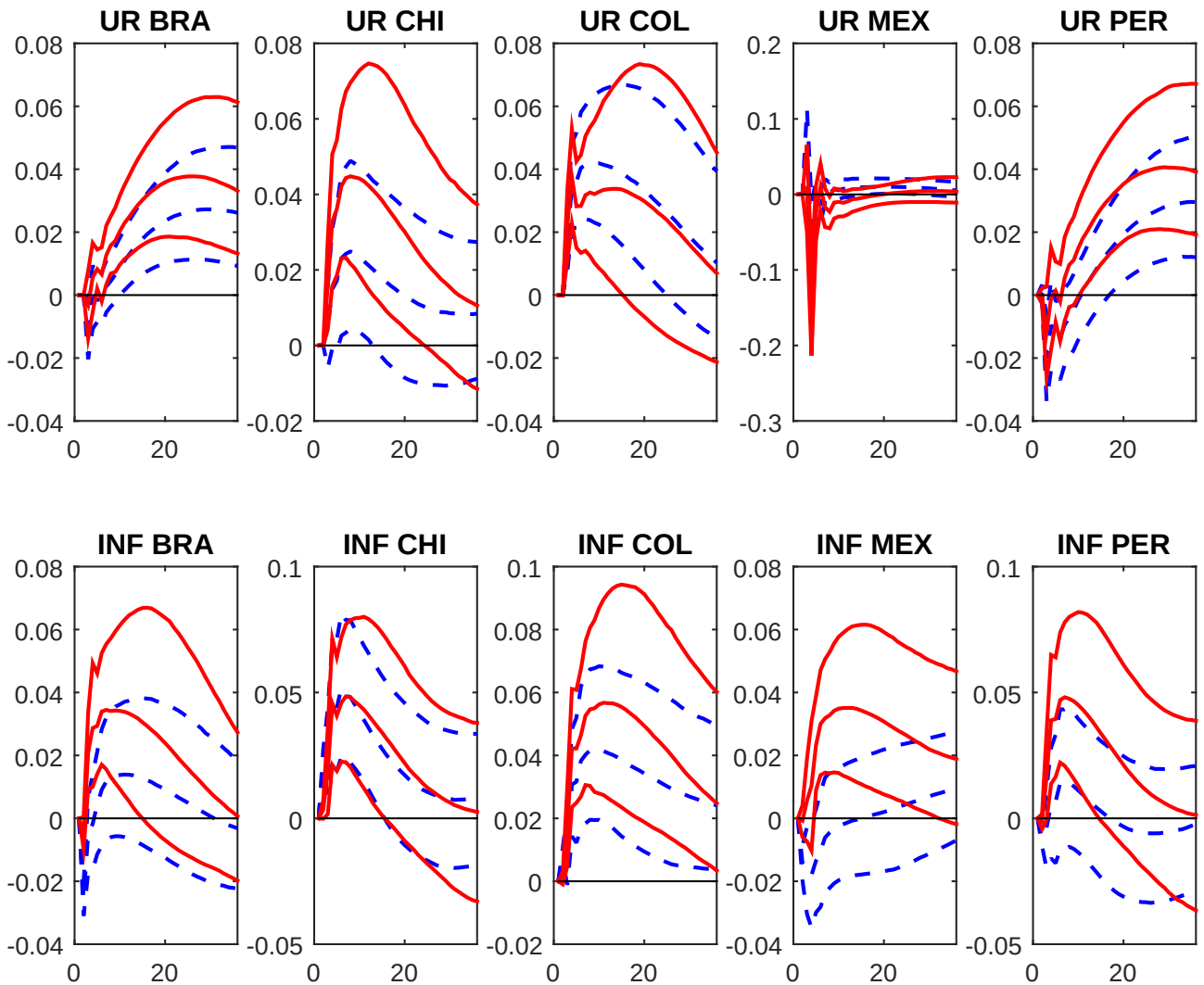
  - $r^h_{US,t-1}$: US interest rate, maturity h (use 1 yr, or 10 yr)
  - Block exogeneity: Σ =blockdiag$\{\Sigma_f, \Sigma_{US}\}$ (Canova, 2005)
- Estimate through Bayesian methods (Gibbs Sampler)

US interest rate Spillovers: Effects on LATAM Factors



Note: The blue dashed (red solid) lines plot the responses to a shock in the 1 year (10 year) US bond yield. The central line corresponds to the response according to the median draw of the simulation, while the lower and upper lines correspond to the 16 and 84th percentile, respectively.

