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Interest rate spillovers from the United States: expectations, term premia and macro-financial vulnerabilities

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Abstract

We analyse how movements in the components of sovereign bond yields in the United States affect long-term rates in 10 advanced and 21 emerging economies. The paper documents significant global spillovers from both the expectations and term premia components of long-term rates in the United States. We find that spillovers to domestic long-term rates in emerging economies from the US expectations components tend to be more sizeable than those from the US term premia. Finally, spillovers from US term premia are larger when an emerging economy displays greater macro-financial vulnerabilities.

JEL classification: E52, E43, F42, F65

Keywords: interest rate spillovers; term premia; emerging economies

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1 Introduction

The close co-movement between long-term interest rates internationally has been well documented (eg Obstfeld (2015); Hofmann and Takats (2015)). One channel works through investors' portfolio allocations, motivated by shifts in risk-taking and search for yield (eg Ammer et al (2018)), such that changes in long-term interest rates in a core economy "spill over" to other economies. Other channels for the co-movement include exchange rate changes or synchronous developments in growth, inflation and monetary policy across countries (eg Hofmann et al (2017); Kose et al (2017)).

However, there is only limited understanding about how changes in the individual *components* of long-term rates – expectations of real rates and inflation, and the term premia – are transmitted internationally. For emerging market economies (EMEs), spillovers through the expectations components could be important, if these economies are expected to keep interest rate differentials contained due to concerns of export competitiveness or financial stability (see eg Mihaljek (2008)). For advanced economies (AEs), spillovers through term premia could be relevant, given that quantitative easing (QE) in these economies has worked in part through lowering term premia (eg Cohen (2018)). Indeed, it has been argued that QE in the United States decreased term premia abroad (Turner (2014); Turner et al (2016)).

The relative strength of the spillovers from the different components could also differ, at least empirically. As Curcuru et al (2018) note, while the distinction is not clear cut, unconventional monetary policy in the form of quantitative easing is typically considered to work on the yield curve mainly through term premia, and conventional interest rate policy and forward guidance mainly through expectations. The spillovers of unconventional and conventional policies could, in turn, differ in magnitude, with different effects on monetary conditions in the receiving economies (see eg Claessens et al (2016) for a survey).

Another relevant aspect at the current juncture relates to macro-financial vulnerabilities in the economy at the receiving end of interest rate spillovers. In particular, weaker macro-financial fundamentals could increase the compensation required by investors for holding a country's sovereign debt during times when global interest rates rise. As a case in point, investors attributed the magnitude of yield increases during the "taper tantrum" of 2013 to macroeconomic vulnerabilities in the respective EMEs, in particular current account deficits (eg Amstad et al (2016)).

This global backdrop raises a number of interrelated research questions. How do movements in the US long-term sovereign yield affect long-term yields in other economies, both AEs and EMEs? Do spillovers depend on which component of the US yield curve shifts – expectations of future real rates and inflation, or the term premia? And, how do macro-financial vulnerabilities in the receiving countries, in particular emerging economies, affect spillovers?

As our empirical approach, we first estimate spillovers from real and inflation expectations and term premia in the United States on long-term interest rates abroad, using monthly panel data for 10 advanced economies and 21 emerging economies from January 2001 to September 2017. Our yield curve decomposition, computed for the United States, is based on the joint modelling of macroeconomic and term structure dynamics, as proposed by Hördahl and Tristani (2014). This approach, which incorporates macroeconomic and survey data, in contrast to a "pure" term structure model, allows us to decompose the long-term yield into four components. In particular, the term premium can be split into the real risk premium – the compensation for the risk associated with future variation in short-term real interest rates – and an inflation risk premium, the compensation related to uncertain future inflation developments. Additionally, the expectations component is split into the expected short-term real interest rates and average expected inflation.

Using these yield curve components, in our baseline estimations we analyse the interest rate spillovers from changes in each component in the United States to the 10-year yield in the "receiving" economies. We also evaluate whether the spillovers differ between advanced economies and EMEs. Then, we examine how macro-financial vulnerabilities in EMEs affect the magnitude of yield spillovers to these economies. We consider macro-financial indicators comprising the current account balance, the headline fiscal balance, the stock of total external debt, as well as outstanding portfolio debt and equity liabilities.

We report a number of findings. First, yield spillovers tend to be large. We find economically and statistically significant spillovers from all four components of long-term rates in the United States: the real risk premium, inflation risk premium and expectations of both real rates and inflation.

Second, we find that there are differences in how movements in the yield curve components affect long-term rates in the different economies. In particular, changes in US term premia have a stronger impact on yields in other advanced economies than in EMEs. In EMEs, we find that spillovers to domestic long-term rates from the US expectations component are more sizeable than those stemming from the US term premia.

Third, we find that spillovers from US yields tend to be larger when a receiving emerging economy displays greater macro-financial vulnerabilities. In particular, interest rate spillovers driven by shifts in US inflation risk premia are sensitive to EME vulnerabilities. If inflation risks in the United States suddenly increase and the inflation risk premium rises, the rise in yields could be transmitted to EMEs as investors balance their portfolios. Notably, the result that spillovers through the inflation risk premium are larger for EMEs with greater vulnerabilities holds for all macro-financial vulnerabilities considered: those related to current account and fiscal balances, the overall size of external debt, and both debt and equity portfolio liabilities.

