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Economic Analysis

Natural Interest Rates in the U.S., Canada and Mexico

Kan Chen / Nathaniel Karp

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- **The U.S. and Canada show a downward trend in their natural interest rates; Mexico's remains stable**
- **The non-growth factor matters the most for Mexico, while the growth factor matters the most for Canada**
- **The comovement of r-stars is high for the U.S. and Canada**
- **The prospect of increasing natural interest rates for the U.S. will affect both Canada and Mexico**

Introduction

Like the Federal Reserve, many central banks around the world will attempt to normalize monetary policy after an extended period of low interest rates. These countries will have to balance the spillover effect from Fed's normalization with their internal dynamics. For countries with close ties to the U.S. economy, the influence could be more profound. This is the case of Canada and Mexico, which are two traditional small-open economies[1], mostly price-takers in the international markets, and highly integrated to the U.S. through international trade and capital markets.

The cornerstone of the Federal Reserve's short-term interest rate normalization process is the natural interest rate or r-star, which acts as the benchmark for full normalization and has repeatedly emerged in discussions on the expected path of monetary policy.[2] In this brief, we try to illustrate the linkages of natural interest rates among the three countries and to better understand the potential implications of U.S. monetary policy normalization on Canada and Mexico's monetary policy.

The analysis follows the approach from Laubach and Williams (2003), used in our previous brief that studied different measures of the natural interest rates and their impact on the U.S. economy.[3] The methodology estimates a system of five equations:

1: In the macroeconomics jargon, a small-open economy is an economy that is both open and small. That is, it actively trades goods, services, and financial products in the international markets. However, due to its small size, it lacks the power of influencing prices.
2: See for example, Carlstrom and Fuerst 2016, Laubach and Williams 2016, Holston et al. 2017, and Galesi et al. 2017
3: Natural Interest rate: uncertainties and policy implications: https://www.bbvaresearch.com/en/publicaciones/u-s-natural-interest-rate-uncertainties-and-policy-implications/.

$$\tilde{y}_t = a_{y,1}\tilde{y}_{t-1} + a_{y,2}\tilde{y}_{t-2} + \frac{a_r}{2}\sum_{j=1}^{2}(r_{t-j} - r^*_{t-j}) + \epsilon_{1,t} \qquad (1)$$

$$\pi_t = b_\pi \pi_{t-1} + b_y \tilde{y}_{t-1} + \epsilon_{2,t} \qquad (2)$$

$$y^*_t = y^*_{t-1} + g_{t-1} + \epsilon_{3,t} \qquad (3)$$

$$g_t = g_{t-1} + \epsilon_{4,t} \qquad (4)$$

$$r^*_t = g_t + z_t \qquad (5)$$

where $\tilde{y}_t$ denotes the gap between actual real GDP (y_t) and the unobserved potential GDP (y^*_t), r_t is the real federal funds rate, r^*_t is the natural interest rate, and π_t denotes the consumer price inflation. Equation (5) further decomposes the natural interest rate into two components: g_t and z_t, where g_t is the growth rate of potential output, and z_t is the aggregate change of non-growth factors, such as individuals' preferences over risks and liquidity. This decomposition enables us to distinguish the effect of growth and non-growth factors on the natural interest rate.

The natural interest rate in the United States, Canada and Mexico

We obtained natural interest rates for Canada, Mexico and the United States with the Three-Step Maximum Likelihood Estimation method developed by Laubach and Williams (2003). Figure 1 shows r* for the three countries. The U.S. and Canada have similar sample spans, which start from 1961 and 1964 respectively, while Mexico's data starts from 1981.

