Global Risk Premiums and the Transmission of Monetary Policy

Gregory H. Bauer, Canadian Economic Analysis Department, and Antonio Diez de los Rios, Financial Markets Department

- An important channel in the transmission of monetary policy is the relationship between the short-term policy rate and long-term interest rates.
- Using a new term-structure model, we show that the variation in long-term interest rates over time consists of two components: one representing investor expectations of future policy rates, and another reflecting a term-structure risk premium that compensates investors for holding a risky asset.
- The time variation in the term-structure risk premium is countercyclical and largely determined by global macroeconomic conditions. As a result, long-term rates are pushed up during recessions and down during times of expansion. This is an important phenomenon that central banks need to take into account when using short-term rates as a policy tool.
- We illustrate this phenomenon by showing that the "conundrum" observed in the behaviour of long-term interest rates when U.S. monetary policy was tightened during the 2004–05 period was actually part of a global phenomenon.

As part of their monetary policy decision making, central banks set the level of a short-term (overnight) policy interest rate. Understanding the effects of policy changes on the economy, however, requires an examination of the entire monetary policy transmission mechanism. An important channel in the transmission of monetary policy is the relationship between the short-term policy rate and long-term interest rates. Long-term rates are a key component of monetary policy, since they represent part of the cost of borrowing for consumers and the cost of capital for businesses (Dorich, Mendes and Zhang 2011).[1]

This article uses a new model (Bauer and Diez de los Rios 2012) to examine the determinants of long-term interest rates in developed countries. The model can be used to decompose long-term rates into two components. The first component is the market's expectation of future policy (i.e., short-term) interest rates. The price of a long-term bond today reflects investors' beliefs

1 A given project is likely to have both short-term and long-term cash flows that should be discounted using an interest rate of the same maturity. Thus, the long-term interest rate will be a key part of the total cost of capital for households and firms. In this article, we do not explore the role of the exchange rate, which is an important additional component of monetary policy.

about future central bank actions. If a central bank gives signals about its future policy direction (either by actions taken today or by changes in its communication to markets), expectations of future policy rates will adjust, which will, in turn, cause a movement in current long-term interest rates.

The second component is the extra return that investors demand for holding a risky asset. Our analysis shows that this component is driven largely by global macroeconomic conditions. In particular, it is strongly countercyclical, rising sharply during global recessions and falling during global expansions. This is an important phenomenon that central banks must consider in their monetary policy decision-making process. For example, markets may be pushing down long-term interest rates at the same time that tightening by central banks would be acting to raise them. Thus, in order to have the required effect on long-term rates, a larger move in the short-term policy rate may be necessary. We illustrate this later in the article by providing an explanation from a global perspective for the "conundrum" regarding the behaviour of long-term interest rates first described by then U.S. Federal Reserve Chairman Alan Greenspan during the 2004–05 period (Greenspan 2005). We also point out that, with the current low levels of long-term interest rates, the variation in the risk premium over time is an even larger component of long-term rates.

We limit our analysis to the transmission of conventional monetary policy actions on the long end of the default risk-free yield curve. We do not examine unconventional policies (e.g., the Federal Reserve's quantitative-easing measures) that may influence current levels of long-term interest rates, since they are examined more closely in other work.[2] In addition, we do not explore the implications of either conventional or unconventional policies on foreign exchange rates, credit markets and other potential channels of transmission.

Understanding the Drivers of Long-Term Interest Rates

In our model, we use the 10-year interest rate on zero-coupon bonds ($y_{j,t}^{(10)}$) as the long-term interest rate measured at time *t* for four countries: *j* = the United States, Canada, the United Kingdom and Germany.[3] The long-term rate is decomposed into two terms in the following equation:

$$y_{j,t}^{(10)} = \frac{1}{10}\sum_{h=1}^{10} E_t\, y_{j,t+h-1}^{(1)} + tp_{j,t}^{(10)}. \qquad (1)$$

The first term involves market *expectations*, that is, the average expected 1-year interest rate over the next 10 years. In our model, we use the 1-year interest rate in country *j* as a proxy for that country's policy rate.[4] Observed yields will, on average, equal the expectations component only under the "expectations hypothesis," which has been statistically rejected in many studies.[5]

2 See Kozicki, Santor and Suchanek (2011).

3 A zero-coupon bond is a claim that sells at a price today and yields a payment of $1 at maturity. Investors thus earn a yield on the bond by buying at a price of less than $1 today and holding the bond to maturity. The yield on the zero-coupon bond can be calculated from prices of regular coupon-bearing bonds observed in the market. We use bonds issued by Germany to represent the euro area. The model is estimated over the January 1975 to December 2011 period.