US rates spillovers: country-specific effects on unemployment, inflation



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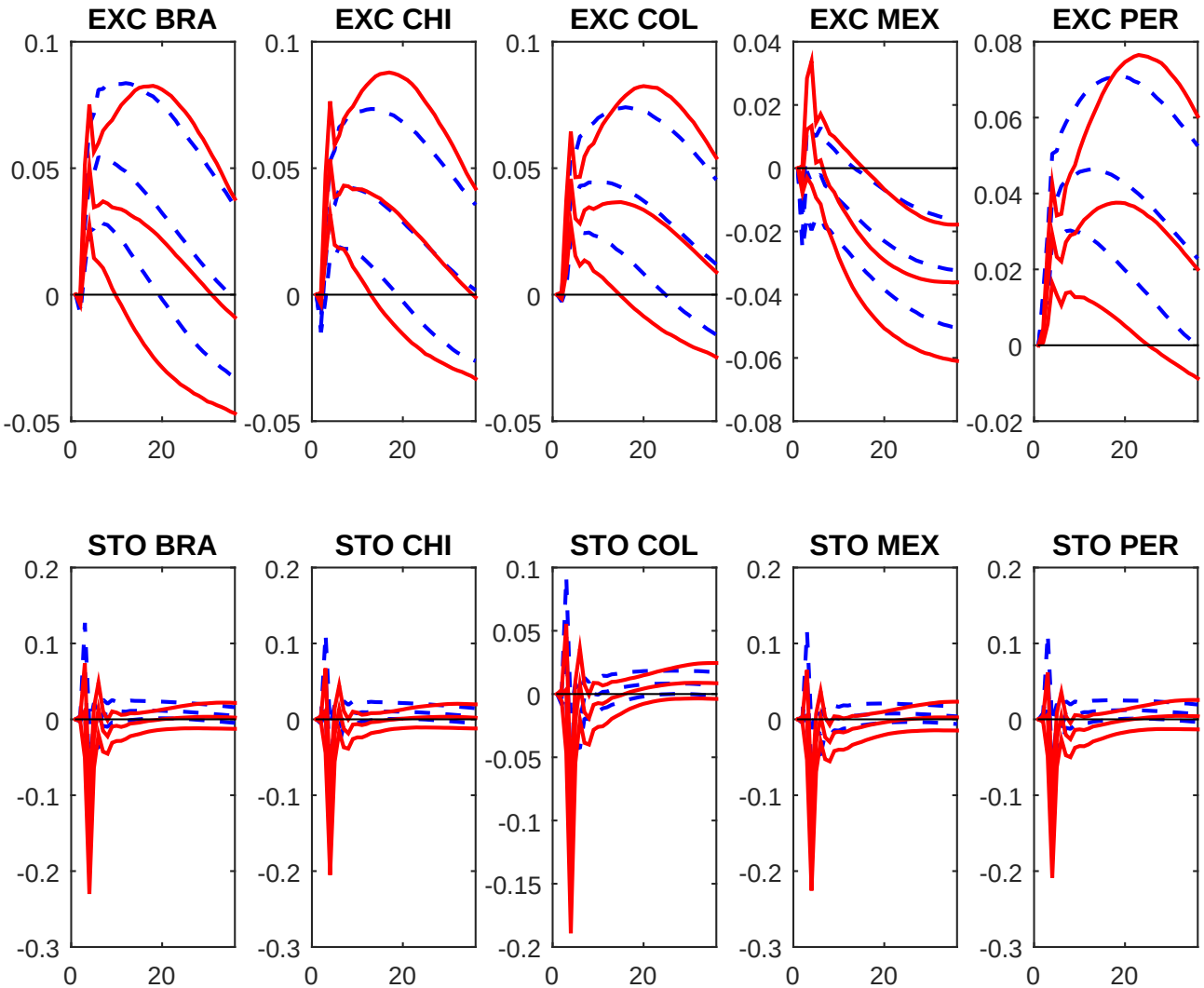
US rates spillovers: country-specific effects on NER, stock markets



Note: The blue dashed (red solid) lines plot the responses to a shock in the 1 year (10 year) US bond yield. The central line corresponds to the response according to the median draw of the simulation, while the lower and upper lines correspond to the 16 and 84th percentile, respectively.

