

December 11, 2006

DOES THE SHARP INVERSION OF THE U.S. YIELD CURVE POINT TO A RECESSION... OR NOT?

Introduction

As house prices and sales correct in the U.S., the economic slowdown is gaining momentum and fuelling fears of a recession. Consequently, probability models based on the yield curve have been receiving a lot of press lately. According to these models, the inverted interest rate curve, long viewed as a recession signal, has raised to over 60% the probability that the U.S. economy will slow for at least six months between now and mid-2007. However, we don't consider the situation all that catastrophic given that the link between the interest rate curve and the health of the U.S. economy has weakened considerably in recent years.

In this *Economic Viewpoint*, we show that when you factor in the federal funds level and other leading indicators of the U.S. economy such as housing starts, initial jobless claims, the stock market and hours worked into the yield curve model, the odds of the U.S. falling into a recession diminish. Then we show that the bond market conundrum of recent years is such that the shrinking spreads between short- and long-term rates are more sustainable (normal) today than in the past.

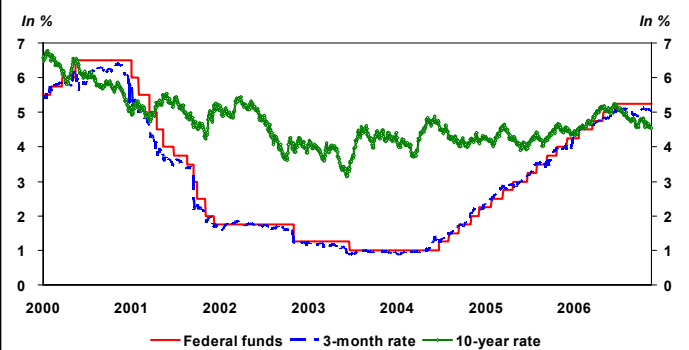
We believe the housing market will continue to lose ground in the months ahead before stabilizing later in 2007. This means a further decline in residential investment and weaker consumer spending. However, our adjusted measure of recession probability shows that the U.S. economy, somewhat like the 1995 downturn, is heading, for now, towards a soft landing rather than a recession.

Historic link between the slope and economic growth

Driven by the weakness of the U.S. economy, the bond market has been rallying since July, gradually pushing U.S. 10-year rates from a high of 5.25% in June 2006 down to a low of 4.53% at the end of November. Meanwhile, after being hiked 17 times in a row, the federal funds rate has been steady at 5.25% since the end of spring (Graph 1). For now, the Fed believes that core inflation is still too high to turn things around and stimulate the economy, but it seems that it's only a matter of time before it does so. At least that's what we can deduce from the yield curve inversion.

The yield curve displays the relationship between different interest rates and their maturity. Monetary authorities and investors closely monitor changes in the rate slope because it provides information on market expectations with regard to the economic impact of current and future

Graph 1
Fed monetary tightening inverts the interest rate curve



Sources: Datastream and Desjardins, Economic Studies

monetary policy. Essentially, this is explained by the expectations hypothesis, which says that long-term bond yields must be equal to the average of expected short-term yields. Consequently, the term spread (the difference between long-term and short-term rates)

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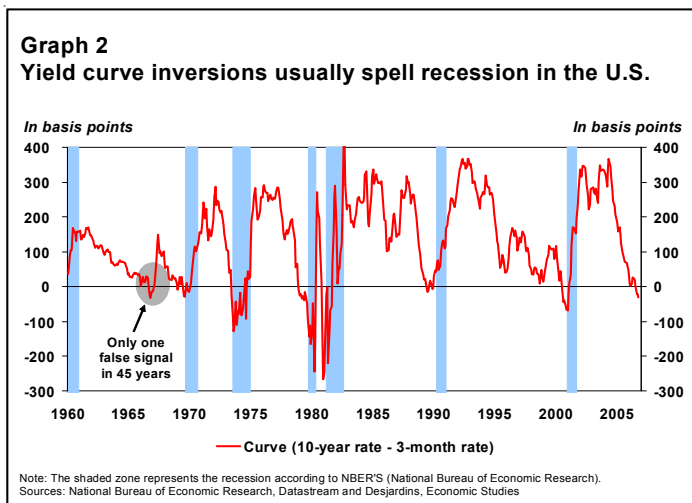
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provides information on the stance (restrictive, neutral or accommodating) of monetary policy.¹ The higher the term spread, the more restrictive is current monetary policy, and the greater the likelihood of a recession.

