

John Murray: Exits, spillovers and monetary policy independence

Remarks by Mr John Murray, Deputy Governor of the Bank of Canada, to the Canadian Association for Business Economics, Kingston, Ontario, 27 August 2013.

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Introduction

Extraordinary monetary policy measures were taken in the heat of the financial crisis, and continue to be applied five years later, as a necessary part of restoring economic growth and stability. While no major advanced economy currently employing these measures is expected to begin withdrawing monetary stimulus in the near future, mildly encouraging data from the United States, coupled with recent statements from various Federal Reserve officials, have definitely caught the market's attention.

The outsized impact that the statements had on asset prices around the world is notable for a number of reasons. First, the statements only suggested that, provided economic data continued to come in largely as expected, the Fed might start reducing the *rate* at which further monetary stimulus was being added to the system. This is materially different from actually reducing the *amount* of stimulus which, in the case of the United States, is still expected by most observers to begin in the second half of 2015.

Second, market consensus, as judged by commentary just prior to the Fed statements, had already arrived at the same conclusion – specifically, if economic events transpired as projected, Fed “tapering” would begin sometime in the autumn or early winter of 2013. In other words, the Fed’s statements were merely confirming, in a conditional sense (i.e., with no guarantees), what the market already expected.

Despite all of this, the pronouncements appeared to trigger an exaggerated reaction in financial markets. Bond yields spiked, and prices for a number of other financial assets that had benefited from expectations of ongoing asset purchases by the Fed dropped precipitously, not just in the United States but in almost every other country.

The magnitude of the response was viewed by many with a mixture of surprise and alarm. Surprise because these prospective policy moves had been so widely anticipated and clearly telegraphed by the Fed, and because the market reaction was so pervasive. Alarm because it suddenly seemed that unwinding unconventional monetary policies (UMP) might not be as straightforward and painless as many had thought or at least had hoped. The fears voiced by UMP critics appeared to have been confirmed.

My objective here today is twofold: first, to put these developments in a broader context and diffuse some of the angst that has surrounded them; second, to view them more specifically from the standpoint of Canada. What are the likely implications for our economy? What are the possible risks? What are the elements that, especially from a Canadian perspective, provide some comfort?

Uncharted waters

Policy-makers around the world responded in a timely and aggressive manner in the autumn of 2008, when what had previously been characterized as a period of “extreme market turbulence” developed into a full-blown crisis. The severity of the situation was quickly recognized, as was the potential for it to degenerate into another Great Depression, but on a truly global scale. Coordinated and substantive fiscal remedies were applied, together with concerted monetary policy easing. However, room for manoeuvre on the fiscal front in most advanced economies (AEs) was soon exhausted, and attention had to turn to fiscal consolidation as opposed to expansion. Monetary policy was, by default, the “only game in town” – but it, too, faced a critical constraint.

Low inflation and the impossibility of pushing nominal interest rates significantly below zero meant that there was little scope for lowering real interest rates and easing credit conditions by conventional means. Official short-term interest rates – the instrument of choice for central banks – were cut aggressively but soon hit the zero lower bound, where most of them have remained for the past five years (Chart 1).

This in itself was an “unconventional” development. Official short-term rates had never been as low or had remained there for as long. It was soon apparent, however, that even this would not provide sufficient easing to restore market functioning and resurrect collapsing economic activity. Other, more unconventional, means would have to be deployed.

These alternative measures took two forms. The first is often referred to as “forward guidance,” and involves an explicit commitment by central banks to leave short-term interest rates low for a prolonged period. By doing this, central banks hope to condition market expectations, lowering interest rates further out the yield curve (much like additional cuts to short-term interest rates would have done, had they been possible).

The commitment to extend monetary easing well beyond the point where central banks might have been expected to begin tightening under more normal circumstances also served to raise inflation expectations, thereby lowering the real rate of interest even further. The increased certainty provided by forward guidance regarding the path of future rates reinforced this stimulative effect.¹

Most central banks that used this instrument initially relied on a loose form of calendar or date-based guidance, in which they committed to leave rates low for “an extended period of time.” In some cases, a more specific time frame was mentioned, such as mid-2014 or mid-2015.

The commitment was not unconditional, however. There was a clear, if implicit, understanding that, if the state of the macroeconomy and the inflation outlook were to change materially, the central bank would respond appropriately.

The Bank of Canada pioneered the use of conditional guidance in April 2009.² It committed to hold the policy rate at its effective lower bound through the second quarter of 2010, conditional on the outlook for inflation. The Bank’s guidance succeeded in changing market expectations regarding the future path of interest rates, providing the desired stimulus and thereby underpinning a rebound in growth and inflation in Canada (**Chart 2**).³

In more recent applications, forward guidance has become more explicitly outcome- or data-based, with some central banks identifying thresholds such as specific rates of inflation or unemployment which, if crossed, would prompt a reconsideration of their policy track.

The second form of unconventional monetary policy employed by many central banks involves purchasing large amounts of government bonds or other financial instruments. “Quantitative easing,” as it is generally known, is viewed as a complementary and more direct means of easing credit conditions, exerting immediate upward pressure on the prices of the assets that were purchased, as well as those of other assets, through a process of

¹ At the zero lower bound, interest rate risk is asymmetric: short-term rates can rise, but they cannot fall. This asymmetry causes the mean or expected outlook for short rates to be greater than the modal or most likely path. Thus, guidance can lower long-term rates by reducing uncertainty about the future path of short-term rates, even if it does not change the modal expectation as to the duration at the lower bound.