Figure 1. Natural interest rates (r*) for Canada, Mexico and the United States
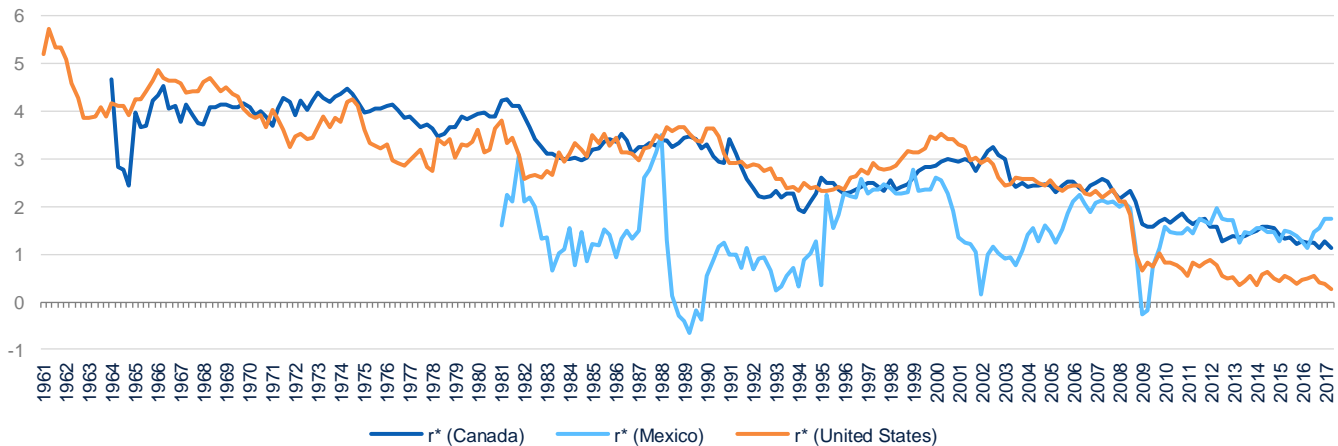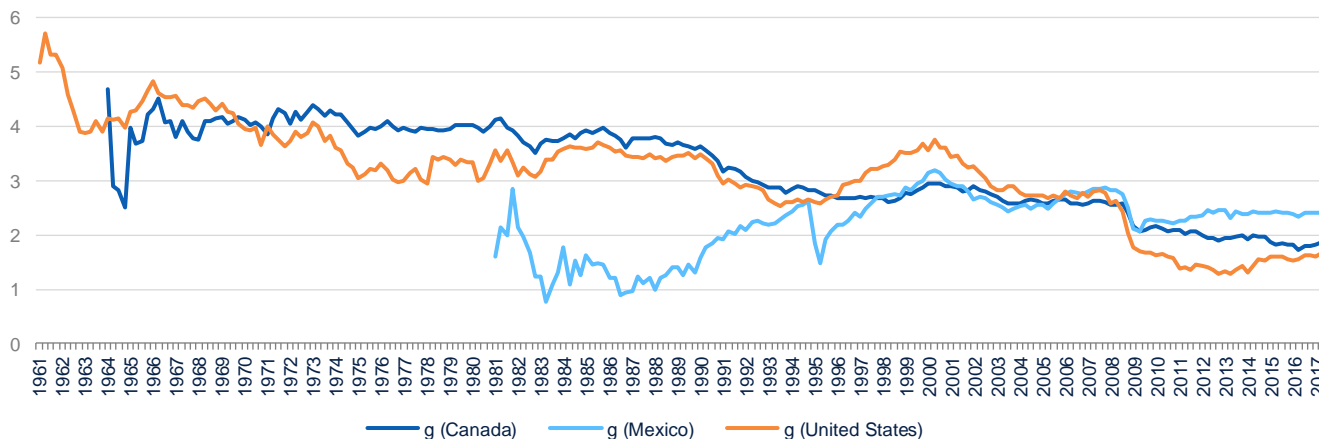

Source: BBVA Research

From Figure 1, we can see that the natural interest rates of Canada and Mexico are notably different. First, Mexico's r-star is significantly more volatile than natural interest rates of the U.S. and Canada. This is consistent with the argument of Aguiar and Gopinath (2007) that "the cycle is the trend" for emerging market economies. That is, transitory shocks in emerging market economies are much larger and more persistent than in advanced economies. Therefore, it is often challenging to separate cycles and trends in the business cycle. Second, the dynamics of natural interest rates vary significantly after 2008's global financial crisis. For Canada, the scale of the drop in its natural interest rate is much smaller than for the U.S. However, the declining trend for both countries shows that both are affected by similar structural

factors, such as the slowdown of productivity, aging of the labor force, and insufficient investment. For Mexico, its natural interest rate exhibits an even more substantial decrease. However, after a swift rebound r-star returns to the pre-crisis level. This sharp rebound and a higher natural interest rate than its partners indicates the resilience of the Mexican economy and financial system.