Under these circumstances, it is not surprising that recent changes in the slope of the yield curve have gotten a lot of press.² It bears mentioning that inverted interest rate curves have preceded all U.S. recessions since 1960 (Graph 2). The only exception was after the credit crunch of 1966, when the NBER,³ despite a subsequent sharp drop in industrial output, did not deem that the economy had officially fallen into a recession.



Historically, forecasting models⁴ based on the interest rate curve have been fairly accurate in predicting economic slumps, on average one year in advance. The most convincing examples can be found in 1975 and in the early '80s, when the inversions were sharpest

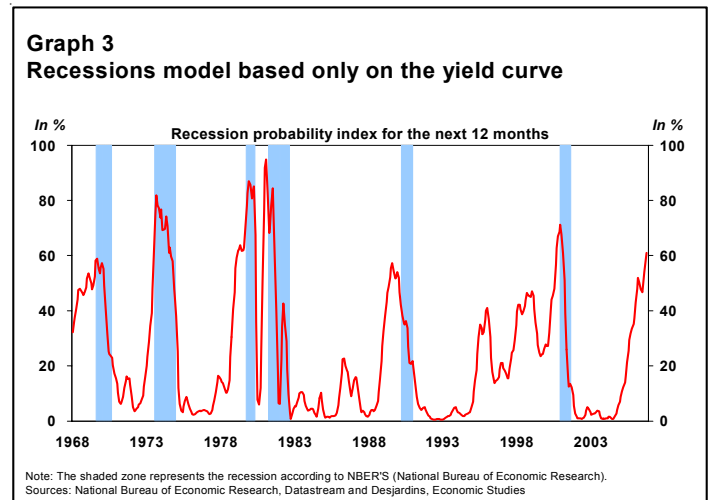
¹ The difference between 10-year and 3-month U.S. Treasury rates is usually preferred since these rates are not subject to significant credit risks. Moreover, while the spread between 10-year bond rates and the federal funds rate has in the past proven to be a good leading indicator of recession, key rates are controlled by the central bank and consequently, do not entirely reflect market expectations.

² The slope of the yield curve, which has been inverting since August 2006, became steeper by almost 50 basis points in November.

³ National Bureau of Economic Research.

⁴ When the goal is to predict recessions, the methodology used is typically a probit or logit equation in which the forecasted variable only assumes the values one and zero (either the economy is in a recession or it is not).

(Graph 3). There were also two episodes in the 1990s when the term spread virtually disappeared, without however, inverting on a monthly basis.⁵ No recession followed. With the probability currently estimated at more than one chance out of two, some analysts are sounding the recession alarm... but perhaps unjustly.



Slope inversion: a necessary condition but no longer sufficient

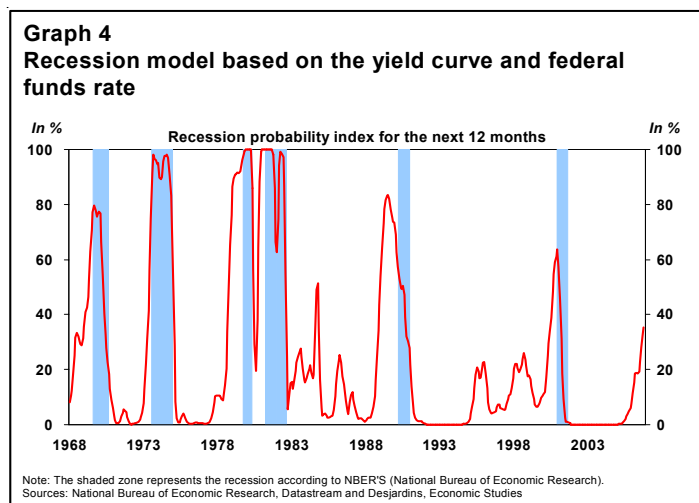
Interpreting the yield curve can be hazardous. The term spread may not tell the whole story of the yield curve's ability to predict recession. The fact is that the expectations hypothesis does not take into account risk premiums. Be it credit, interest, liquidity risk or inflation risk, they all increase the yield premiums demanded by investors for longer maturities.⁶ And this is what usually gives the interest rate curve a positive slope.