² For a review of the evolution of forward guidance, see M. Carney, “Monetary Policy After the Fall” (Eric J. Hanson Memorial Lecture, University of Alberta, Edmonton, 1 May 2013).

³ See Z. He, “Evaluating the Effect of the Bank of Canada’s Conditional Commitment Policy,” Discussion Paper No. 2010–11, Bank of Canada, 2010; and M. Woodford, “Methods of Policy Accommodation at the Interest-Rate Lower Bound,” paper presented at the Jackson Hole Symposium, “The Changing Policy Landscape,” 31 August–1 September 2012.

portfolio substitution.⁴ It is this form of unconventional monetary policy that has probably provoked the greatest degree of unease on the part of many market participants. **Chart 3** shows how the balance sheets of various central banks have grown over the past five years. They have now reached levels equivalent to 20 or 30 per cent of GDP.

In the case of Japan, the central bank's balance sheet is projected to hit nearly 60 per cent of GDP within the next two years. While a number of vocal critics dispute the wisdom of these actions, there is general agreement – based on a growing body of evidence – that forward guidance and quantitative easing have had a significant and beneficial impact. Credit conditions have improved, market functioning has been restored and interest rates well out the yield curve have been lowered materially. More importantly, real economic activity and employment have been supported, and a global deflation/depression has been avoided.⁵

Some people believe that these policies will prove *too* effective and will induce runaway inflation; others believe that they have been largely ineffective but carry significant future costs in the form of financial instability and lost central bank independence. Even the supporters of unconventional monetary policies would acknowledge that they involve some risk, but that, at least until now, the benefits have far outweighed any current or prospective costs.

Extricating ourselves from UMP and effecting a smooth exit, the critics argue, is going to be extremely difficult if not impossible. They contend that the situation is “unprecedented,” and that we are in “uncharted waters.”

Once bitten...

One can understand why emerging-market and developing economies (EMDEs) might feel particularly exposed. Over the postwar period, there have been repeated episodes of sharp interest rate increases in the advanced countries followed by financial crises in EMDEs. In the post-Volcker period, for example, short-term interest rates in the United States have jumped by more than two percentage points within a one-year period on several occasions.

A similar, although slightly less extreme, pattern can be observed in long-term interest rates. One of the best-known examples of a disorderly jump in U.S. long-term rates occurred in 1994, immediately preceding the Mexican financial crisis (Chart 4).

Mexico's experience is not unusual. In many cases, the spillover effects on EMDEs have been dramatic. Moreover, these episodes involved large adjustments in conventional, as opposed to unconventional, monetary policy. Aggressive tightening in the early 1980s by

⁴ Quantitative easing refers to outright purchases of financial assets funded by the expansion of the monetary base through the creation of central bank reserves – in other words, enlarging the central bank's balance sheet. If assets are imperfect substitutes, these purchases push up the price of, and reduce the yield on, the purchased assets (which are normally government securities but could include private assets). As private investors rebalance their portfolios toward other assets, the stimulative impact is spread across financial markets.

Many central banks, especially during the most acute phases of the crisis, also employed policies known as “credit easing,” which involves purchases of private sector assets in certain credit markets that are important to the functioning of the financial system but are temporarily impaired. The objective of credit easing is to reduce risk premiums and improve liquidity and trading activity in these markets.

In addition to these “hydraulic” effects, both quantitative and credit easing can have “signalling” effects. That is, both can affect perceptions of the central bank's reaction function. Like forward guidance, signalling effects can provide additional stimulus by affecting expectations of future monetary and financial conditions.

⁵ See E. Santor and L. Suchanek, “Unconventional Monetary Policies: Evolving Practices, Their Effects and Potential Costs,” *Bank of Canada Review* (Spring 2013): 1–15; B. Bernanke, “Monetary Policy Since the Onset of the Crisis” (speech at the Federal Reserve Bank of Kansas City Economic Symposium, Jackson Hole, Wyoming, 31 August 2012); and M. Joyce, M. Tong and R. Woods, “The United Kingdom's Quantitative Easing Policy: Design, Operation and Impact,” *Bank of England Quarterly Bulletin* (2011Q3): 200–212.

Volcker, for example, coincided with the beginning of the Latin American debt crisis and the so-called “lost decade.” This is not to say that policy tightening by advanced economies was always the primary cause of these crises, nor was it always the catalyst. Many, if not most, were self-induced.

Ironically, concern among EMDEs over the past five years has focused mainly on the problems associated with too much monetary easing in advanced economies. Negative spillover effects in the form of excessive capital inflows and upward pressure on their exchange rates have at times made it difficult for them to control domestic credit conditions and have threatened their international competitiveness.

Without arguing the merits of these complaints in detail, it is perhaps worth noting the following. First, most observers, including the International Monetary Fund, believe that pull factors have been more important than push factors in attracting these capital inflows. In other words, the inherent attractiveness of investing in EMDEs, as opposed to accommodative policies elsewhere, was the major driving force.

Second, the argument overlooks the fact that UMP presumably led to faster growth in the advanced economies and the global economy more generally, which benefited the EMDEs. The alternative would have been much less appealing.

Finally, there might have been less need for UMP were it not for the restrictive measures that many of the EMDEs had used to control capital flows and exchange rate movements beginning well before the crisis. These restrictive measures contributed to sizable global imbalances, which in turn fuelled the crisis. They also inhibited the required rebalancing of global demand after the crisis, increasing the need for aggressive monetary policy responses by the United States and other advanced economies.

