NBP Narodowy Bank Polski

Longer-term Yield Decomposition: The Analysis of the Czech Government Yield Curve

A Comment and Insights from NBP's experience

Overview

- Motivation:
  - Yield curve decompositions are important input to decision-making in the areas of monetary policy, financial stability and portfolio risk management (foreign reserves).
  - Hence, the topic at heart of the paper is one of the most important in the central banking business.

- Approach:
  - Apply finance-only models to extract 4 components of the yield curve (adjusting for ZLB).
  - Check, whether the extracted components are meaningful.
  - Explain the dynamics of components linking them to a set of macro-variables in a VAR-X model.

Overview

- Strengths:
  - Parsimonious framework suitable for decomposing yield curves in countries outside the spectrum of major sovereign bond markets
  - Powerful tool for simulations – differentiation between different sovereign yield components allows for rich specification of shocks driving the yield curve dynamics
  - Methods used allow for high fitting accuracy, computationally far less demanding than macro-finance models
  - Allowance for ZLB
  - Convincing interpretation of extracted yield curve components

- Simplifying assumptions – are they really so benign?
  - No credit and liquidity risk present in the zero-coupon swap curve
  - Term structure of CDS represents credit risk only
  - Robustness checks could be improved on:
    - Portfolio effect= Zero-coupon yield – Risk-free rate – Term premium – Credit risk
    - E.g. check how the *term structure* of portfolio premium corresponds to the term structure of bid-ask spreads

Insight 1. Spillovers from major markets play important role in explaining behaviour of bond yields across EMEs (1)

Jabłecki J., Kleszcz T. (2018), *Assessing the impact of the Fed's monetary policy normalization on emerging market economies using a term structure model and simple linear regressions*, mimeo.

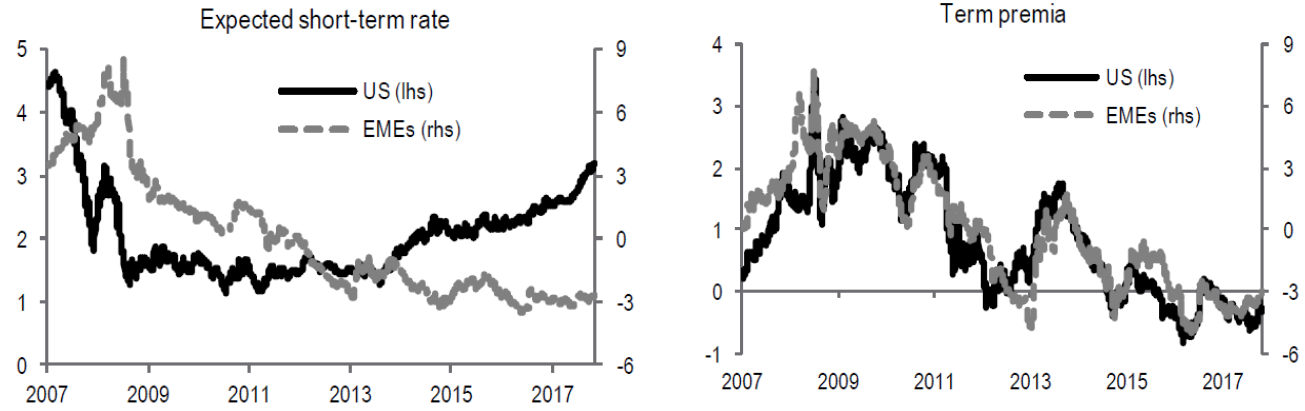
What did the authors do?

- use the Adrian, Crump, Moench (2013) model to decompose yield curves for 19 emerging market economies
- analyse correlations between term premia and risk-free rates of EMEs and that of the US – viewed individually and using principal component analysis
- identify determinants of EME's yields' sensitivity to changes in US term premia (pooled OLS regression)
- identify factors driving the US term premia (simple OLS regression)