4 A country's 1-year rate can be viewed as being closely related to the current (short-term) policy rate that is targeted by that country's central bank, as well as to the expectations of near-term policy moves.

5 See Campbell and Shiller (1991); Bekaert and Hodrick (2001); and Sarno, Thornton and Valente (2007).

The rejection of the expectations hypothesis is typically attributed to the existence of the second term in equation (1), a time-varying *term-structure risk premium*. The risk premium represents the extra compensation that investors require for holding a 10-year bond. In our model, agents hold portfolios for one year, and the prices of long-term bonds may change considerably over that period, necessitating a higher expected rate of return. Several studies have focused on the properties of the term-structure risk premium (see Cochrane and Piazzesi (2005) and their references).

Our term-structure model (Bauer and Diez de los Rios 2012) separates the observed long-term interest rate into these two unobserved components and captures the relationship between fundamental economic forces (i.e., real growth and inflation) and the cross-section of international bond yields and exchange rates. The model enforces a "no-arbitrage" condition across all of the assets so that risk-free arbitrage (i.e., a free lunch) is ruled out.

The model incorporates three key aspects of real-world financial markets. First, the cross-section of yields in the international bond market may be explained by a combination of global and local (country-specific) factors. The global factors include a level factor (the average level of interest rates across all countries and maturities) and a slope factor (the average difference between long- and short-term interest rates across all countries). The model's no-arbitrage condition uses both global and local factors to explain international yield curves at a single point in time (the yields shown on the left side of equation (1)).

The second real-world aspect of the model consists of the constraints placed on the time-varying risk premium, the second component of equation (1).[6] Previous work has shown that imposing restrictions on the term-structure risk premium makes the forecast values of interest rates more realistic than those in unrestricted models.[7] Our model restricts risk premiums on bonds through its assumption of global asset pricing; i.e., in integrated international markets, only global risks carry significant risk premiums. As a result, the term-structure risk premium on any bond is driven by the bond's exposure to the global level and slope factors only. The local factors, while helping to explain prices at a point in time, do not affect expected returns (i.e., changes in prices), since investors can eliminate their effects by diversifying with a global portfolio.[8]

The third real-world aspect of the model is that it shows how the prices of the global risks change over time. The level factor is driven by expected global inflation (an average of expected inflation across all countries), while the slope factor is driven by an estimate of real global economic growth (industrial production). Thus, changes in these macroeconomic conditions will affect the expected returns on long-term bonds across all four countries in the model.

6 Technically, the restrictions are imposed on the expected return for the 1-year holding period of the bonds (i.e., the return from buying a 10-year bond today and selling it one year later). The 10-year term-structure risk premium in equation (1) is the sum of the expected 1-year holding-period returns over the next 10 years.

7 Since realized returns are quite variable, the simple regressions that are used to capture expected returns (i.e., risk premiums) are prone to several forms of small-sample bias; statistical restrictions may therefore aid in the identification of expected returns. See Bauer, Rudebusch and Wu (2011).

8 We also impose maximum Sharpe ratios on investments in international bond markets, reflecting the limited nature of real-world investment possibilities. A Sharpe ratio is the ratio of the expected excess return on the bond divided by its standard deviation. The ratio thus shows the extra expected return per unit of risk in the investment. No-arbitrage term-structure models are likely to yield bond portfolios with unrealistically high Sharpe ratios, owing to the large number of parameters that may lead to the overfitting of returns in sample (Duffee 2010).

When the model imposes the restrictions described above, it generates forecasts of interest rates that match those from survey data. When the restrictions are not imposed, the forecasts differ. In particular, when local factors are allowed to have a large influence on the dynamics of the rates, the model produces unrealistic forecasts. This suggests that the assumption of global asset pricing is reasonable.

We use this restricted model to decompose long-term interest rates as in equation (1). **Chart 1** shows the time series of the expectations component of the long-term yield in each of the four countries since 1975. The grey bars indicate a recession period in the United States, as identified by the National Bureau of Economic Research (NBER).[9] The chart shows the long-run decline in market expectations as policy rates gradually fell from the very high levels reached during the early 1980s, when the U.S. Federal Reserve and other central banks raised short-term interest rates in an attempt to slow inflation. Following the dramatic reduction in inflation, long-term interest rates gradually declined.