Growth and non-growth components of r*

As equation (5) suggests, we can decompose the natural interest rate (r_t^*) into two parts: the growth component (g_t) and the non-growth component (z_t). The intuition behind such decomposition is straightforward. First, the natural interest rate should reflect the return to capital investment, which will be captured by the growth component. Second, the natural interest rate should also indicate market characteristics, such as preferences over risks and liquidity conditions. Such characteristics will be captured by the non-growth component. Therefore, the decomposition will shed light on our understanding of the driving factors behind natural interest rates in this cross-country study.

Figure 2. Growth components (g) for Canada, Mexico and the United States

Source: BBVA Research

Figure 2 illustrates the growth component for the three North American countries. For the U.S., the rate of potential output growth peaked around 2000 and suffered a significant decline after the Great Recession. The gradual rebound thereafter is consistent with our alternative estimations suggesting that the potential output growth rate will be between 1.8% and 2.3% for the next decade.[4]

According to our estimation, after the global financial crisis, Mexico has the highest and most stable potential output growth rate. The robust growth rate of 2.4% since 2012 reflects favorable demographics and strong economic fundamentals in high-value-added industries. On the other hand, Canada, the other small-open economy in North

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America, exhibits a declining secular trend in potential output growth since the 1980s. Our estimate of the growth rate is 1.8% for 2017, which is slightly higher than the Bank of Canada's 1.4% over 2017-2019.[5]

The estimates of the non-growth components depict a different picture from the growth components (Figure 3). The z series for Mexico is highly volatile, and for most of the time, it is significantly negative as well. This might be the result of the vulnerability to international capital flows that characterize an emerging market economy. It can also reflect the rebalancing between safe and risky domestic assets. Before NAFTA, currency crisis appears to have a significant effect. In the 2000s, the investment reversal and industrial rebalancing amid greater competition from China explain the low rates of the non-growth component that lasted for an extended period. After 2006, excluding the global financial crisis, Mexico's z factor remained relatively stable, highlighting a robust export sector and greater confidence in the financial system. Nonetheless, the recent uptick could reflect higher uncertainty after the U.S. elections. It is worth noting that the high volatility explains the patterns of the natural interest rate despite its stable potential output growth rate. Therefore, financial stability should remain a top priority for policymakers.

Figure 3. Non-growth components (z) for Canada, Mexico and the United States
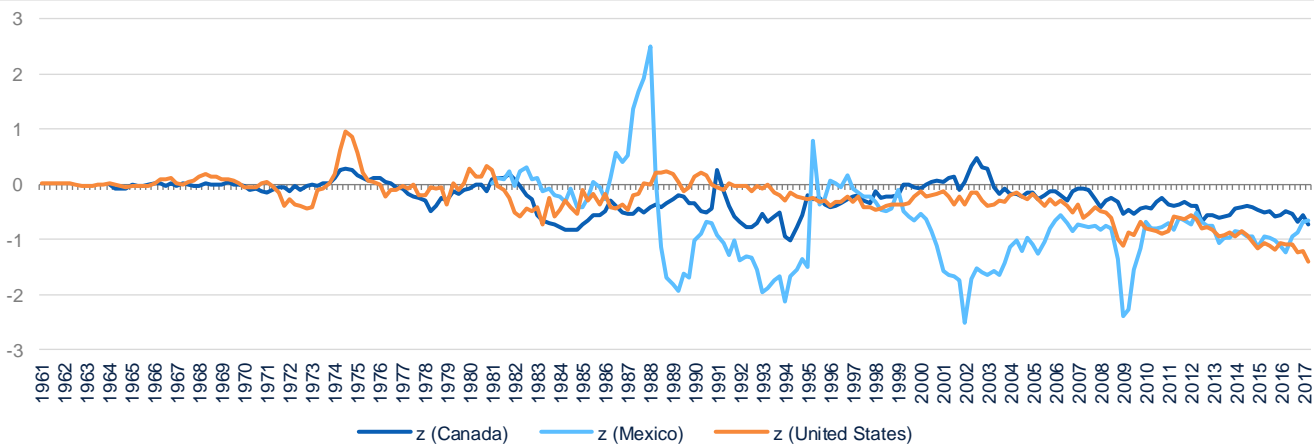
Source: BBVA Research