⁵ Although the yield curve inverted on a few occasions in November 1995, it is better to measure the persistence of the signal in order to distinguish temporary market fluctuations from fundamental changes perceived by the markets. This distinction may be captured through a monthly average.

⁶ An increase in uncertainty generally leads to an increase in risk premiums, which tends to accentuate the short-term part of the yield slope and flatten the long-term part through convexity effects on the curve. The convexity occurs because of the non-linear relationship between bond prices and yields. The effect is negligible in the near term but becomes increasingly evident in the longer term. As such, the shape of the curve depends on the balance between (1) risk premiums (which tend to raise long-term rates) and (2) convexity (which tends to cause long-term rates to fall).

However, some factors can ease the uncertainty associated with holding a long-term bond, which, despite the flattening of the interest rate curve, would make credit conditions more accommodating and stimulate the economy. Consequently, it follows that the shape of the yield curve does not only provide information about market expectations but about risk premiums as well.

A recent Federal Reserve study suggests getting around the problem by taking into account federal funds rates⁷ because they are the best indicators of monetary policy stance and are not subject to the problems associated with risk premiums. Adding the federal funds level to recession models considerably increases their predictive power (Graph 4).

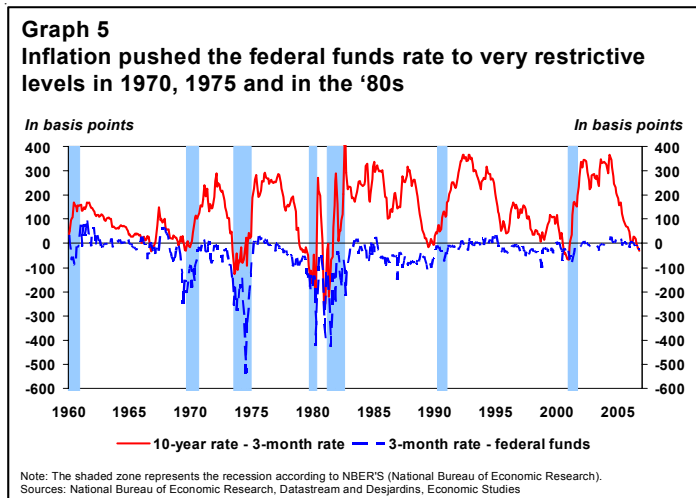


First, we notice that the signal was strongest for the two recessions in the 1970s, the ones in the early '80s and the 1990 slump. During those years, galloping inflation prompted the Fed to raise the federal funds rate to restrictive levels that were clearly above market expectations (Graph 5). Conversely, the signs of 1995 and 1998 (which ultimately turned out to be false)—the result of models based solely on the interest rate curve—and the odds of a recession in 2001, were weaker when monetary policy is factored in. In these conditions, despite the inversion of the curve, the relatively low federal funds rate (at 5.25% considered to be at the upper end of the neutral range) lowers the probability of a recession to about 30%.