The paper is related to various strands of literature. First, it contributes to research that has analysed long-term interest rate spillovers from the United States (eg Obstfeld (2015); Hofmann and Takats (2015)). This strand of literature includes studies that use a decomposition of US yields into term premia and expectations components, but do not differentiate further between the real and inflation components (eg Caceres et al (2016); Curcuru et al (2018)). Albagli et al (2018) also investigate US interest rate spillovers, but consider yield curve decompositions for the *receiving* economies, rather than for US yields. These authors also do not distinguish between the real and inflation components of term premia or expectations.

Our results are consistent with the result in Curcuru et al (2018) – who use a different methodology and focus on yield changes around FOMC announcement days – that spillovers from the expectations component of US yields to EME yields are larger than those arising from US term premia. We provide novel evidence by considering an additional decomposition of the US term premium and expectations components into those associated with real rates and inflation, and investigating the associated spillovers. Moreover, we use a much larger sample of economies.

More generally, our study relates to research that highlights the role of monetary policy in the United States for global credit and financial conditions (eg McCauley et al (2015); Bruno and Shin (2015); Rey (2013)).

The paper is also related to studies that analyse how macro-financial vulnerabilities in EMEs affect financial market reactions in these economies. A number of papers have examined the experience from the taper tantrum (Ahmed et al (2017); Aizenman et al (2016); Eichengreen and Gupta (2015); Mishra et al (2018)). We contribute to this literature by analysing the role of macro-financial fundamentals in EMEs for the magnitude of interest rate spillovers over a longer sample period.

The paper is structured as follows. The next section discusses the methodology and the data. Section 3 shows the results from the empirical analysis, while Section 4 concludes.

2 Methodology and data

Our contribution rests in analysing the spillovers from different components (real and inflation expectations and term premia) of US ten-year sovereign bond yields to long-term yields internationally, and how macro-financial vulnerabilities in EMEs affect these spillovers. To this aim, we decompose the yield curve using the model by Hördahl and Tristani (2014), which uses yields of both nominal and index-linked government bonds as well as data on inflation and the output gap. In addition, it incorporates survey data on expected inflation and interest rates at various horizons. In the model, government bonds are priced based on the dynamics of the short rate, which is obtained from the solution of a forward-looking macroeconomic model.

The model by Hördahl and Tristani (2014) yields a decomposition for the US ten-year yield whereby the term premium can be split into the real risk premium ${prem\_real^{US}}_t$, ie the compensation for the risk associated with future variation in short-term real interest rates, and an inflation risk premium ${prem\_infl^{US}}_t$, ie the compensation for the risk related to uncertain future inflation developments. Additionally, the expectations component can be split into expected short-term real interest rates, ${exp\_real^{US}}_t$, and average expected inflation ${exp\_infl^{US}}_t$.

To gauge the extent of spillovers from these four yield curve components of long-term US government bond yields to those in other economies, we estimate the following equation using monthly panel data for 10 AEs and 21 EMEs:[1]

$$\Delta ir_t^i = \alpha_0^i + \beta_1 \Delta {exp\_real^{US}}_t + \beta_2 \Delta {exp\_infl^{US}}_t + \beta_3 \Delta {prem\_real^{US}}_t + \beta_4 \Delta {prem\_infl^{US}}_t + \gamma \ \ dlog\, VIX_t \ + \Gamma_1 X_t^i + \Gamma_2 X_t^{us} + \varepsilon_t^i. \tag{1}$$

In Equation (1), Δir_t^i denotes the monthly change in the ten-year local currency sovereign bond yield in economy i, and $\Delta {exp\_real^{US}}_t$, Δexp_infl^{US}, $\Delta {prem\_real^{US}}_t$ and $\Delta prem\_infl^{US}$ are the changes in the real interest rate expectations, inflation expectations, real risk premium and inflation risk premium components, respectively, of the ten-year US government bond yield (all in percentage points). Obstfeld (2015) shows how such an equation can be derived from the uncovered interest parity condition.