Spillover effects from policies run both ways. EMDEs have grown large enough that their collective influence on global conditions now matches that of the advanced economies.

Why this time might be different

Before getting too excited about the negative consequences of exiting, it is important to step back and consider why events might unfold in a manner that is more benign than some critics have feared.

The first – and most obvious – reason is that the exit will start from a point of extraordinary policy accommodation, and will involve gradually reducing the amount of stimulus in place, as opposed to initiating a rapid and severe policy tightening. Moreover, it will be undertaken only when officials believe there are clear and convincing signs that the U.S. economy and, subsequently, others, have achieved self-sustaining momentum (“escape velocity”). In this sense, exiting should be regarded as a good and natural thing.

Unlike earlier episodes, these actions will not be taken in the context of an overheated economy that requires a quick and substantive dose of policy tightening to dampen economic activity and inflationary pressures.

The second reason is that monetary authorities have learned the value of clear communication from previous unfortunate experiences, such as in 1994, when almost no attempt was made to forewarn markets.⁶

The same can be said of the more positive experience of the past few years in which effective communication has been used successfully to condition market expectations.

⁶ Federal Reserve Board Chairman Alan Greenspan did try to prepare markets for higher short-term interest rates in testimony before the Joint Economic Committee a few days before the February 1994 meeting of the Federal Open Market Committee at which the tightening began. However, this preparation was quite minimal in comparison with recent Fed statements about “tapering.”

The third reason is that not all advanced economies will be exiting from UMP at the same time, because they are at different points in the business cycle. Much of Europe is still in recession and the European Central Bank is considering additional policy easing.⁷ Japan is in the midst of more ambitious easing as part of the “Three Arrows” program for reflating its economy. The lack of synchronization in policy stances across countries should help to moderate the reaction of global interest rates.

The fourth reason is that unconventional monetary policy is not really all that unconventional, either in concept or application. In many ways, it is a throwback to an earlier era. Using asset purchases to inject or withdraw high-powered money into or from the economy is how most textbooks used to describe the monetary policy process. Conducting monetary policy by indirect means, through announced changes in the target overnight rate, while simpler and effective in normal times, is a relatively new development.

Guidance, the other form of UMP, is simply a modern version of moral suasion and window guidance, which were actively used by most central banks through the 1950s and 1960s (if not later). The pre-Treasury Accord period also serves as an example of rather direct guidance.⁸

Neither is the scope nor size of the monetary policy adjustment unprecedented. It all depends on how you measure it. The growth in asset purchases, whether measured in absolute terms or relative to GDP, is truly enormous, and is no doubt responsible for much of the shock and awe that UMP has attracted. However, if one focuses on the resulting growth of credit over the recent period or the movements in long-term interest rates, the effects are less concerning.⁹ The swings in credit and interest rates from the start of many past tightening episodes to their conclusion were much wider than anything currently contemplated.

This is not to say that the process is without risks or will necessarily be smooth. However, as noted earlier, authorities have learned some valuable lessons about communication and the importance of working with markets. Their intentions and tentative game plans have been clearly laid out, as well as the events that would likely trigger the start of the exit.

In the United States, for example, the Fed has introduced explicit thresholds and outlined the sequence in which the withdrawal of stimulus would likely proceed. The exit would be preceded by a gradual decrease in the size of asset purchases (i.e., a slowing in the amount of extra easing), followed by the end of asset purchases, a gradual withdrawal of excess liquidity from the system, measured increases in the federal funds rate and, eventually, a normalization of the Fed’s balance sheet. All of this would be contingent on the evolving state of the economy. Importantly, incentives would be well aligned. Those countries that are

⁷ At the European Central Bank’s July and August press conferences, ECB President Mario Draghi stated that the ECB’s Governing Council was maintaining an easing bias. In August, he said specifically that they had unanimously agreed that “the key ECB interest rates, including the rate on the deposit facility, will remain at present or lower levels for an extended period of time.” He emphasized that this downward bias is due to the subdued outlook for inflation. See <http://www.ecb.europa.eu/press/pressconf/2013/html/is130801.en.html>.

⁸ In 1942, after the United States entered the Second World War, the Federal Reserve committed to maintaining a low interest rate peg on government bonds. It did so at the request of the U.S. Treasury. The Fed’s independence was restored in 1951 with the Treasury Accord.

⁹ The fact that large changes in the monetary base have been associated with only moderate changes in credit and interest rates may lead some to conclude that these policies have been less effective than anticipated. This conclusion, however, is based on a faulty premise. In fact, the magnitude of the change in the monetary base is not surprising. As the opportunity cost of holding money – the nominal interest rate – declines, the interest elasticity of money demand increases. Near the zero lower bound, this effect causes the velocity of money to collapse. The effectively infinite demand for money causes the relationship between the narrow and broad monetary aggregates (the money multiplier) to break down. Consequently, changes in the monetary base have almost no effect on asset prices and aggregate demand. Rather, the stimulative effects of UMP are mainly attributable to the induced changes in the composition of private sector portfolios and signalling effects.

exiting would understand the dangers of leaving too early or too late, while those countries that would feel the effects should have no desire to see the process unfold any differently. Having a major advanced economy fail to reach escape velocity through a premature exit, or generate an inflationary spiral through a late departure, would surely be in no one's long-term interest.

Spillovers

Spillovers are an unavoidable consequence of openness and globalization. Policy actions by systemically important countries – both AEs and EMDEs – will necessarily have an impact on others. Indeed, similar actions by many small countries, taken together, would have the same effect.