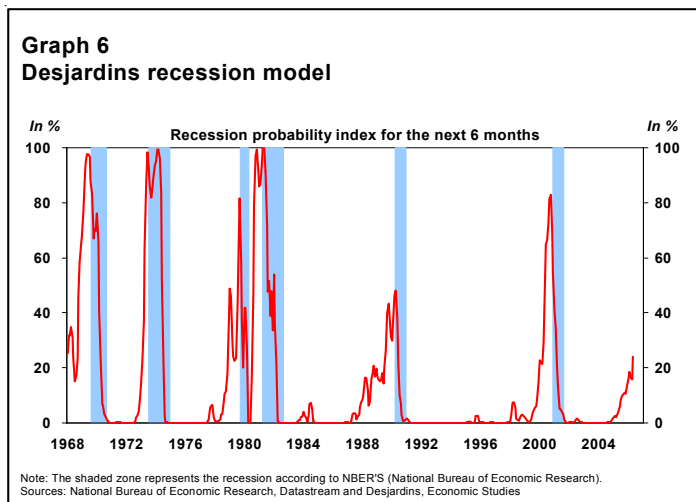
While the addition of the federal funds rate to the model is a definite improvement, the signal of the yield curve

⁷ See Jonathan H. Wright (2006).

inversion remains too persistent. Therefore, although concrete signs are pointing to a downturn, we feel the conditions are not in place to send the U.S. into a recession in the near term, and we believe the current probability (37% in October) is too high.



Not satisfied, we pushed our analysis further to take into account other leading U.S. economic indicators. Thus, we added housing starts, initial jobless claims, the stock market and hours worked to the Fed model based on the yield curve and the federal funds rate level and succeeded in considerably improving the odds of forecasting a recession. Our model was almost 100% accurate in predicting the recessions of 1970, 1975 and 1980-81, and the probabilities associated with the 2001 recession were far higher⁸ (Graph 6).

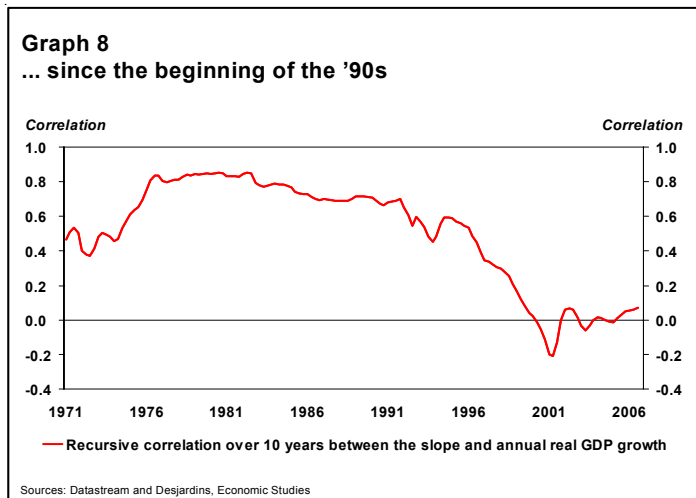
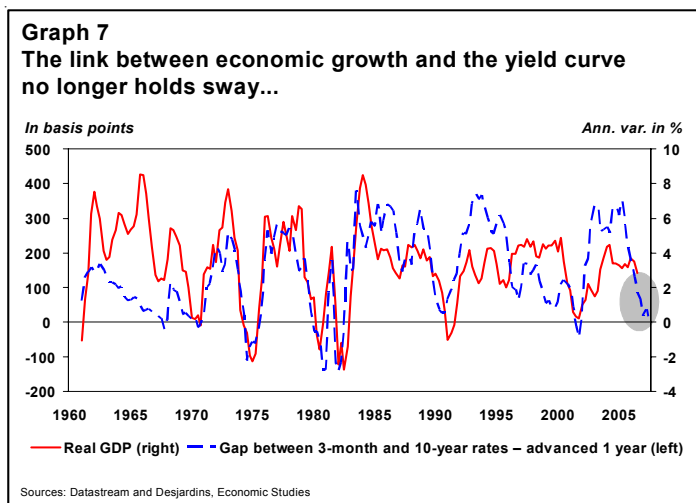


⁸ Using our model, in the case of 2001, the bear market clearly generated a strong recession signal.

Moreover, our model assigned a very low recession probability to the years 1995 and 1998. As for 2007, the chance of a recession (less than 25%) is more in line with our opinion that the current curve inversion is not enough to propel the U.S. economy into a recession.

