

# A New Effective Exchange Rate Index for the Canadian Dollar

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- *A new Canadian-dollar effective exchange rate index (CERI) has been created to replace the C-6 index that the Bank currently uses. The CERI uses multilateral trade weights published by the International Monetary Fund and includes the six currencies of countries or economic zones with the largest share of Canada's international trade.*
- *The multilateral trade weights used to calculate the CERI account for both direct and third-market competition, thus giving a more comprehensive picture of Canada's trade competitiveness than the bilateral weights used in the existing C-6 index.*
- *This new index better reflects the recent changes in Canada's trade profile, including the rise in the importance of China and Mexico and the relative decline in importance of Europe and Japan in Canada's international trade.*
- *Given the substantial weight assigned to the U.S. dollar in each index, the CERI and the existing C-6 track each other closely. However, the sub-indexes created when the U.S. dollar is excluded from both indexes show significantly different paths for the Canadian dollar.*

**A**n effective exchange rate is a measure of the value of a country's currency vis-à-vis the currencies of its most important trading partners. It is calculated by taking a weighted average of the relevant bilateral exchange rates of the country in question. These weights typically represent the relative importance of a foreign country to the home country's international trade. An index of this effective exchange rate is used by the Bank of Canada to summarize exchange rate developments in order to assess current and future economic developments. The purpose of this article is to describe the Bank's new Canadian-dollar effective exchange rate index (CERI), which was created to replace its current trade-weighted index.

The Bank has been using the C-6 index and its predecessor, the G-10 index, since the early 1980s. The C-6 index tracks the foreign exchange value of the Canadian dollar against six major currencies (the U.S. dollar, the euro, the Japanese yen, the U.K. pound, the Swiss franc, and the Swedish krona).<sup>1</sup> The weightings used to calculate the values of the C-6 are based on Canadian merchandise trade flows over the 1994 to 1996 period. Apart from a revision to the currency basket to reflect the introduction of the euro in 1999, the currency composition and weights used in the computation of the C-6 index have not been reviewed since 1999.

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1. For the period before 1999, the index includes the currencies of Belgium, France, Germany, Italy, and the Netherlands, which are now part of the euro zone.

Trade patterns worldwide and in Canada have changed appreciably over the past decade. According to a recent survey of global trade patterns by the International Monetary Fund (IMF), the United States, Mexico, and developing Asia (particularly China) have all seen their relative share of Canada's international trade increase, while the shares of both the euro zone and Japan have declined (Bayoumi, Lee, and Jayanthi 2005).

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*The C-6 will no longer be published on the Bank's website or in external publications after 31 December 2006.*

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To better reflect these changes in Canada's trade profile, the Bank of Canada has replaced the C-6 index with an effective exchange rate index composed of an updated group of currencies and associated weights based on the most recent IMF statistics. The C-6 will no longer be published on the Bank's website or in external publications after 31 December 2006.

## The New Index

Designed to be a summary measure of the Canadian dollar's movements against the currencies of its important trading partners, the CERI updates the weights and composition of the currency basket based on IMF-calculated trade weights.<sup>2</sup> The weights used to calculate the index from 1996 to the present are based on trade data for 184 countries over the 1999–2001 period and encompass trade in non-energy commodities, manufactured goods, and services (e.g., tourism).<sup>3</sup> Before 1996, the weights are based on trade data over the 1989–91 period.

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2. For more details on the IMF methodology to calculate the weights, see Bayoumi, Lee, and Jayanthi (2005).

3. See the Appendix for the formula used to calculate the index.

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*Inclusion in the new index is limited to the currencies of countries that have IMF-calculated trade weights of 2 per cent or higher.*

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The weights also account for the geographical distribution of trade (import, bilateral export, and third-market competition) in determining the significance of a particular country to Canada's international trade.<sup>4</sup> This is important because domestic firms compete with foreign firms in three locations: 1) at home, through imports; 2) in foreign markets with local firms; and 3) with other exporters in foreign markets. Ideally, all three locations of competition should be captured in the calculation of trade weights between a country and the rest of the world. Given the breadth and depth of the IMF's methodology, the IMF weights provide a more accurate ranking of the importance of different countries to Canada's international trade than do the weights in the C-6, which are calculated using simple bilateral merchandise-trade data.