US monetary Spillovers: Historical Decomposition (US 10 yr rates)

	US 10 yr	UR	INF	EXC	STO
US 10 yr	1.00	0.66	0.07	0.52	0.07
UR	0.00	0.12	0.00	0.01	0.01
INF	0.00	0.19	0.86	0.24	0.11
EXC	0.00	0.02	0.04	0.23	0.31
STO	0.00	0.00	0.02	0.00	0.49

Note: Rows denote contribution of each variable to the in-sample variance of the variable in each column.

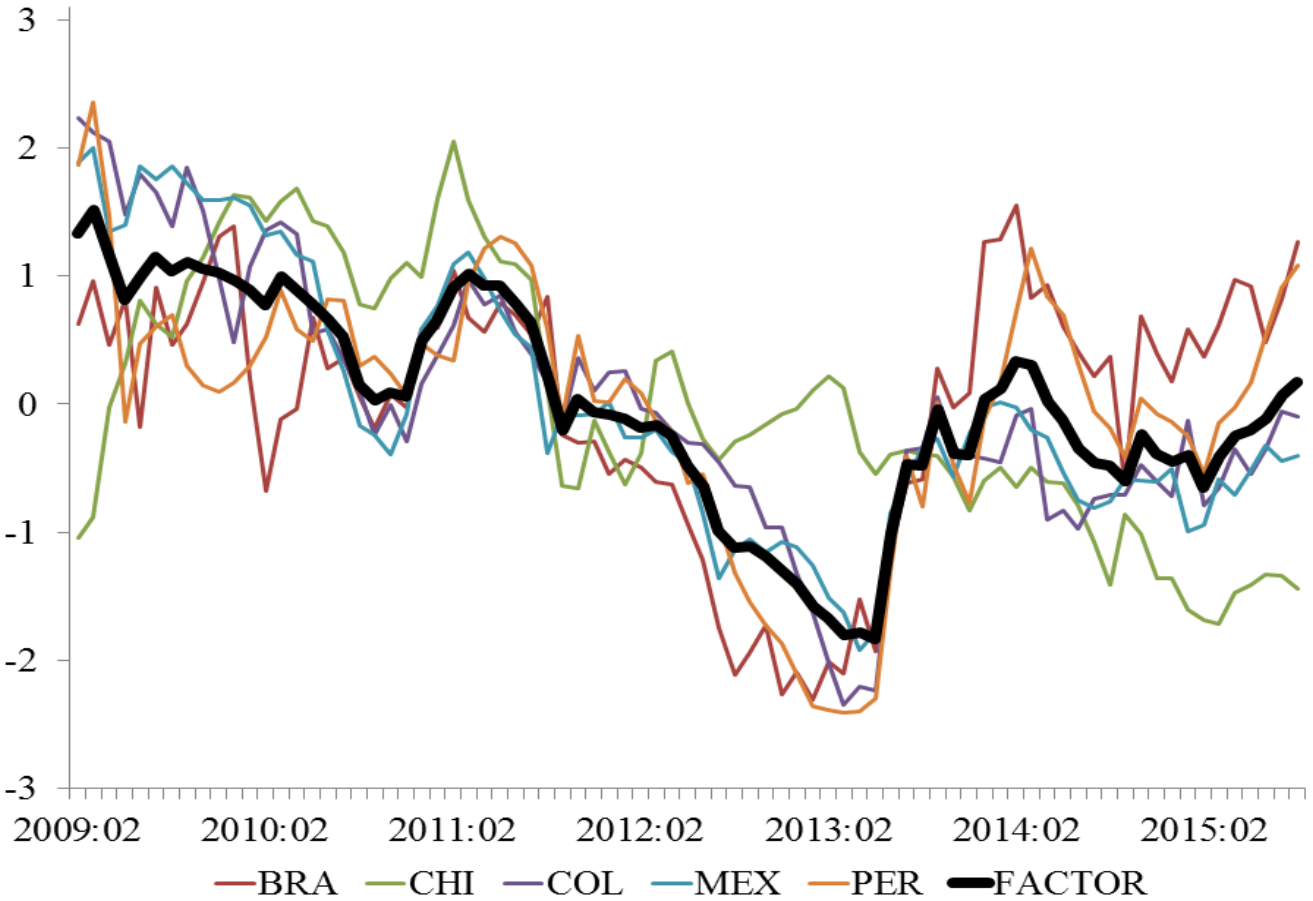
Outline

Post 2009 sub sample FAVAR

- Beginning 2009, we have good data on long term rates for all LATAM countries included (at least for 10 yr rates)
- This period also coincides with the start of unconventional MP by the US: natural break point in the sample
- We replicate the FAVAR, but including domestic 10 yr bond yields (after stock markets in the VAR ordering)