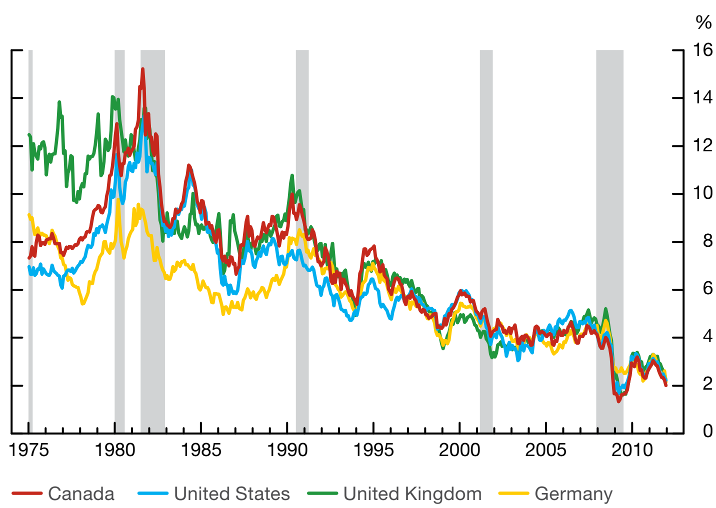
There was a long-run decline in market expectations as policy rates gradually fell from the very high levels reached during the early 1980s

The model also shows a great deal of variation in the second component of the decomposition, the term-structure risk premium (**Chart 2**). The effects of global macroeconomic conditions are seen in two features of the risk premiums. The first is a long-run structural decline, reflecting the reduction in both the level and volatility of global inflation.[10] From the early 1980s to the mid-2000s, risk premiums declined steadily, with reversals during recessionary periods.

The second feature is the strong countercyclical behaviour of the risk premiums. Term-structure risk premiums are driven by variations in real global economic growth over time, which affect an investor's desire to hold risky assets. Hence, global risk premiums have been low before recessions, when growth is still quite strong. Indeed, these premiums reached negative levels during the 2005–08 period leading up to the collapse of Lehman Brothers

Term-structure risk premiums are driven by variations in real global economic growth over time, which affect an investor's desire to hold risky assets

Chart 1: Estimated expectations component of yields on 10-year zero-coupon government bonds



Note: The grey bars represent recession periods in the United States, as identified by the National Bureau of Economic Research.

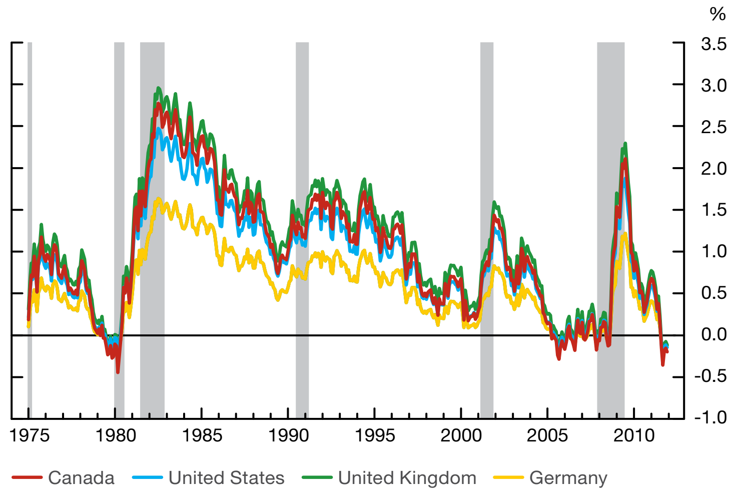
Source: Bauer and Diez de los Rios (2012)

Last observation: December 2011

9 We use the NBER recession dates as a proxy for global recessions.

10 Joslin, Priebsch and Singleton (2010) and Wright (2011) find a similar long-run decline. Wright (2011) suggests that the decline may also be the result of less uncertainty regarding inflation rates.

Chart 2: Estimated term-structure risk-premium component of yields on 10-year zero-coupon government bonds



Note: The grey bars represent recession periods in the United States, as identified by the National Bureau of Economic Research.

Source: Bauer and Diez de los Rios (2012)

Last observation: December 2011

and the subsequent financial crisis.[11] In contrast, risk premiums rise sharply in recessionary periods; at these times, output and consumption fall, which results in an increase in the value that investors place on marginal units of output. Thus, compensating investors for holding a risky asset requires a decrease in the price of the asset or an increase in its yield. Several studies have shown that the term-structure risk premium is countercyclical (Cochrane and Piazzesi 2005; Joslin, Priebsch and Singleton 2010).[12]

Monetary Policy and the Global Risk Premium

Our model highlights the importance of examining the influence of global asset markets when projecting movements of long-term interest rates in the context of expected monetary policy decisions. To investigate the effects of time-varying risk premiums, we focus on relatively short periods to reduce the influence of the long-run downward trend.