The link between the yield curve and economic health is not as strong as in the past

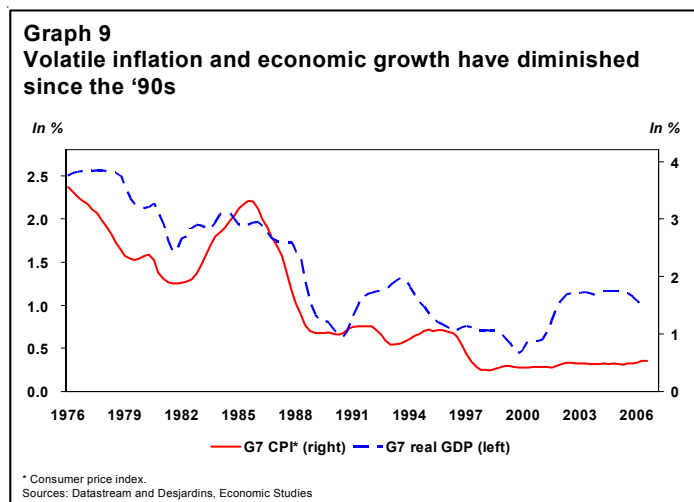
The fact is that the link between the yield curve and the state of the economy is not as strong as it was in the past (Graph 7). While the term spread was an excellent leading indicator of turning points in the economic cycle during the 1970s and '80s, the relationship has since lost all meaning (Graph 8).



Getting back to the basic concept that the term spread can be broken down into two separate parts, i.e. current market expectations with regard to future interest rates and the additional yield demanded by investors to protect themselves against the risks of holding long-term assets,

the collapse of the link between the slope and the economy necessarily implies a reduction in risk premiums.⁹ This is explained in part by improved macroeconomic conditions but also by the influence certain factors have on the demand for U.S. long-term bonds.¹⁰

Of all the factors, market globalization and more confidence in the central banks' ability to rein in inflation expectations have played the biggest role. The result has been better inflation anchors and a gradual reduction in the volatility of economic growth and inflation since the 1980s (Graph 9). At the same time, market deregulation and the introduction of new financial products aimed at reducing risk have caused long-term bond yields to converge and become less volatile.



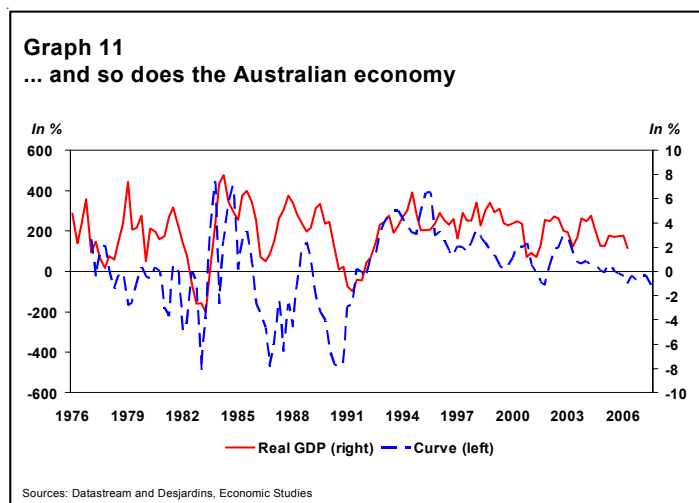
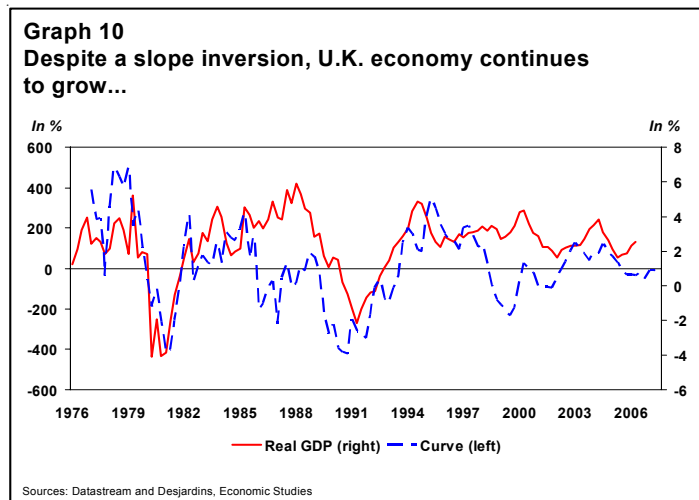
More recently, hedge funds in pursuit of returns have invested massively in the bond market, which together with the surplus savings of Asian countries and the growing needs of pension funds around the world, have caused interest rates to fall further.¹¹ Consequently, the flattening of the yield curve, and even its inversion, is more sustainable than in the past and does not necessarily signal an economic downturn, or worse, a recession.