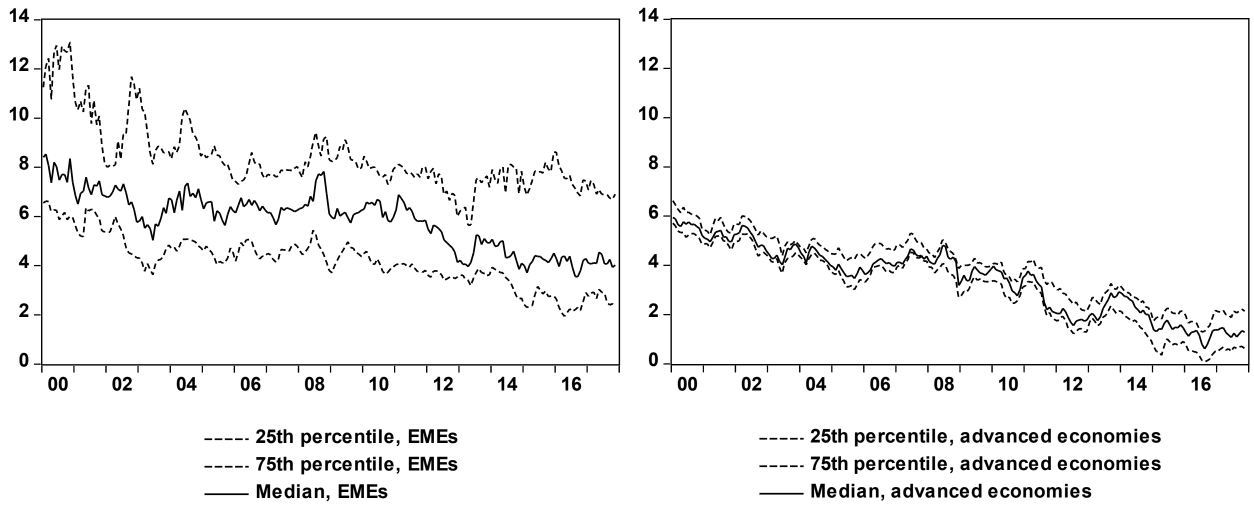
The remaining explanatory variables in (1) control for factors that could drive interest rates.[2] Among them, $dlog\, VIX_t$ denotes the log monthly change of the VIX, the commonly used indicator of stock market volatility which captures shifts in price volatility and investor sentiment in the US stock market and proxies as a measure for global financial market uncertainty (see also Bekaert et al (2013)).[3] X_t^i is a vector of domestic macroeconomic variables: consumer price inflation and industrial production growth, which control for the impact of the business cycle in the receiving country.[4] X_t^{us} denotes the same macroeconomic variables for the United States. Finally, α_0^i are country fixed effects.

[1] In addition to the United States, the advanced economies in the sample are Canada, Denmark, Japan, Norway, Sweden, the United Kingdom, the euro area, New Zealand, Australia and Switzerland. The EMEs are China, Hong Kong SAR, Indonesia, India, Korea, Malaysia, the Philippines, Singapore, Thailand, Brazil, Chile, Colombia, Mexico, Peru, the Czech Republic, Hungary, Poland, Russia, South Africa, Turkey and Israel.
[2] We do not include exchange rates as explanatory variables, as they respond endogenously to the other variables included in Equation (1), in particular interest rate differentials. See also the discussion in Obstfeld (2015).
[3] The VIX index is displayed in Appendix Figure A1.
[4] First differences (in percentage points) are taken for both variables, to be consistent with the inclusion of yields in first-difference form in the regressions.

We estimate Equation (1) for a sample period from January 2001 to September 2017. We use a monthly frequency since the decomposition into the four yield curve components (real and inflation risk premia and expectations) is only available at a monthly frequency. This arises since it also uses macroeconomic and survey data in the decomposition, in contrast to decompositions based solely on data on nominal and index-linked US Treasury yields.

Figure 1 shows the distribution of ten-year yields in AEs and EMEs over the sample, highlighting the trend decline in yields.

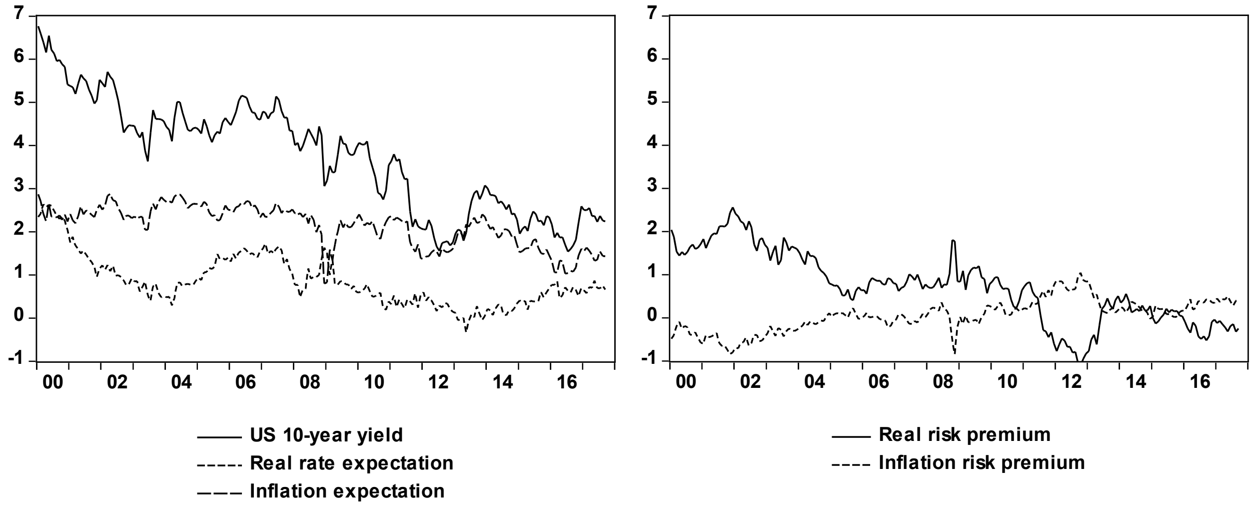
Figure 1 10-year government bond yields, median and interquartile range, in %



Source: Bloomberg, authors' calculations.