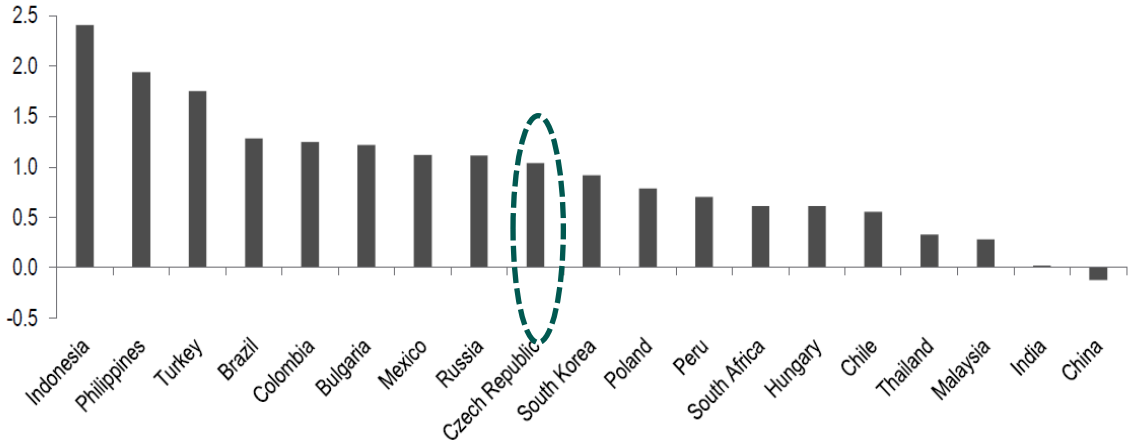
Insight 1. Spillovers from major markets play important role in explaining behaviour of bond yields across EMEs (2)

Main results:

(i) Bond yields across EMEs spectrum are much more strongly associated with changes in US term premia than with changes in risk-neutral yields. 80% of variability of EMEs yields can be exlpained by variability of US components.



(ii) Sensitivity of yields to US term premia is significantly determined the share of non-residents in the government debt market

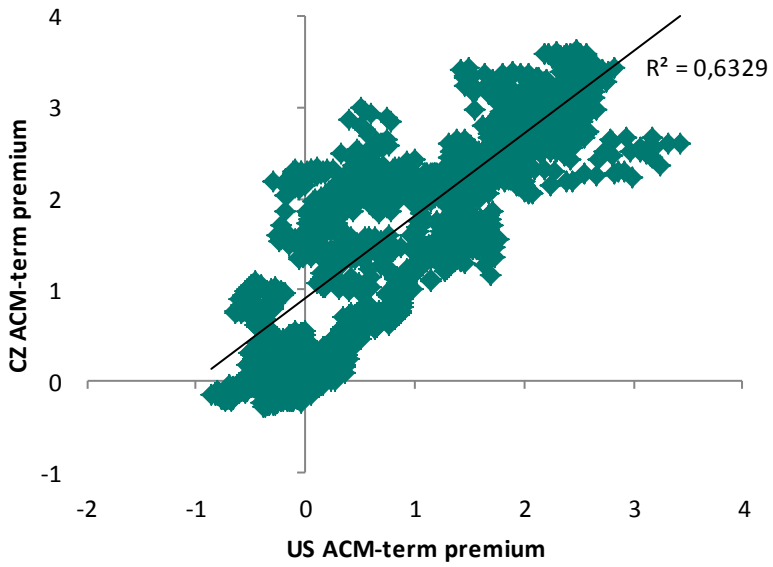


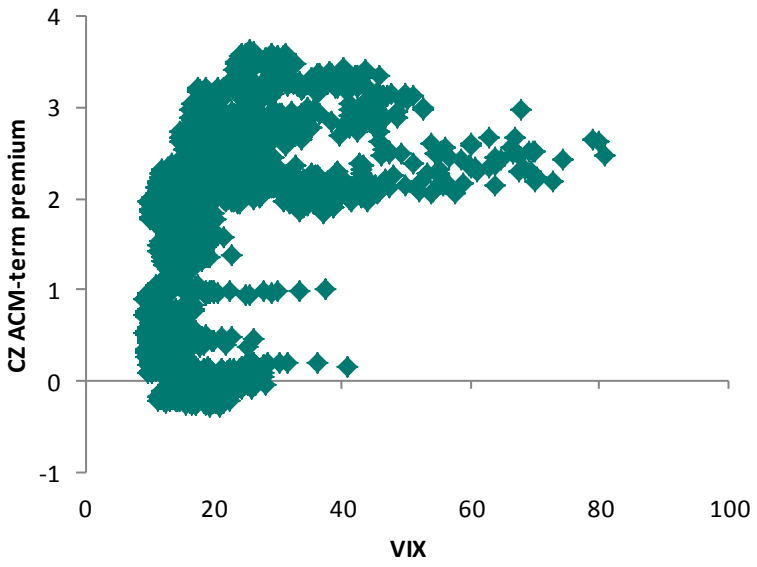
(iii) US term premia are well exlpained by the volatility of long-term interest rates (option-based), expected level of future inflation and uncertainty about it

Insight 1. Spillovers from major markets play important role in explaining behaviour of bond yields across EMEs (3)

What implications for the modelling framework of Dvořák et al.?