When the U.S. Federal Reserve increased its policy rate in an attempt to slow growth and reduce inflationary pressures during the 2004–05 period, to the surprise of Federal Reserve officials, long-term U.S. interest rates remained stable. Alan Greenspan, then Federal Reserve Chairman, described this behaviour as a "conundrum," because existing models of the U.S. term structure could not explain the movements in the yield curve (Greenspan 2005). Later studies have indicated that the U.S. term-structure

11 The low level of risk premiums (expected excess returns) on "safe" (i.e., AAA-rated) bonds before 2008 may have caused some investors or financial intermediaries to "search for yield," that is, to invest in riskier securities or projects. The search-for-yield phenomenon is of concern to policy-makers, since it is questionable whether all of the investment decisions being made fully take into account the risks involved (e.g., Cociuba, Shukayev and Ueberfeldt 2011).

12 Other researchers have advocated that global imbalances caused declines in term premiums in the mid-2000s. According to this view, there was an increase in the demand for highly rated U.S. assets (by foreign exchange reserve managers in emerging-market central banks and others) following the Asian financial crisis of 1997–98. This increase in demand caused a decline in global term premiums (e.g., Caballero, Farhi and Gourinchas 2008). While we do not deny that global imbalances may have played a role in the recent decline in term premiums, we note that premiums were declining during the expansions of the 1970s, 1980s and 1990s, when global imbalances had yet to emerge. Similarly, we also note the large increases in the term premiums during recessions.

risk premium was falling at the time, helping to offset the impact of the Fed's actions on long-term interest rates (Backus and Wright 2007; Cochrane and Piazzesi 2008; Kim and Wright 2005; Kozicki and Sellon 2005; Rudebusch, Swanson and Wu 2006).

In Bauer and Diez de los Rios (2012), we show that the risk-premium explanation of the U.S. conundrum can be viewed as a global phenomenon; that is, it was present across term structures in several countries. **Table 1** shows the actual short-term (1-year) and long-term (10-year) interest rates on zero-coupon bonds, as well as the model's estimated 10-year rate, market expectations and the risk premium, in May 2004 and July 2005. As is evident in the first column, the increase in the Federal Reserve's policy rate corresponded with a rise in the short-term rate from 1.64 per cent to 3.86 per cent. The long-term rate fell, however, from 4.74 per cent to 4.33 per cent.

The risk-premium explanation of the U.S. conundrum can be viewed as a global phenomenon

Table 1: Changes in short- and long-term interest rates, May 2004 to July 2005

	Actual 1-year yield (%)	Actual 10-year yield (%)	Fitted 10-year yield (%)	Expectations component (%)	Term-structure risk premium (%)
United States					
May 2004	1.64	4.74	4.74	4.05	0.69
July 2005	3.86	4.33	4.44	4.46	-0.02
Change (in basis points)	*222.00*	*-41.00*	*-30.41*	*41.33*	*-71.74*
Canada					
May 2004	2.13	4.78	4.84	4.07	0.77
July 2005	2.88	3.96	3.83	3.89	-0.06
Change (in basis points)	*75.00*	*-82.00*	*-101.62*	*-18.04*	*-83.58*
United Kingdom					
May 2004	4.47	4.96	4.94	4.05	0.89
July 2005	4.21	4.29	4.26	4.22	0.04
Change (in basis points)	*-25.83*	*-66.81*	*-67.95*	*17.00*	*-84.95*
Germany[a]					
May 2004	2.17	4.40	4.42	3.97	0.45
July 2005	2.14	3.26	3.34	3.39	-0.05
Change (in basis points)	*-2.50*	*-113.80*	*-108.45*	*-57.98*	*-50.47*

a. We use interest rates on bonds issued in Germany to represent the euro area.
Source: Bauer and Diez de los Rios (2012)

The model explains why the policy actions of the Fed did not result in higher long-term rates. The expectations component of the 10-year U.S. yield rose over the same period, from 4.05 per cent to 4.46 per cent. Thus, the 222-basis-point rise in short-term rates led market participants to increase their expectations regarding the future path of the policy rate by 41 basis points. However, since the economy was expanding and conditions were expected to be favourable, the term-structure risk premium for U.S. Treasuries fell by almost 72 basis points. It is important to note that this was a global phenomenon: the risk premium on the long-term yields in each of the four countries fell, even though other central banks were either raising short-term interest rates (Canada) or leaving them close to their starting levels (the United Kingdom and Germany).