⁹ See Don H. Kim and Jonathan H. Wright (2005).

¹⁰ For an in-depth review of the factors that could explain the "bond conundrum" of the past few years, see the *Economic Viewpoint* of August 8, 2005 "Will we see a return to higher interest rates?"

¹¹ This brings to mind the drop in American long-term government rates caused by the 1998 Russian financial crisis and the collapse of the LTCM hedge fund.

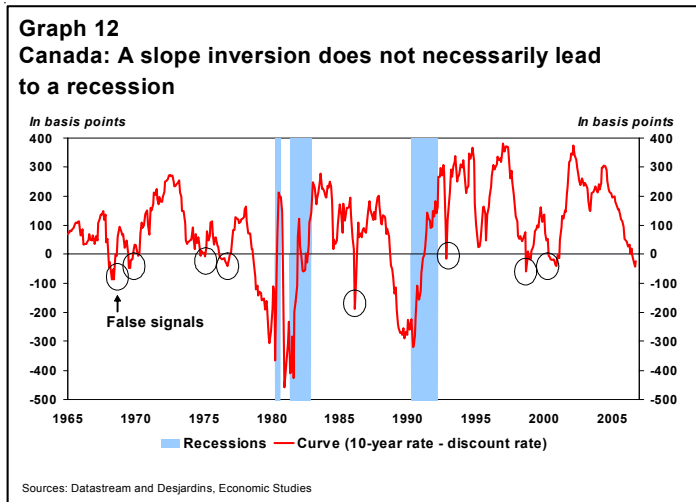
In these circumstances, the U.S. economy will likely keep on growing. The best examples are probably Australia and the U.K. whose economies continue to expand despite their inverted yield curves (Graphs 10 and 11).



Canada

In Canada, the relationship between the inversion of the yield curve and an economic recession is far less convincing. In fact, since 1955 the country has had only three official recessions despite 12 incidents of a negative spread between 10-year federal bond rates and the overnight rate (Graph 12). However, the last two recessions, i.e. 1981-1982 and 1990-1991, were preceded by a significant inversion of the yield curve, with spreads exceeding 250 points. Except for a sharp

inversion in 1986 following the Plaza Accord¹², the other inversion incidences were much less pronounced, i.e. never more than 100 basis points.