Moreover, there should be no presumption that spillovers are always and everywhere bad, although the term admittedly sounds slightly pejorative. Actions taken by one country that are in its own long-term interest (keeping its house in order) typically benefit others (keeping the neighbourhood safe). More fundamentally, the benefits that open markets bring by directing capital to its most productive ends and allowing countries to maximize the gains from trade cannot typically be separated from other external shocks without serious costs.

Those countries with less-developed institutions and financial systems, limited policy credibility, greater foreign currency debt and/or more precarious economic situations are certainly more exposed than others to external shocks.¹⁰ It is, therefore, not surprising that the recent Fed statements had a larger impact on assets in EMDEs with higher debt and deficits and that are perceived to be more dependent on external financing (**Charts 5, 6**).

This was a natural and predictable reaction, but one that should be largely reversed unless fundamentals justify it.

The first response that countries should make if the shocks persist, and are regarded as unhelpful, is to review the stance of their own fiscal and monetary policies to determine whether there is anything that requires adjustment.

If the external shocks seemed to pose financial stability risks, macroprudential measures might be introduced as a complement or backstop to existing regulations and oversight of domestic financial systems. However, they should be used judiciously by targeting financial vulnerability itself, and not as a pretext for more protectionist and, ultimately, welfare-eroding measures. The temptation to impose additional capital controls, engage in persistent and large-scale exchange rate intervention and otherwise inhibit necessary adjustments in relative prices should be resisted.

Some countries that dislike the spillover effects associated with the monetary policies of AEs are also unhappy with the options that they have for managing them.

Many of these countries favour fixed exchange rate arrangements. However, trying to stabilize the exchange rate with monetary policy is viewed as undesirable because of the implications for domestic credit conditions. Capital controls would allow them to stabilize domestic credit conditions and the exchange rate but create serious distortions over time. The preferred solution, in the opinion of many of these countries, is for the United States to internalize the effects of its monetary policies – more specifically, not to exit or at least to do so at a time that is more convenient for others.

¹⁰ In previous episodes, an accumulation of foreign currency sovereign debt played an aggravating role. In the current situation, it is firms in EMDEs, not sovereigns, that have built up significant unhedged short-term foreign currency debt. A depreciation of EME currencies would raise the local currency value of firms' debt. EME authorities could limit the accumulation of foreign currency debt in the future by adopting appropriate regulatory measures and by allowing for greater exchange rate flexibility. The latter would discourage unhedged foreign currency debt by creating two-sided exchange rate risk.

The problem that these unhappy countries face has a long history in international economics – old wine in new bottles. The most succinct exposition of this problem is often credited to the Canadian economist Robert Mundell, and is popularly referred to as the “impossible trinity” or “trilemma” (**Figure 1**).¹¹

Countries, Mundell observed, cannot simultaneously enjoy the advantages of free capital movements, a stable exchange rate and an independent monetary policy. Only two of the three are possible at any one time, so countries must choose.

Following the advice of their critics would oblige the United States and several other AEs to surrender some of their monetary policy independence. In our view, however, this would be a Faustian bargain. There is a much better way to proceed. The trilemma should be resolved by allowing exchange rates to float, while preserving the free movement of capital and monetary independence for all. Other palliatives might be appropriate as a temporary expedient if there is obvious evidence of market excesses, but should not be used as an ongoing crutch.

Canada’s experience

Globalization and the economic interdependence that it implies are nothing new for Canada. We have always been a relatively small and open economy with close ties to other, much larger, economies. Globalization and the emergence of new economic powers in Asia and Latin America have expanded the number of connections but not the fundamental facts of Canada’s economic situation or the policy environment within which we operate.

Canada abandoned all of its currency controls and virtually all of its capital controls shortly after the Second World War, and moved to a floating exchange rate in 1950, well before the collapse of the Bretton Woods system.¹²

Despite the monetary independence that a floating exchange rate gave us, our long-term interest rates have always moved closely with those of the United States (Charts 7 and 8).

This should not come as a surprise, given the close real economic ties between our economies and the highly integrated nature of our capital markets. The same is true of other countries now that they have shifted to open regimes similar to our own (Charts 9 and 10).

Nevertheless, Canada has been able to control inflation and has been a successful inflation targeter since 1991, influencing economic activity and aggregate prices through adjustments in interest rates at the short end of the yield curve. These changes are in turn reflected, albeit with declining influence, out the yield curve to longer-dated instruments and, importantly, in the exchange rate.

In this regard, the exchange rate serves as both an automatic buffer for internal and external shocks and as an integral part of the monetary policy transmission mechanism. Indeed, in a classic paper written in the early 1960s, Mundell (Mundell, 1963) showed how, in a world of complete asset substitutability and perfect capital mobility, real interest rates would be largely determined by international market forces with the exchange rate moving in response to changes in domestic monetary policy to provide most of the desired accommodation or tightening.

Mundell’s model was extremely simple and included a number of heroic assumptions, but it accurately reflected important elements of the world in which open economies operate.

¹¹ R. A. Mundell, “Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates,” *The Canadian Journal of Economics and Political Science* 29, no. 4 (1963): 475–485.

¹² Canada has had more experience with a floating exchange rate than any other major country. While Canada reverted to a fixed exchange rate in 1962, this proved to be temporary, and the dollar was allowed to float again in 1970. Overall, the Canadian dollar has floated for 55 of the past 63 years.