10 yr rates: Individual Countries and LATAM Factor

Figure: Long-term interest rates in LATAM



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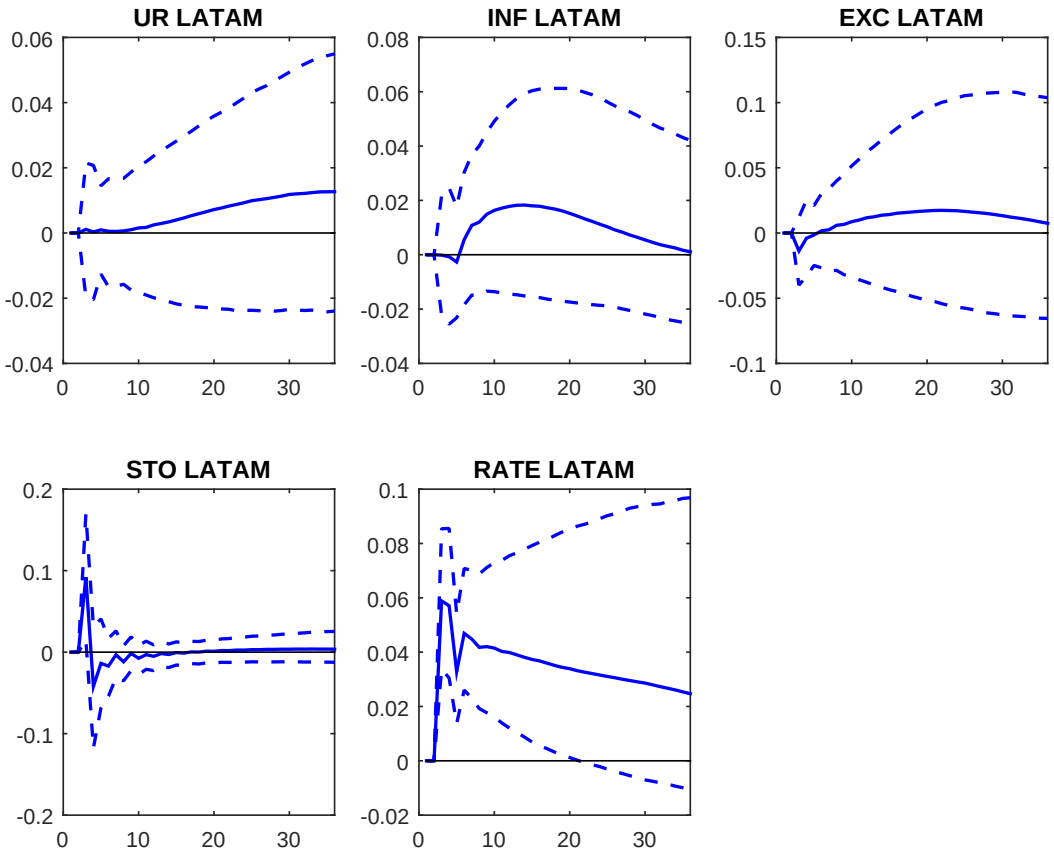
US interest rate spillovers post 2009



Note: The lines plot the responses of the LATAM factors to a shock in the 10 year bond yield for the post 2009 sample.

US interest rate Spillovers: Cumulative Effects

horizon	BRA	CHI	COL	MEX	PER	LATAM
1 YEAR	0.35	0.07	0.21	0.22	0.26	0.24
2 YEAR	0.92	0.13	0.58	0.60	0.74	0.66