- richer specification of the model linking curve components to macro-factors is needed for policy-relevant inference in the area of monetary policy and financial stability
- would be very interesting to assess spillovers from US/euro area yield curve dynamics through the lenses of the proposed framework





Insight 2. Non-linearities may be worth considering in modelling risk premia (1)

Brzoza-Brzezina M., Kotłowski (2016), *The non-linear nature of country risk and its implications for DSGE models*, NBP Working Papers 250, Narodowy Bank Polski, Economic Research Department.

What did the authors do?

- estimate the panel smooth transition regression model of Gonzáles et al. (2005) for a group of 41 advanced and emerging market economies (1991-2014)

$$y_{it} = \mu_i + \delta_1 NFA_{it} + G(s_{it};\gamma,c)\delta_2 NFA_{it} + \beta' x_{it} + u_{it}$$, where:

y_{it} - risk premium measured as the difference between 10-year government bond for country *i* and that for US

x_{it} - vector containing following variables: GG debt/GDP, GG deficit/GDP, VXO, International reserves/GDP, relative CPI inflation, CA/GDP, relative GDP per capita, FX volatility

$G(s_{it};\gamma,c)$ - transition function (tested in logistics and exponential function form)

s_{it} - transition variable (in this case NFA stock), c – threshold parameter, γ – identifying restriction

Insight 2. Non-linearities may be worth considering in modelling risk premia (2)

Main results:

	(1)	(2)	(3)	(4)	(5)	(6)
	FE-OLS	FE-IV	FE-TD-OLS	FE-TD-IV	FE-EM-OLS	FE-EM-IV
NFA (δ_1) - regime I	-1.916***	-1.920***	-2.134***	-2.128***	-1.926***	-1.932***
	(0.722)	(0.728)	(0.614)	(0.625)	(0.718)	(0.729)
NFA (δ_2)	1.850**	1.848**	2.248***	2.245***	1.876***	1.873**
	(0.735)	(0.739)	(0.640)	(0.658)	(0.726)	(0.738)
NFA ($\delta_1 + \delta_2$) - regime II	-0.066	-0.072	0.114	0.117	-0.050	-0.059
Transition parameter (γ)	205.49	208.80	236.19	178.80	244.21	230.32
	(491.25)	(492.38)	(379.07)	(259.96)	(570.95)	(556.64)
Threshold parameter (c)	-0.742***	-0.742***	-0.729***	-0.733***	-0.699***	-0.702***
	(0.013)	(0.012)	(0.004)	(0.006)	(0.006)	(0.004)
AE dummy	-	-	-	-	-0.044***	-0.041***
					(0.015)	(0.012)
INF DIF	0.541***	0.544***	0.513***	0.513***	0.542***	0.546***
	(0.067)	(0.065)	(0.068)	(0.067)	(0.066)	(0.065)
EXRATE VOL	0.152***	0.124***	0.141***	0.075*	0.157***	0.125***
	(0.047)	(0.037)	(0.039)	(0.039)	(0.048)	(0.037)
GG DEBT	0.017**	0.017**	0.014**	0.014**	0.017**	0.017**
	(0.008)	(0.008)	(0.006)	(0.006)	(0.008)	(0.008)
GG BALANCE	-0.067***	-0.067***	-0.015	-0.014	-0.067***	-0.067***
	(0.023)	(0.023)	(0.033)	(0.033)	(0.023)	(0.023)
GDP PER CAP	-7.313**	-7.330**	-10.71***	-10.72***	-7.468**	-7.466**
	(3.069)	(3.137)	(3.294)	(3.366)	(3.076)	(3.153)
R2	0.344	0.338	0.491	0.484	0.345	0.338
Adj R2	0.337	0.330	0.467	0.460	0.336	0.329
Obs	693	693	693	693	693	693

We protect the value of money