Over the sample period, the yield curve decomposition for the United States suggests that the real rate expectation and the real term premium declined by more than the corresponding inflation components (Figure 2). The decline in expected real rates after the GFC may have partly reflected a perceived fall in the natural rate of interest, while the real interest rate risk premium declined strongly as unconventional monetary policy measures were introduced (Cohen et al (2018)). By contrast, inflation expectations and the inflation risk premium remained relatively stable, the latter at levels close to zero over the sample.

Figure 2 Ten-year US government bond yield and its decomposition, in %



Source: Bloomberg, calculations based on Hördahl and Tristani (2014).

We also evaluate how the degree of macro-financial vulnerability in the receiving emerging economy affects interest rate spillovers. Weaker macro-financial fundamentals could increase the compensation required by investors for holding the country's sovereign debt during times when global interest rates rise. Consider, for example, an economy with a large current account deficit. If US interest rates rise, higher sovereign yields in the receiving economy may be required to compensate global investors for holding sovereign debt when the risk of capital flight is already elevated.

To examine this issue, for each macro-financial indicator, we divide the sample of EMEs into two groups of countries of higher and lower vulnerability, respectively, based on the median value for each indicator during the sample period. Then, we estimate Equation (1) for the two country groups, for each macro-financial variable.[5] The vulnerability indicators used to split the sample comprise the current account balance, the headline fiscal balance, total external debt, portfolio equity liabilities and portfolio debt liabilities, all expressed as ratio to GDP.

The median current account is 2.0% of GDP in deficit for economies with greater vulnerability along this dimension, while it is 3.2% of GDP in surplus in the group of countries with lower vulnerability based on this variable. For the headline fiscal balance, the corresponding values are a deficit of 3.5% of GDP (higher vulnerability) and a small deficit of 0.1% of GDP (lower vulnerability). For total external debt, the corresponding values are 45% and 24% of GDP; for portfolio equity liabilities, 24% and 7% of GDP; and for portfolio debt, 13% and 9% of GDP.

[5] This type of sample split can be justified if the vulnerability indicators remain relatively stable over time. Indeed, we find that for four out of the five macro-financial indicators considered, less than 5% of the observations in the more vulnerable group cross the median observation of the less vulnerable group. In the case of portfolio debt liabilities, the share of such observations is slightly higher, at 16%.

All models are estimated by within-group fixed effect panel regression. We include country fixed effects in order to control for time-invariant country-specific heterogeneities. We use White period standard errors, allowing for correlation in the residuals within the same country over time.

Finally, we note that endogeneity cannot be fully ruled out in our framework. However, as the overwhelming majority of economies in the sample are small relative to the US economy, there is arguably little reason to expect that changes in long-term yields abroad would affect the individual yield curve components in the United States (see also Hofmann and Takats (2015)).

3 Empirical results

3.1 Interest rate spillovers

We commence with the baseline estimations, examining the spillovers from the different US yield curve components to long-term yields in other advanced economies and EMEs. In Table 1, Columns (1) and (2) present results for the full panel of 31 countries; (3) and (4) consider EMEs only; (5) and (6) show the results for advanced economies.

Our results confirm significant spillovers from US sovereign yields to long-term yields in both advanced and emerging economies. Column (1) shows that a one percentage point increase in the US 10-year yield is associated with a 0.57 percentage point increase in 10-year yields in the "receiving" economy. Our estimate is notably close to the estimate by Hofmann and Takats (2015) of 0.57–0.59 in a sample of 30 economies, using quarterly data. Caceres et al (2016) report cumulative impulse responses after one year, based on vector autoregressive models. They find that in two thirds of the 38 countries included in their sample, the impact is between 0.50 and 0.80 percentage points. In Curcuru et al (2018), the spillovers to long-term yields during a one-day window around FOMC announcement days amount to 0.38–0.58 percentage points in AEs and 0.26–0.41 percentage points in EMEs.

Column (2) shows the spillovers from the four US long-term yield curve components (the expected real rate, expected inflation, real risk premium and inflation risk premium), estimated according to Equation (1). The effects of all four components are statistically significant at the 1% level. Overall, spillovers are somewhat larger in magnitude for the expectations component, with coefficient estimates of around 0.60. This compares with the real and inflation risk premium components where the coefficient estimates are 0.45 and 0.37, respectively.