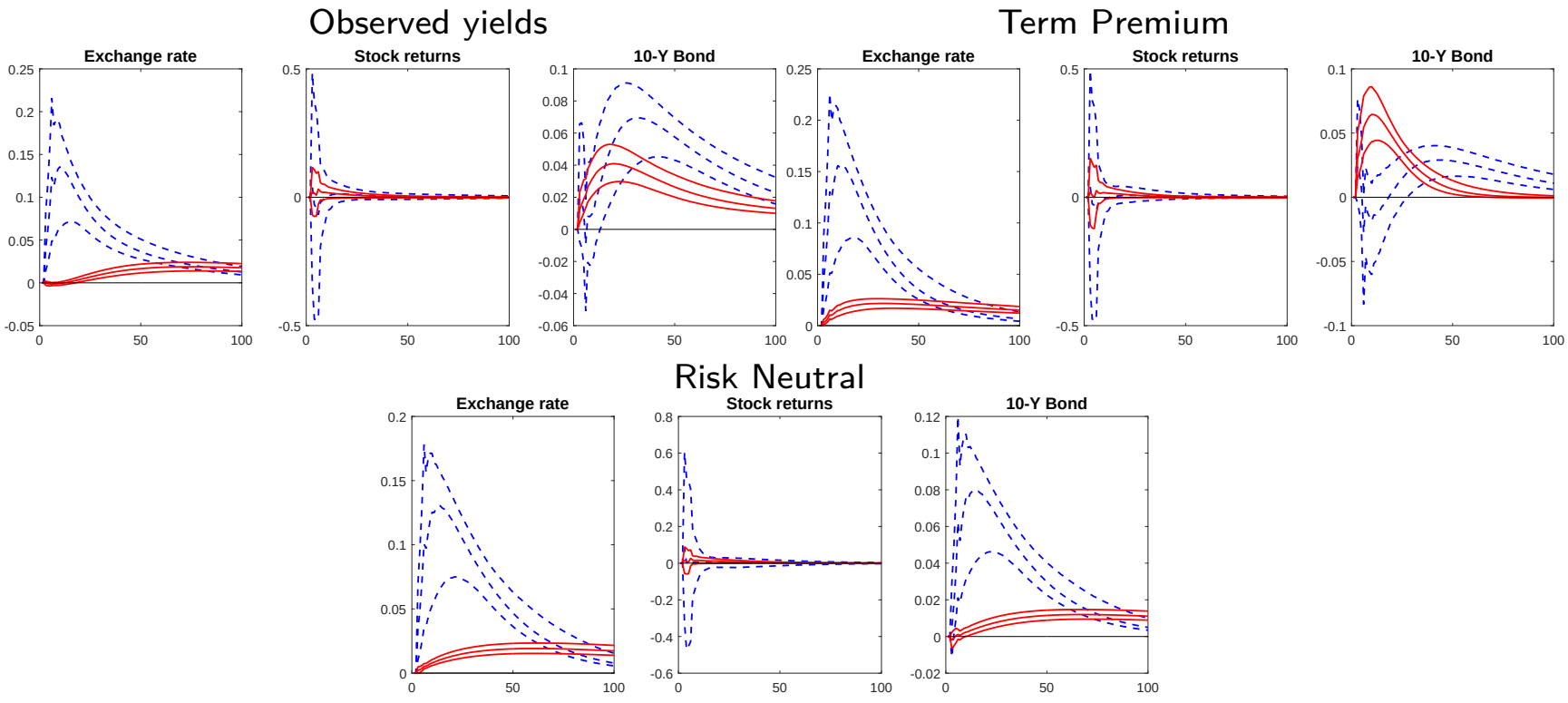
Note: Table depicts cumulative responses in terms of standard deviations from the mean in each country (and LATAM factor). Initial shock to 10 yr US rate is 25 bp, which cumulates to 100 bp after a year (and 250 bp after 2 years).