Although authorities are able to exercise considerable influence over real interest rates, especially at the short end of the yield curve, and central banks are ultimately responsible for the rate of inflation in their economies, it is the exchange rate that does a great deal of the work.

It is important to note, in this regard, that international arbitrage does not require complete interest rate equalization, just the equalization of (risk-adjusted) rates of return, including anticipated moves in the exchange rate. Control of the short rate is possible because monetary policy shifts the expected rate of currency appreciation or depreciation.

The response of the Canadian economy to the Fed's easing of UMP over the past five years has been exactly as one would expect. Asset purchases and Fed guidance put downward pressure on long-term interest rates in the United States and upward pressure on equity and other asset prices. The U.S. dollar depreciated as investors sought higher returns elsewhere, putting downward pressure on foreign interest rates and upward pressure on global asset prices and foreign currencies.

Although the resulting upward pressure on the Canadian dollar served as a drag on domestic growth, the effects of this headwind were more than offset by the positive effects of stronger U.S. demand for our exports, higher asset prices, higher commodity prices and an improvement in our terms of trade.¹³ In other words, Fed easing was a net positive for Canada, making a difficult situation better. The process will work in reverse once the exit begins, but with one important difference: it will take place in the context of a strengthening U.S. economy. The improving underlying strength of the U.S. economy should more than compensate for the drag from higher interest rates. Stronger external demand, coupled with downward pressure on our currency and support for commodity prices from a global economic recovery, will provide the lift.

Of course, the process is unlikely to unfold quite as neatly or mechanically as I have just described. Rudiger Dornbusch (Dornbusch, 1976) extended Mundell's framework to a dynamic environment and showed that forward-looking behaviour, together with price stickiness, could generate exchange rate overshooting.¹⁴ In the real world, there are a host of other reasons for exchange rates and other asset prices to overreact, including "animal spirits" and excessive exuberance. These should be transitory, however, with markets settling at levels consistent with fundamentals after a short period of time, assisted perhaps by some additional guidance.

Conclusion

The exit, when it comes, will not be without challenges both for those exiting and those feeling the effects of the exit. Nevertheless, this process should be viewed positively, as a sign that the global economy is well on the way to recovery and that it is time for interest rates to begin normalizing. If interest rates are kept low for too long, both price and financial stability would suffer.

Markets seldom operate in a smooth, textbook, fashion. They are prone to excessive moves in response to breaking news or changes in sentiment. Although past experience with sharp interest rate moves might give cause for concern, especially among smaller economies with less-developed financial markets and institutions, a number of factors are working in favour of a smoother transition this time.

¹³ On the impact of UMP on Canada, see Box 1 in the Bank of Canada's October 2012 *Monetary Policy Report*. It should be noted that several other factors also influenced the Canadian-dollar exchange rate, including strong commodity prices and general weakness in the U.S. dollar.

¹⁴ R. Dornbusch, "Expectations and Exchange Rate Dynamics," *Journal of Political Economy* 84, no. 6 (1976): 1161–76.

One of the most critical differences is the emphasis that is now put on clear communication and the increased awareness of the importance of transparency. The unwinding of UMP should be one of the best-telegraphed events in monetary history.

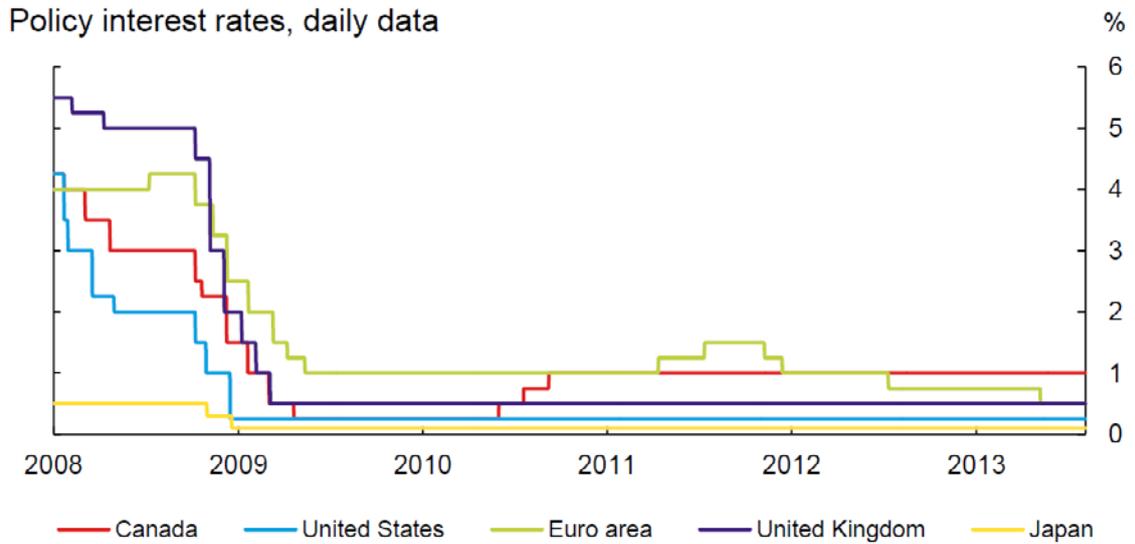
A second important factor working in our favour is the tight alignment of incentives on the part of countries that are exiting as well as those that are affected by the process. No one wants it to proceed in a disorderly manner, and no one should want the exit to occur too early or too late.

A third significant development from the perspective of EMDEs is the greatly improved circumstances in which these countries find themselves, in terms of their size and resilience. The impressive fiscal, financial and structural reforms that many of them have undertaken will put these economies in a far better position than they were 30, 20, or even 10 years ago.