Table 1 Estimates for interest rate spillovers

Variable	AE&EMEs		EMEs		AEs	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta i^{US}{}_t$	0.568***		0.575***		0.557***	
	0.040		*0.057*		*0.043*	
$\Delta exp\_real^{US}{}_t$		0.600***		0.620***		0.564***
		0.051		*0.074*		*0.041*
$\Delta exp\_infl^{US}{}_t$		0.612***		0.643***		0.556***
		0.036		*0.045*		*0.053*
$\Delta prem\_real^{US}{}_t$		0.445***		0.384***		0.565***
		0.061		*0.086*		*0.049*
$\Delta prem\_infl^{US}{}_t$		0.368***		0.260**		0.581***
		0.090		*0.124*		*0.070*
Δvix_t	0.287***	0.275***	0.462***	0.442***	-0.041**	-0.039**
	0.080	*0.071*	*0.104*	*0.088*	*0.020*	*0.015*
$\Delta ip^{US}{}_t$	-0.003	-0.004	-0.003	-0.006	-0.001	-0.001
	0.004	*0.004*	*0.005*	*0.006*	*0.002*	*0.002*
$\Delta infl^{US}{}_t$	0.003	0.013	0.007	0.022	0.017***	0.015***
	0.010	*0.012*	*0.014*	*0.018*	*0.005*	*0.003*
$\Delta ip^{dom}{}_t$	0.001**	0.001**	0.002**	0.002**	0.000	0.000
	0.001	*0.001*	*0.001*	*0.001*	*0.001*	*0.001*
$\Delta infl^{dom}{}_t$	0.065***	0.065***	0.073***	0.072***	-0.003	-0.003
	0.012	*0.012*	*0.013*	*0.013*	*0.010*	*0.010*
Obs	5619	5619	3632	3632	1987	1987
Number of countries	31	31	21	21	10	10
Adjusted R-squared	0.204	0.206	0.178	0.182	0.548	0.548

Notes: The dependent variable is the ten-year yield in the domestic economy. Within-group fixed effect panel regression. Constant term is not displayed. White period standard errors are shown in italics below the coefficient estimates. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

The difference between the spillover estimates for the expectations components and term premia in the full sample stems mostly from the EMEs. Indeed, while the effect of the US yield on the domestic 10-year bond yield is very similar in both EMEs and AEs (Columns (3) and (5)), term premia spillovers are much larger in magnitude for AEs than EMEs (Columns (4) and (6)). An increase in the US real risk premium by one percentage point is associated with an increase in the 10-year yield by 0.38 percentage points in EMEs but by 0.57 points in AEs. The differences are even greater for the inflation risk premium, with a one percentage point increase in the US associated with a 0.26 percentage point rise in EME yields and 0.58 percentage point in AEs.

Are the estimated coefficients on the yield curve components statistically significantly different from one another? Table 2 shows that the coefficients on expected real rates are significantly different from those on real risk premia for EMEs, as well as for the combined sample of AEs and EMEs. Similarly, the coefficients on expected inflation rates are significantly different from those on inflation risk premia for EMEs, as well as for the combined sample of AEs and EMEs. We can also reject equality of all four yield curve components for EMEs, and for AEs and EMEs combined. By contrast, the coefficients on the yield curve components are not significantly different within the group of AEs; and for EMEs, the real/inflation decomposition does not appear to add much in the baseline regression. However, as we show below, the real/inflation decomposition provides additional information when we consider the relevance of macro-financial vulnerabilities for interest rate spillovers into EMEs (see Tables 3 and 4).

Table 2 Wald tests for equality of coefficients on yield curve components; p-values

	AEs & EMEs	EMEs	AEs
$\Delta exp\_real^{US}{}_t = \Delta prem\_real^{US}{}_t$	0.004***	0.001***	0.978
$\Delta exp\_infl^{US}{}_t = \Delta prem\_infl^{US}{}_t$	0.011**	0.003***	0.636
$\Delta exp\_real^{US}{}_t = \Delta exp\_infl^{US}{}_t$	0.798	0.743	0.809
$\Delta prem\_real^{US}{}_t = \Delta prem\_infl^{US}{}_t$	0.306	0.258	0.608
$\Delta exp\_real^{US}{}_t = \Delta exp\_infl^{US}{}_t = \Delta prem\_real^{US}{}_t = \Delta prem\_infl^{US}{}_t$	0.035**	0.010**	0.420
Obs	5619	3632	1987
Number of countries	31	21	10

Note: ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

What accounts for the larger spillovers of the expectations component in EMEs compared to term premia? Regarding the former, global investors may expect EME policymakers to avoid large interest rate differentials vis-à-vis core advanced economies in their policy interest rate setting. This could arise due to concern about exchange rate movements that erode competitiveness, or to avoid large gross capital flows that create financial stability risks (see eg Mihaljek (2008)).

Our result of larger spillovers in EMEs through expected rates than term premia is also consistent with Curcuru et al (2018). These authors hypothesise that as EME government bonds are more risky and less substitutable with US bonds than AE government bonds, there is less portfolio rebalancing. This is then reflected in weaker spillovers through the term premia for EMEs than for AEs. By contrast, for advanced economies, Curcuru et al (2018) find the spillovers through term premia and expectations components to be similarly sized, consistent with our results.