For the U.S. and Canada, non-growth components have also declined since 2000, signaling the chronic shortage of apparently safe assets relative to an increasingly high demand from both domestic and international investors (Bernanke et al. 2011). Recent studies suggest that the shortage of safe assets during the financial crisis can lead to a massive decline of natural interest rates (Caballero et al. 2017), and the effect can last an extended period (Barro et al. 2017). In part, this could also reflect the Fed's quantitative easing programs that were aimed at purchasing U.S. Treasuries, and the regulatory requirements that prompted an increase in the demand for safe assets from financial institutions. Canada's downward trend reflects monetary actions and spillover effects from the U.S. However, the widening gap between both countries shows a more forceful monetary response in the U.S.

5: Monetary Policy Report – July 2017: http://www.bankofcanada.ca/wp-content/uploads/2017/07/mpr-2017-07-12.pdf.

The common factor

Studies on international business cycles suggest that countries with common characteristics usually have comovement in their key macroeconomic variables (Kose et al. 2003). Due to the geographic proximity and the trade agreements between Canada, Mexico, and the U.S., the flow of capital, labor, and technology has been remarkably active among the three partners. Therefore, by obtaining common components in different series, we can investigate the dynamics of the comovement of natural interest rates in North America. Furthermore, we can also analyze the contribution of growth and non-growth components to the common factor, and thus shed light on the driving forces of the natural interest rate. Our approach uses a standard dynamic factor model with the following system of equations for the three countries:
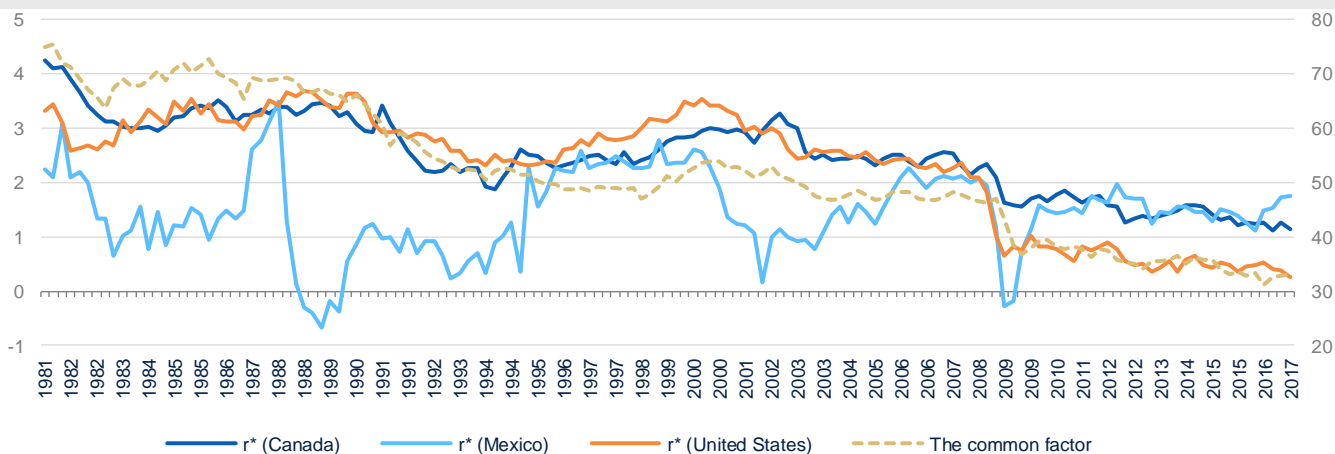
$$g_{i,t} = p_i^g f_t + \epsilon_{i,t}^g \qquad (6)$$
$$z_{i,t} = p_i^z f_t + \epsilon_{i,t}^z \qquad (7)$$
$$f_t = a_1 f_{t-1} + a_2 f_{t-2} + \epsilon_{i,t}^f \qquad (8)$$