The same cannot be said of every country, of course. Much more remains to be done in many EMDEs as well as AEs. There can be no guarantee that the exit process will end positively for all countries. Vulnerabilities that were previously concealed by generous amounts of global liquidity may become more evident as normal monetary conditions are restored. All of this underscores the importance of countries getting their houses in order.

Chart 1: Policy interest rates are at historically low levels in advanced economies

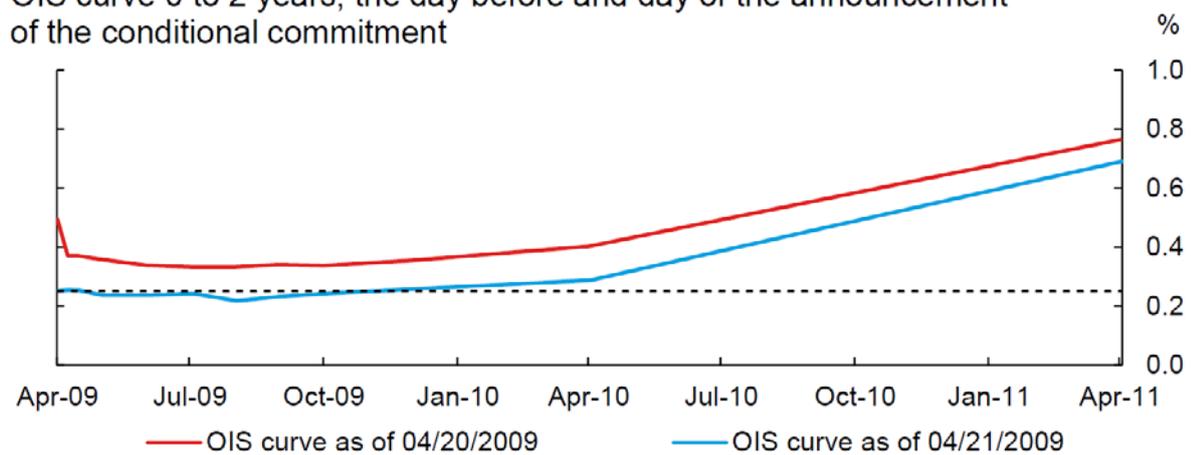
Policy interest rates, daily data



Sources: Bank of Canada, U.S. Federal Reserve, European Central Bank, Bank of England and Bank of Japan Last observation: 5 August 2013

Chart 2: Bank of Canada yield curve expectations declined after conditional commitment was announced

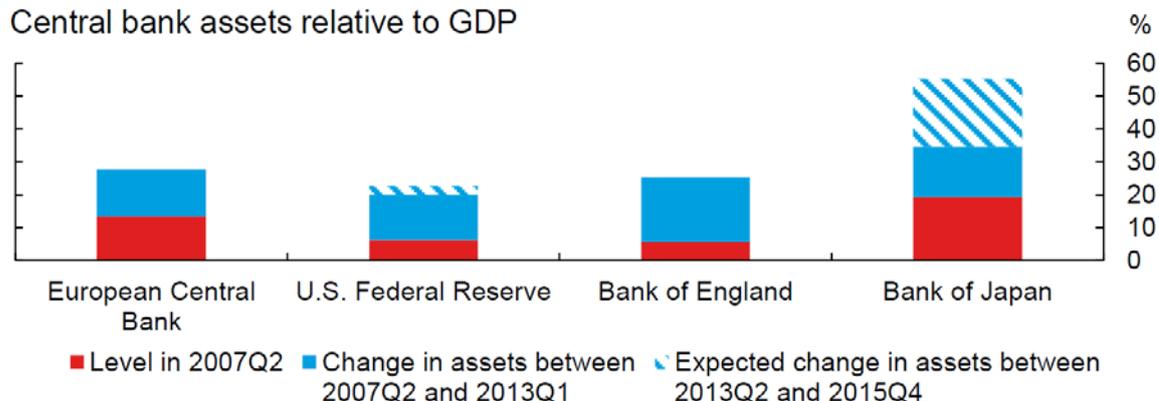
OIS curve 0 to 2 years, the day before and day of the announcement of the conditional commitment



Note: On 21 April 2009, the Bank of Canada announced its commitment to hold the policy rate at 0.25 per cent until the end of 2010Q2. Source: Bloomberg Last observation: April 2009

Chart 3: Some central banks have committed to providing additional substantial unconventional monetary easing