The implications of global financial market uncertainty – proxied by the VIX – also differ between advanced economies and EMEs. Rising financial market uncertainty leads to higher long-term yields in EMEs but lower yields in AEs. Both coefficients are statistically significant at the 5% level, although the absolute size of the coefficient estimate in advanced economies is only one tenth of that in the EMEs. This result could stem from flight-to-safety, whereby higher uncertainty leads global investors to shift their portfolios from EMEs to advanced economy assets, pushing yields down in advanced economies.[6]

[6] Excluding the VIX from the regressions in Columns (3) and (5) would yield (weak) evidence that interest rate spillovers are higher for advanced economies, with the coefficients on the 10-year yield at 0.56 for AEs and 0.50 for EMEs, respectively. However, even in this case, the difference between the country groups is not statistically significant at

3.2 Macro-financial vulnerabilities

Next, we divide the sample of EMEs into two groups of countries, one with lower and one with higher macro-financial vulnerabilities, respectively. We consider five different sample splits, each along a different macro-financial indicator, based on its median value for each country over the sample. Table 3 shows the results for sample splits based on the current account balance, the headline fiscal balance and external debt; Table 4 considers the stock of portfolio liabilities. All models are estimated based on Equation (1).

Table 3 Macro-financial vulnerabilities in EMEs

Variable	Current account balance		Headline fiscal balance		External debt	
	Low	High	Low	High	High	Low
$\Delta exp\_real^{US}{}_t$	0.669***	0.566***	0.641***	0.595***	0.607***	0.635***
	0.093	*0.116*	*0.092*	*0.117*	*0.070*	*0.124*
$\Delta exp\_infl^{US}{}_t$	0.632***	0.665***	0.715***	0.565***	0.625***	0.659***
	0.067	*0.056*	*0.032*	*0.084*	*0.076*	*0.053*
$\Delta prem\_infl^{US}{}_t$	0.358**	0.168	0.343**	0.185	0.409***	0.114
	0.146	*0.207*	*0.143*	*0.208*	*0.146*	*0.192*
$\Delta prem\_real^{US}{}_t$	0.475***	0.291***	0.395***	0.387***	0.427***	0.343***
	0.135	*0.105*	*0.133*	*0.114*	*0.123*	*0.121*
Δvix_t	0.556***	0.319***	0.562***	0.313**	0.366***	0.512***
	0.120	*0.117*	*0.114*	*0.124*	*0.110*	*0.132*
$\Delta ip^{US}{}_t$	0.000	-0.012	-0.002	-0.011	-0.008	-0.005
	0.006	*0.010*	*0.007*	*0.010*	*0.006*	*0.009*
$\Delta infl^{US}{}_t$	0.001	0.0410*	-0.017	0.058***	0.014	0.029
	0.024	*0.022*	*0.020*	*0.022*	*0.026*	*0.025*
$\Delta ip^{dom}{}_t$	0.004**	0.001	0.004**	0.001	0.001	0.003**
	0.001	*0.001*	*0.002*	*0.001*	*0.001*	*0.001*
$\Delta infl^{dom}{}_t$	0.089***	0.063***	0.100***	0.054***	0.051**	0.088***
	0.018	*0.019*	*0.019*	*0.017*	*0.023*	*0.013*
Obs	1856	1776	1933	1699	1764	1868
Number of countries	11	10	11	10	10	11
Adjusted R-squared	0.201	0.167	0.201	0.169	0.186	0.183

Notes: The dependent variable is the ten-year yield in the domestic economy. Within-group fixed effect panel regression. Constant term is not displayed. White period standard errors are shown in italics below the coefficient estimates. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

We find that, along all the macro-financial dimensions considered, spillovers from the US inflation risk premia are stronger when a receiving EME displays greater vulnerabilities. In particular, in country groups where vulnerabilities are lower, the coefficient on the US inflation risk premium is never statistically different from zero (Tables 3 and 4). By contrast, in those country groups where vulnerabilities are higher, the coefficient on the US inflation risk premium is statistically significant at a 5% level. Thus, while a Wald test would not reject the equality of the coefficients on the inflation

conventional levels. Moreover, a Wald test clearly rejects setting the coefficient on the change in log(VIX) to zero in Columns (3) and (5).

risk premium between the different country groups, we can reject the hypothesis that the coefficient is zero in the group of higher vulnerabilities.

Why would differences in the strength of spillovers mainly arise through a risk premium component? When fundamentals in the receiving economy are weaker, investors may require greater compensation for risks, which may then be reflected mainly through the risk premium component.

One channel working through the inflation risk premium is the risk of bond yield "snapbacks". If inflation risks in the United States suddenly rise and the inflation risk premium moves up, the rise in yields could be transmitted to EMEs as investors balance their portfolios (eg BIS (2018)). Our results suggest that spillovers in such a scenario would be particularly large for EMEs with greater vulnerabilities. More generally, the result that countries with weaker fundamentals are affected most when external conditions change is consistent with some evidence from the taper tantrum (eg Ahmed et al (2017); Mishra et al (2018)). Moreover, the relevance of portfolio equity liabilities is consistent with the result in Kearns et al (2018) on the importance of financial openness for global interest rate spillovers that arise from monetary policy shocks.