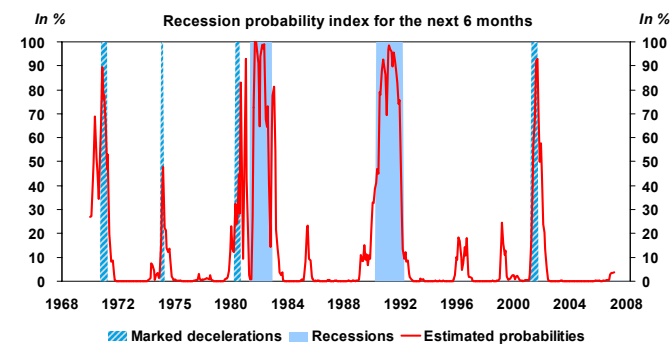


This situation can be explained by the fact that our bond market is less focused on Canada's economic outlook and is less in line with the Bank of Canada's policy. In fact, Canadian bond market rates seem to move in tandem with those in the U.S. Since the early '70s, the correlation between 10-year federal bond rates in Canada and the U.S. has been 98%, clearly reflecting the proximity of the two markets. Therefore, a complete inversion in the Canadian yield curve is not necessarily indicative of the economic situation nor is it a reliable predictor of future growth. In fact, our estimates reflect this weaker relationship between Canada's yield curve and the probability of recession. Thus, the recession probability model based solely on the yield curve is far less reliable than our model, which includes some components of the Canadian leading indicator along with the yield curve (Graph 13).

The fact is that only a very steep inversion of the slope would signal a marked downturn in the Canadian economy, and the spread would have to be about 300 basis points between the overnight rate and the 10-year bond rate to truly signal a recession (i.e. more than 50% probability). In light of the current situation and the Bank of Canada's fairly prudent monetary policy, such a probability is highly unlikely. In fact, even the period

¹²This inversion was caused by a strong increase in Canadian key rates (nearly 200 points) in order to stabilize the depreciation of the loonie in the days following the Plaza Accord.

Graph 13
Canada: Desjardins recession model



Sources: Datasteam and Desjardins, Economic Studies

before the 1990-91 recession did not fulfill these conditions. It therefore follows that a slight inversion of the Canadian yield curve does not signal a future recession. As a matter of fact, according to our probability model, chances of a recession in the next six months are actually very slow.

Conclusion

Our adjusted measure of recession probability shows that the U.S. economy is headed towards a soft landing, and in this case, the inversion of the yield curve should not be interpreted as a signal of a marked slowdown. First, it bears mentioning that short- and long-term interest rates are relatively low (both in real and nominal terms) compared to past recessions. And as we have seen, the reduction in long-term rates, caused by the decrease in yield premiums, has made credit conditions more accommodating and is consequently stimulating the economy.

Still, caution is in order. Our recession model is just one of many analysis tools. Moreover, we are not immune to another shock. We need look no farther back than 2001 when, despite an inverted yield curve, things appeared to be "different." Then the tech bubble burst and the ensuing market correction plunged the U.S. economy into a recession, although it was considered weak and short lived.

For the time being, things are looking good. Unlike the end of past real estate cycles, the ratio of mortgage loans to total loans is currently lower, and the risk is more equally shared between the various economic agents, leaving the banks in a better position to deal with a slowdown in the housing market. Moreover, American firms are in good health: profit margins are high, liquidity

is ample and balance sheets are sound, which, combined with accommodating credit conditions, should support employment and favour economic growth. That said, the downturn in the real estate sector is such that the economy will undergo a period of adjustment. We believe that the soft patch will persist a bit longer and even deepen before the economy turns around later in 2007 and in 2008.

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Bibliography

ESTRELLA, Arturo and Mary R. Trubin. "The Yield Curve as a Leading Indicator: Some Practical Issues," *Current Issues*, Federal Reserve Bank of New York, Vol. 12, No. 5, July-August 2006.

ESTRELLA, Arturo. "The Yield Curve as a Leading Indicator: Frequently Asked Questions," Federal Reserve Bank of New York, October 2005.

FISHER, Mark. "Forces That Shape the Yield Curve: Parts 1 and 2," *Working Paper Series*, Federal Reserve Bank of Atlanta, March 2001.

HAUBRICK, Joseph G. and Ann M. Dombrosky. "Predicting Real Growth Using the Yield Curve," *Economic Review*, Federal Reserve Bank of Cleveland, 1996.

KIM, Don H. and Jonathan H. Wright. "An Arbitrage-Free Three-Factor Term Structure Model and the Recent Behavior of Long-Term Yields and Distant-Horizon Forward Rates," *Finance and Economics Discussion Series*, Federal Reserve Board, August 2005.

WRIGHT, Jonathan H. "The Yield Curve and Predicting Recessions," *Finance and Economics Discussion Series*, Federal Reserve Board, February 2006.