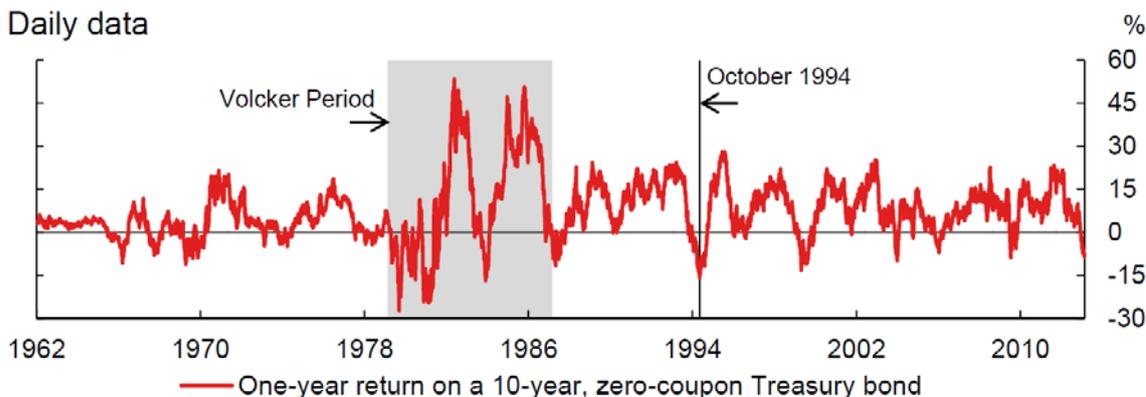
Central bank assets relative to GDP



Note: The expected increase in the assets of the U.S. Federal Reserve is based on an average of private sector forecasts, assuming no change in the total stock of assets after the end of the current asset-purchase program. For the Bank of Japan, the expected change in assets is based on the most recent policy announcement. There is no planned expansion of asset purchases by the European Central Bank or the Bank of England between 2013Q2 and 2015Q4.
Sources: European Central Bank, Eurostat; U.S. Federal Reserve, U.S. Bureau of Economic Analysis; Bank of England, U.K. Office for National Statistics; Bank of Japan, Cabinet Office of Japan; and Bank of Canada calculations
Last observation: 2013Q1

Chart 4: U.S. long-term bond returns

Daily data



Notes: The observation for each day is the continuously compounded return on a theoretical 10-year, zero-coupon Treasury bond purchased 252 trading days prior. The bond prices were calculated based on parameters from an update presented in R. Gurkaynak, B. Sack and J. Wright, "The U.S. Treasury Yield Curve: 1961 to the Present," Finance and Economics Discussion Series, 2006-28, Federal Reserve Board, 2006.
Sources: U.S. Federal Reserve Board and Bank of Canada calculations
Last observation: 5 August 2013

Figure 1: Mundell-Fleming trilemma: Only two of the three objectives can be achieved simultaneously

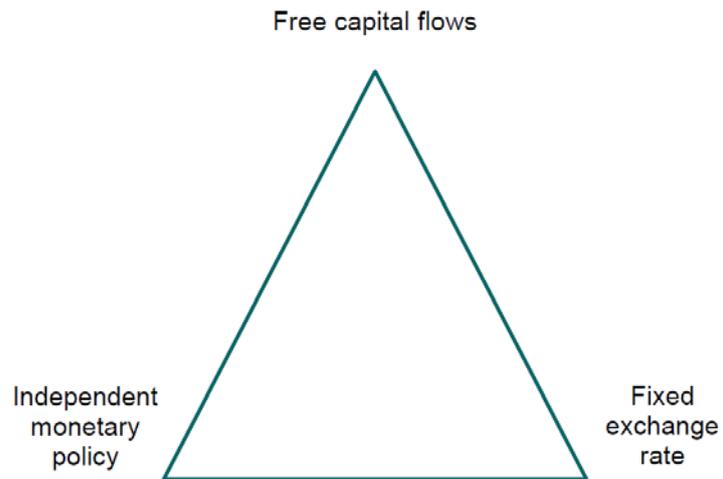
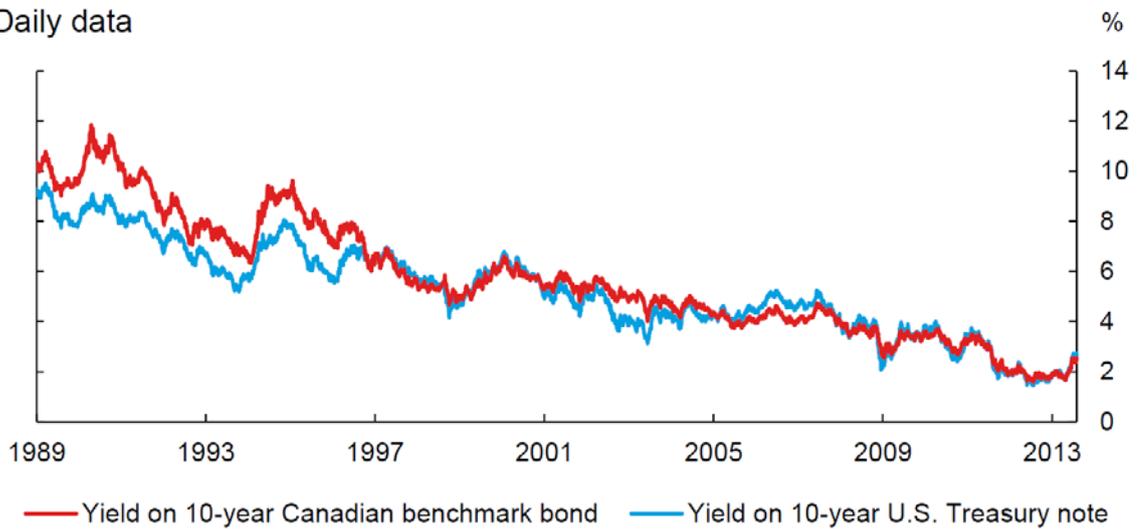