We can also estimate the influence of the global risk premium during recessions. **Table 2** shows the change in the policy rate and the long-term interest rate in each of the four countries during five periods officially identified as recessions in the United States by the National Bureau of Economic Research. In each of the five periods, central banks attempted to ease monetary conditions by lowering short-term interest rates. For the most part, long-term interest rates fell at the same time, driven largely by decreases in the expectations regarding yields over the long term. For example, during the 1981–82 recession, the Federal Reserve lowered short-term U.S. rates by 476 basis points, and the 10-year yield fell by 262 basis points. The model suggests that the Fed was able to lower the expectations for the 1-year yield over the 10-year horizon by 280 basis points. At the same time, however, the risk premium rose, putting upward pressure on long-term U.S. rates by 69 basis points. This offsetting effect of the global term-structure risk premium is common across countries: it rises during recessionary periods, putting upward pressure on interest rates on the long-term bonds, which are more exposed to this risk.

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This effect is evident during the financial crisis of 2007–09. While short-term U.S. rates fell by 263 basis points, long-term U.S. rates decreased by a mere 23 basis points. This occurred because, although the Fed succeeded in lowering expectations of future policy moves by 224 basis points (**Table 2**),[13] the term-structure risk premium rose by 190 basis points.

Table 2: Changes in short- and long-term interest rates during U.S. recessions
In basis points, from the beginning to the end of the recession dates, as identified by the National Bureau of Economic Research

	Actual 1-year yield	Actual 10-year yield	Fitted 10-year yield	Expectations component	Term-structure risk premium
United States					
December 1979–July 1980	-219	34	64	-9	73
June 1981–November 1982	-476	-262	-211	-280	69
June 1990–March 1991	-157	-27	-24	-45	21
February–November 2001	-246	-3	1	-81	81
October 2007–June 2009	-263	-23	-34	-224	190
Canada					
December 1979–July 1980	-100	13	37	-46	83
June 1981–November 1982	-889	-486	-484	-564	80
June 1990–March 1991	-294	-73	-87	-111	24
February–November 2001	-237	1	17	-77	94
October 2007–June 2009	-329	-46	-37	-255	218
United Kingdom					
December 1979–July 1980	-133	-120	-141	-225	84
June 1981–November 1982	-199	-242	-249	-333	84
June 1990–March 1991	-272	-109	-109	-133	25
February–November 2001	-111	-6	-16	-113	97
October 2007–June 2009	-414	-94	-91	-318	226
Germany[a]					
December 1979–July 1980	-20	-15	-4	-54	50
June 1981–November 1982	-526	-180	-179	-225	47
June 1990–March 1991	22	-31	-32	-46	14
February–November 2001	-125	-5	1	-55	56
October 2007–June 2009	-310	-46	-45	-172	127

a. We use yields on bonds issued in Germany to represent the euro area.
Source: Bauer and Diez de los Rios (2012)

13 This may be the result of the Fed's unconventional policy actions.

While the financial crisis may have originated elsewhere, it is clear that Canada was not completely isolated from its influence. The Bank of Canada reduced its policy rate, which translated into a 329-basis-point decline in the actual 1-year interest rate used in the model. However, Canadian long-term interest rates were clearly affected by global macroeconomic conditions and the resulting policy moves, both at home and abroad. For example, our model indicates that, at the end of 2011, investors in Government of Canada bonds anticipated that 1-year rates would average 2.01 per cent over the next 10 years (**Chart 1**). Canadian long-term interest rates are also affected by the low level of the global term-structure risk premium, with the estimated risk-premium component in Canada falling to just below zero at the end of 2011 (**Chart 2**).

Concluding Remarks

The analysis in this article demonstrates the extent to which the global term-structure risk premium as well as monetary policy actions influence long-term interest rates. The risk premium is countercyclical to the global business cycle and thus may affect long-term interest rates in the opposite direction to that related to central bank policy actions. As a result, central banks need to take these forces into account in appropriately calibrating their policy response. Indeed, given the current low level of long-term rates, understanding movements in the global risk premium is important for the monetary policy decision-making process.

Since monetary policy may affect expectations and the term-structure risk premium differently, the levels of these two components may, in turn, affect the macroeconomy in various ways. For these reasons, understanding the effects on growth and inflation of movements in market expectations and the global term-structure risk premium is an important aim for future research.

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