Outline

Country-specific evidence

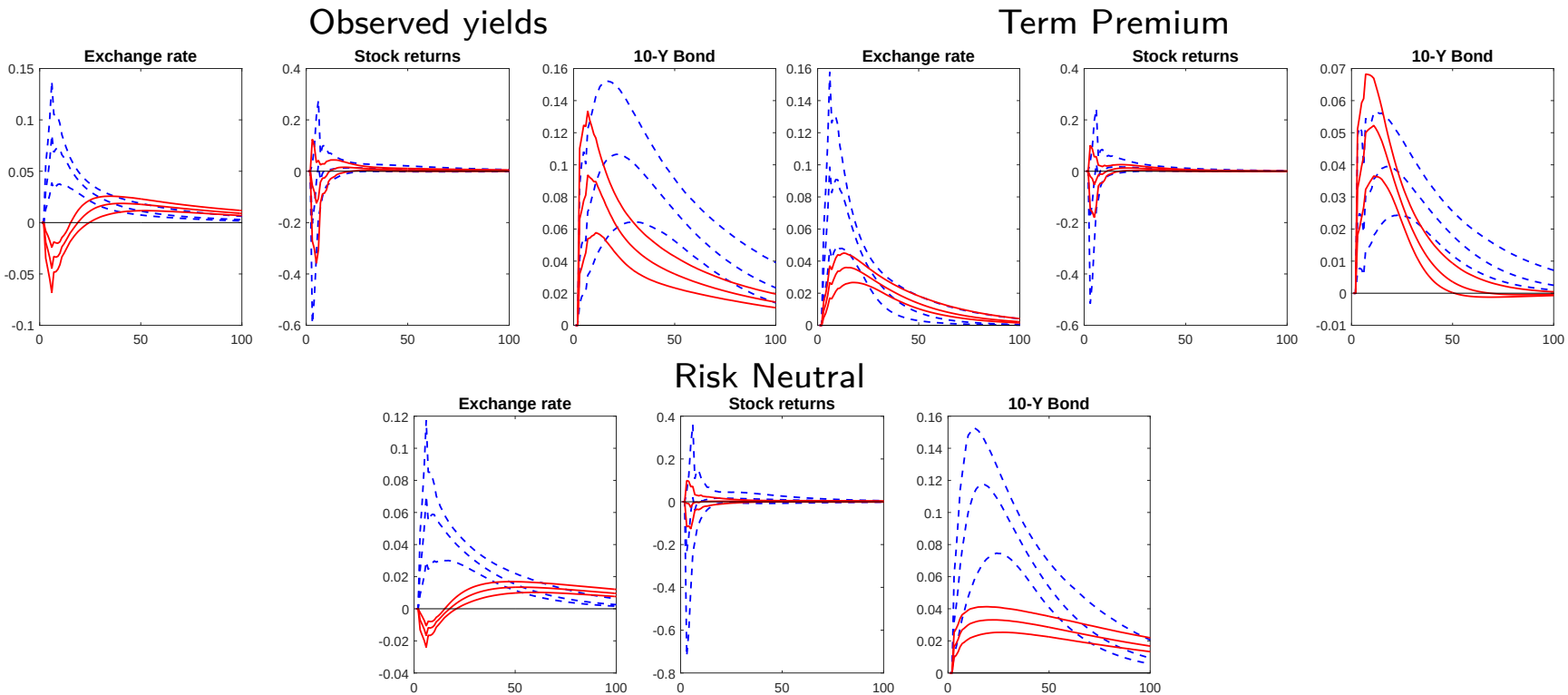
- Chile and Mexico have high frequency interest rate data (at several maturities) for full sample
- This allows to:
  - Compute US interest rate pass through for both sub samples
  - Use a term-structure model to decompose domestic yields into risk-neutral component (expected short-term rates) and a term premium component (Methodology: Adrian et al., 2013)
- We focus on a high frequency (weekly) VAR for each country
  - Include exchange rates, stock market returns, and a measure of domestic interest rates (observed yield, risk-neutral rates, or term premium)
  - Impose similar block exogeneity restriction for US 10 yr rates

Country-specific Analysis: Response to US 10 yr rates in Chile



Note: The blue dashed (red solid) lines plot the responses to a shock before (after) the zero lower bound. All responses are cumulated with the exception of interest rates.

Country-specific Analysis: Response to US 10 yr rates in Mexico



Note: The blue dashed (red solid) lines plot the responses to a shock before (after) the zero lower bound.

Country-Specific Analysis

Table: Pass through of US interest rates to bond yields and its components

Type of rate	Period	Chile	Mexico
Observed	1Y before ZLB	0.56	1.05
	2Y before ZLB	1.01	1.55
	1Y at ZLB	0.56	0.96
	2Y at ZLB	0.81	1.34
Risk Neutral	1Y before ZLB	0.64	1.02
	2Y before ZLB	0.80	1.30
	1Y at ZLB	0.12	0.50
	2Y at ZLB	0.28	0.82
Term Premium	1Y before ZLB	0.13	0.36
	2Y before ZLB	0.36	0.45
	1Y at ZLB	0.57	0.46
	2Y at ZLB	0.58	0.46

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Summing up: impact of US interest rates on LATAM

- US LT rates have statistical significant impact on LATAM factors: unemployment (+), inflation (+), exchange rates (+), stock markets (-).
  - Weaker effects (opposite sign in some cases) for Mexico: might reflect closer economic ties with US, more disconnection with LATAM
- US long-term rates account for important fraction of unemployment and exchange rates; less important for inflation and stock markets
- In the post 2009 sample, US LT rates also affect LATAM LT rates (though effect on other variables is weaker)
- Country-specific analysis (Mexico, Chile) confirms spillovers into LT rates of LATAM, though channels seems to have changed after 2009 (more term premium)