Chart 7: Yields on long-term bonds in the United States and Canada

Daily data

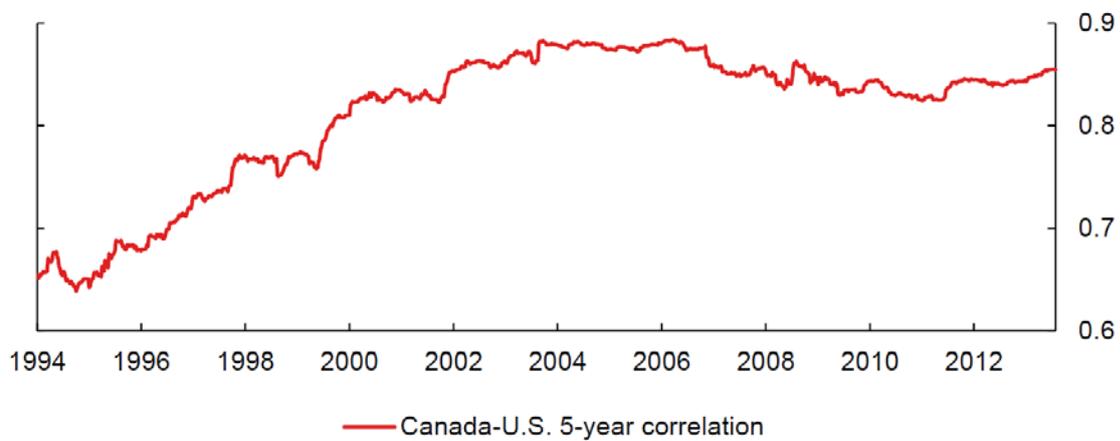


Sources: Bank of Canada and U.S. Treasury

Last observation: 5 August 2013

Chart 8: Rolling correlation of first differences of United States and Canada long-term bond yields

Weekly data

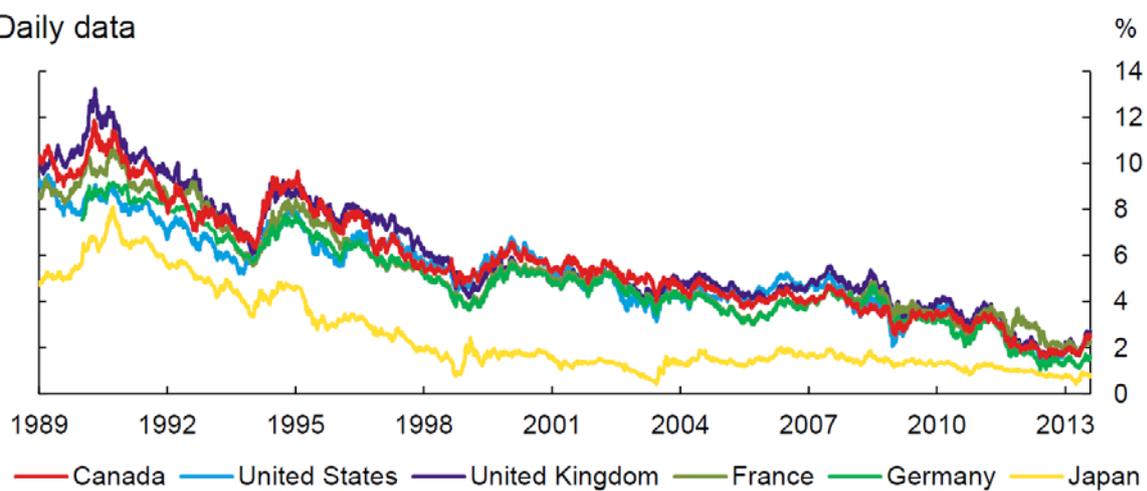


Sources: U.S. Treasury and Bank of Canada calculations

Last observation: 5 August 2013

Chart 9: Long-term bond yields in selected advanced economies

Daily data

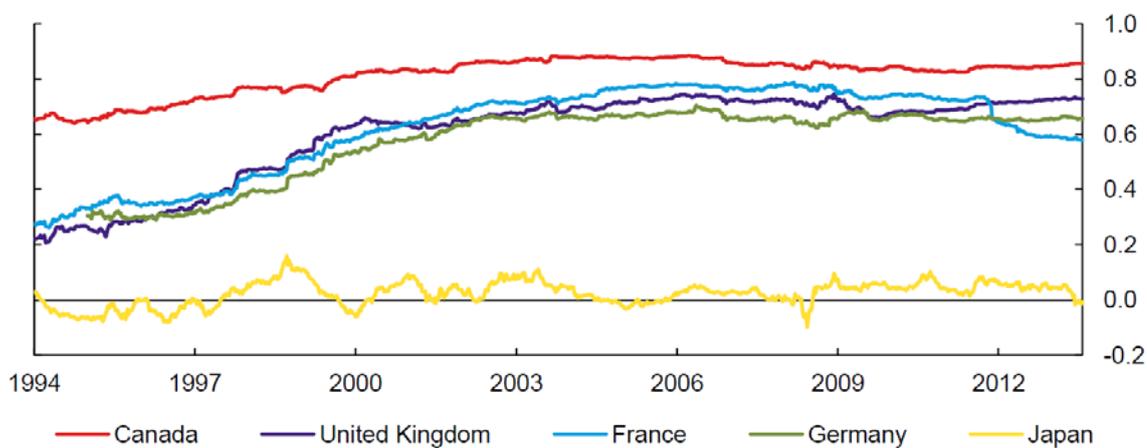


Sources: Bank of Canada, U.S. Treasury, Bank of England, Banque de France, Deutsche Bundesbank and Bank of Japan

Last observation: 5 August 2013

Chart 10: Five-year rolling correlation between changes in U.S. long-term bond yields and those of other advanced economies

Weekly data



Sources: U.S. Treasury, Bank of England, Banque de France, Deutsche Bundesbank, Bank of Japan and Bank of Canada calculations

Last observation: 2 August 2013