Table 4 Macro-financial vulnerabilities in EMEs, continued

Variable	Portfolio debt	Portfolio debt	Portfolio equity	Portfolio equity
	High	Low	High	Low
$\Delta exp\_real^{US}{}_t$	0.540***	0.703***	0.679***	0.555***
	0.074	*0.125*	*0.085*	*0.117*
$\Delta exp\_infl^{US}{}_t$	0.692***	0.592***	0.728***	0.555***
	0.046	*0.075*	*0.034*	*0.077*
$\Delta prem\_infl^{US}{}_t$	0.278***	0.246	0.328**	0.187
	0.104	*0.226*	*0.167*	*0.178*
$\Delta prem\_real^{US}{}_t$	0.277***	0.499***	0.427***	0.338***
	0.075	*0.152*	*0.112*	*0.129*
Δvix_t	0.439***	0.444***	0.369***	0.516***
	0.118	*0.133*	*0.095*	*0.145*
$\Delta ip^{US}{}_t$	-0.003	-0.009	0.000	-0.012
	0.006	*0.010*	*0.005*	*0.011*
$\Delta infl^{US}{}_t$	-0.017	0.061***	0.025*	0.019
	0.020	*0.021*	*0.014*	*0.034*
$\Delta ip^{dom}{}_t$	0.002**	0.002	0.001	0.002*
	0.001	*0.001*	*0.001*	*0.001*
$\Delta infl^{dom}{}_t$	0.092***	0.062***	0.068**	0.076***
	0.026	*0.014*	*0.028*	*0.010*
Obs	1852	1780	1854	1778
Number of countries	10	11	10	11
Adjusted R-squared	0.162	0.205	0.213	0.159

Notes: The dependent variable is the ten-year yield in the domestic economy. Within-group fixed effect panel regression. Constant term is not displayed. White period standard errors are shown in italics below the coefficient estimates. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

The difference in the statistical significance of the US inflation risk premium in the two groups also suggests a possible measure for the “cost” of deviating from good fundamentals. In particular, in economies where vulnerabilities are higher, a one standard deviation increase in the US inflation risk premium (37 basis points) would be associated with an increase in domestic long-term yields by 10–15 basis points. By contrast, in the group of economies with lower vulnerabilities, the effect on long-term yields is not significantly different from zero.

4 Conclusions

In this paper, we have provided novel evidence on global interest rate spillovers from the United States using a decomposition of the long-term yield in the United States into real and inflation risk premia, as well as expected real rates and inflation. We have investigated how movements in each of the four components affect long-term yields in a large number of other advanced and emerging economies. The paper has also analysed how macro-financial vulnerabilities in the receiving emerging economy affect interest rate spillovers from the four components of the US yield curve.

We find significant spillovers from all four components of long-term rates in the United States to other economies. This confirms the results from previous reduced form analyses, which have typically found strong international spillovers from US long-term yields. We also find that changes in the US term premia affect long-term interest rates more in advanced economies than in EMEs. This, taken together with recent similar results by Curcuru et al (2018), would suggest that EMEs would be somewhat less exposed to shifts in broader monetary conditions stemming from changes in the US term premium, be it through quantitative easing or safe haven flows to US Treasuries, than from changes in US expectations components.

Moreover, we find that spillovers from US inflation risk premia are stronger when a receiving EME displays greater vulnerabilities. This holds along all the macro-financial dimensions considered: higher current account and fiscal deficits, and higher external debt and stocks of portfolio liabilities. One policy implication of our results is that “keeping one’s own house in order” by avoiding macro-financial vulnerabilities is useful to avoid excessive international interest rate spillovers, especially if the latter are not deemed conducive to domestic macroeconomic and financial stability.

References

Ahmed, S, B Coulibaly and A Zlate (2017): “International financial spillovers to emerging market economies: How important are economic fundamentals?”, Journal of International Money and Finance 76, pp. 133–52.

Aizenman, J, M Binici and M Hutchison (2016): “The transmission of Federal Reserve tapering news to emerging financial markets”, International Journal of Central Banking 12, pp. 317–56.

Albagli, E, L Ceballos, S Claro and D Romero (2018): “Channels of US monetary policy spillovers to international bond markets”, BIS Working Papers, no. 719.

Ammer, J, S Claessens, A Tabova and C Wroblewski (2018): “Searching for yield abroad: risk-taking through foreign investment in U.S. bonds”, BIS Working Papers, no. 687.

Amstad, M, E Remolona and J Shek (2016): “How do global investors differentiate between sovereign risks? The new normal versus the old”, Journal of International Money and Finance 66, pp. 32–48.

Bank for International Settlements (2018): The Annual Economic Report 2018.

Bekaert, G, M Hoerova and M Lo Duca (2013): “Risk, uncertainty, and monetary policy”, Journal of Monetary Economics 60(7), pp. 771–88.

Bruno, V and H S Shin (2015): “Capital flows and the risk-taking channel of monetary policy”, Journal of Monetary Economics 71, pp. 119–32.

Caceres, C, Y Carriere-Swallow, I Demir and B Gruss (2016): “U.S. monetary policy normalization and global interest rates”, IMF Working Paper, no 16/195.

Claessens, S, L Stracca and F Warnock (2016): “International dimensions of conventional and unconventional monetary policy”, Journal of International Money and Finance 67, pp. 1–7.

Cohen, B, P Hördahl and D Xia (2018): “Term premia: models and some stylised facts”, BIS Quarterly Review, September, pp. 79–91.