where $i = Mexico, Canada, and US$, and f_t is the common factor that drives all growth and non-growth series for the three countries.

Figure 4. The common factor and natural interest rates

Source: BBVA Research

Figure 4 shows the common factor from the dynamic factor model and the natural interest rates of the three countries. A visual inspection reveals that the common factor (f_t) was more similar to r-stars of Canada and the U.S. up until the mid-90s. After NAFTA, the common factor responds to conditions in all three countries although the influence of Mexico is lower. This is consistent with findings in the empirical literature on international business cycles that advanced economies tend to have much higher comovement than emerging market economies.

We further investigate different components' contribution to the common factor by calculating the correlation coefficients of the common factor (f_t) and all series (r-star, growth factor and non-growth factor), and summarize the results in Table 1. First, we can see that the growth factor is always more significantly correlated with the common factor than the non-growth factor. As the growth factor in the model is one country's potential output, this implies that measures aimed to

promote the country's long-run economic potential would play a critical role in normalizing and stabilizing the interest rate. Second, by comparing the correlation coefficients for the full sample and for the post-global financial crisis period, we can see that the r-star of the U.S. is becoming less correlated with the common trend. Especially, the correlation coefficient for the growth factor drops from 0.77 to 0.17. This probably reflects that idiosyncratic headwinds to the U.S. economy have become more relevant in determining potential output; a topic that has been extensively discussed among economists and policymakers (Gordon 2016). Third, while most correlation coefficients for the U.S. and Canada are positive, most of the coefficients for Mexico are significantly negative. Such stark differences confirm the lack of comovement between developed and developing countries and the *global savings glut* theory (Bernanke et al. 2011), which states that developing countries hold excessive quantities of safe assets from developed countries, in order to protect themselves from adverse effects of sudden capital outflows. However, this strategy will drive down the interest rates of the advanced economies to an extremely low level.

Table 1. Correlation coefficients with the common factor

Full Sample: 1981-2017

Country	Natural interest rate	Growth component	Non-growth component
Canada	0.79	0.87	-0.01
Mexico	-0.09	-0.57	0.33
United States	0.76	0.77	0.60

Post-Global Financial Crisis: 2009-2017

Country	Natural interest rate	Growth component	Non-growth component
Canada	0.80	0.89	0.49
Mexico	-0.48	-0.75	-0.38
United States	0.65	0.17	0.48

Source: BBVA Research

Bottom Line

In this brief, we estimate and analyze the natural interest rates of the U.S., Canada, and Mexico. For Canada, the decline of the natural interest rate is driven by a slowdown in potential output growth. Thus escaping from the "low-interest-rate-trap" would require improvement on the structural factors of the overall economy. For Mexico, the economy appears to have a stable potential growth rate that is also higher than in the U.S. and Canada. However, as expected for an emerging market economy that is subject to large fluctuations of risk perception, its non-growth component is notably volatile. In fact, swings in the supply of domestic safe assets and uncertainty after the U.S. elections have had a significant impact on the natural interest rate. For the U.S., it is the only economy whose r-star significantly positively correlates with the common trend for the full sample, which illustrates its substantial influence within North America. Considering that the growth factor will continue converging with its expected long-run rate of around 2%, all else equal, the natural interest rate is bound to increase modestly. However, the main upside would be a rebound in the non-growth

factor, which currently stands at its historical low. This is highly probable given the beginning of the Fed's balance sheet normalization and the ongoing rebalancing from safe assets towards investment.

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