Curcuru, S, S Kamin, C Li and M Rodriguez (2018): “International spillovers of monetary policy: conventional policy vs quantitative easing”, Board of Governors of the Federal Reserve System, International Finance Discussion Papers, no 1234.

Eichengreen, B and P Gupta (2015): “Tapering talk: The impact of expectations of reduced Federal Reserve security purchases on emerging markets”, Emerging Markets Review 25, pp. 1–15.

Hofmann, B, I Shim and H S Shin (2017): “Sovereign yields and the risk-taking channel of currency appreciation”, BIS Working Papers, no. 538.

Hofmann, B and E Takats (2015): “International monetary spillovers“, BIS Quarterly Review, September, pp. 105–18.

Hördahl, P. and O Tristani (2014): “Inflation risk premia in the euro area and the United States”, International Journal of Central Banking, vol 10, pp 1–47.

Kearns, J, A Schrimpf and D Xia (2018): “Explaining Monetary Spillovers: The Matrix Reloaded,” SSRN Working Paper.

Kose, M A, C Lakatos, F Ohnsorge and M Stocker (2017): "The global role of the U.S. economy. Linkages, policies and spillovers", World Bank Policy Research Working Paper no. 7962.

McCauley, R, P McGuire and V Sushko (2015): "Global dollar credit: links to US monetary policy and leverage", Economic Policy 30(82), pp. 187–229.

Mihaljek, D (2008): "The financial stability implications of increased capital flows for emerging market economies", In: BIS Papers No 44, pp. 11–44.

Mishra, P, P N'Diaye and L Nguyen (2018): "Effects of Fed announcements on emerging markets: What determines financial market reactions?", IMF Economic Review, forthcoming.

Obstfeld, M (2015): "Trilemmas and trade-offs: living with financial globalisation", BIS Working Papers, no 480, January.

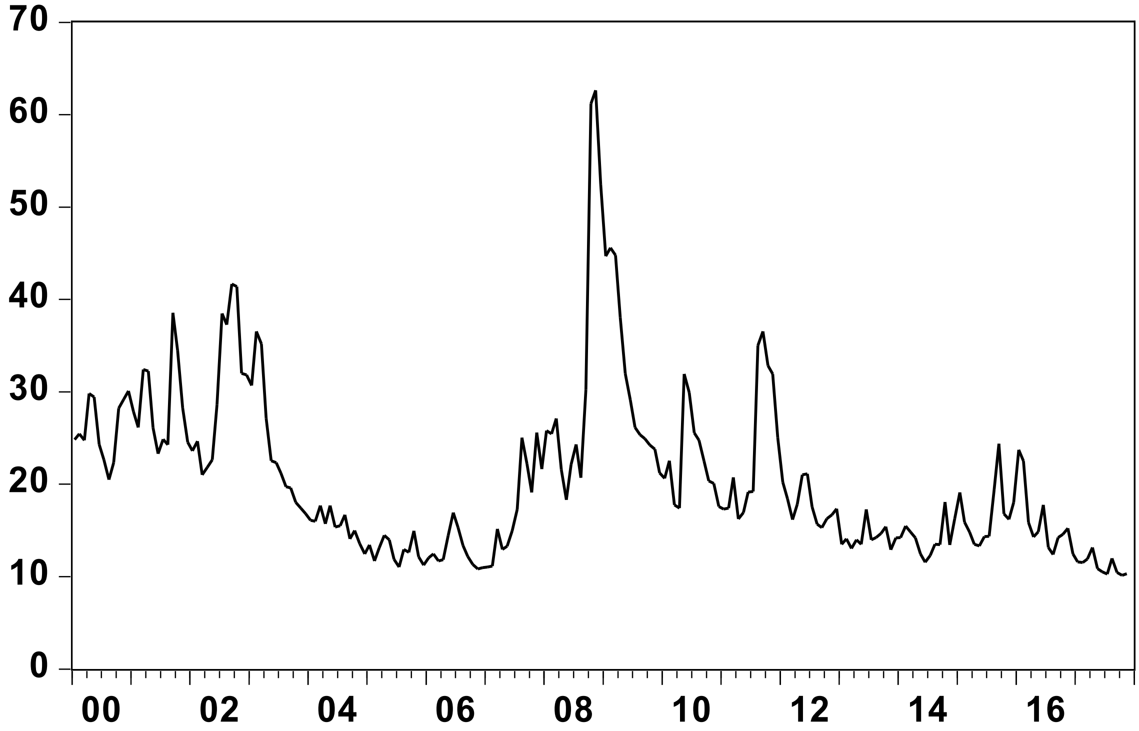
Rey, H (2013): "Dilemma not trilemma: the global financial cycle and monetary policy independence", Jackson Hole Symposium Proceedings.

Turner, P (2014): "The global long-term interest rate, financial risks and policy choices in EMEs", BIS Working Paper, no 441.

Turner, P, Hördahl, P and J Sobrun (2016): "Low long-term interest rates as a global phenomenon", BIS Working Paper, no 574.

Appendix

Figure A1 VIX volatility index



Source: Bloomberg.

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