Inclusion in the new index is limited to the currencies of countries that have IMF-calculated trade weights of 2 per cent or higher. Of the 184 countries surveyed by the IMF, five countries plus the euro zone satisfy this criterion.<sup>5</sup> The United States, with the highest weight, is Canada's most important trading partner by a very large margin. The euro zone and Japan rank second and third, respectively. China, Mexico, and the United Kingdom complete the six countries included in the index (Table 1).<sup>6</sup>

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4. Third-market weights measure the intensity of competition between two countries (domestic and foreign) outside their respective local markets by multiplying the foreign country's share of total supply in each third market by the relative importance of the third markets as destinations for the domestic country's exports. For details on how the weights are computed, see Bayoumi, Lee, and Jayanthi (2005).

5. The IMF treated the euro zone as a single entity with a single exchange rate.

6. With a trade weight of around 1 per cent, China did not make the cut-off of 2 per cent for the 1989-91 period. During that time, Canada traded (or competed) more with South Korea than with the People's Republic of China.

**Table 1**  
**CERI and C-6 Currency Weightings**

Currencies <sup>a</sup>	CERI		C-6 index
	Weights used 1996–present <sup>b</sup>	Weights used 1981–95 <sup>b</sup>	Weights used 1980–present
U.S. dollar	0.7618	0.5886	0.8584
Euro	0.0931	0.1943	0.0594
Japanese yen	0.0527	0.1279	0.0527
Chinese yuan	0.0329	–	–
Mexican peso	0.0324	0.0217	–
British pound	0.0271	0.0368	0.0217
South Korean won	–	0.0307	–
Swiss franc	–	–	0.0043
Swedish krona	–	–	0.0035

a) We used the Bank of England proxy for the euro for the period before January 1999. Some of the exchange rates were from Bloomberg.  
b) The IMF weights were rescaled to sum to unity.

The composition of the index captures a significant share (86 per cent) of Canada's international trade volume and better reflects Canada's trade profile than the C-6, which excludes Mexico and China (South Korea in the earlier period), and should therefore provide a better indication of the current and future impact of exchange rate movements on the real economy. As newer IMF trade weights are published, the index weights and currency composition will be adjusted as required. Historically, the IMF has updated the index weights every 10 years.

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## The CERI and the C-6 Compared

The CERI offers several advantages over the current C-6 index, particularly the use of multilateral trade weights, the inclusion of trade in services, and the use of more recent trade data. These improvements provide a more accurate reflection of the nature of Canada's international trade patterns. Table 2 summarizes the key differences between the two indexes.

**Table 2**  
**Summary Comparison of the CERI and the C-6**

Points of comparison	CERI	C-6 index
Currency-weight calculations	Multilateral	Bilateral
Dates used for reference and for updating	1989–91 weights used for the period 1981–95; 1999–2001 weights used for 1996 to the present	1994–96 weights used for the entire period; updated every 10 years
Percentage of Canada's international trade captured*	86%	81%
Trade included	Goods, services, non-energy commodities	Merchandise trade

\* Based on average total trade over the 1999–2001 period

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Because both indexes place a very high weight on the U.S. dollar, the CERI and the C-6 have tracked each other relatively closely over time (Chart 1).<sup>7</sup> There is, however, a noticeable discrepancy between them over the period 1981 to 1986. During that time, the C-6 depreciated by 13 per cent, while the CERI first appreciated by almost 10 per cent before depreciating sharply, for an overall fall of about 7 per cent.

Some of the discrepancy experienced between 1981 and 1986 can be attributed to the Canadian dollar's significant appreciation (3,000 per cent) against the Mexican peso and, to a lesser degree, the South Korean won (10 per cent), which offset in part the Canadian dollar's 13 per cent depreciation against the U.S. dollar. For the same period, the Canadian dollar also fell by 10 per cent against the euro and 36 per cent against the Japanese yen. The result of the deprecia-

7. An increase in the indexes represents an effective appreciation of the Canadian dollar against the currencies in the basket.

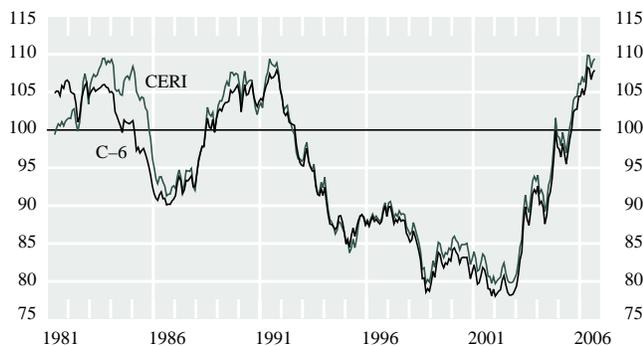
tion against these currencies can be seen mostly in the C-6, which does not include the Mexican peso and the South Korean won to counter the effect.

From 1987 onward, the CERI and the C-6 have tracked each other very tightly. The two indexes appreciated by around 18 per cent from 1987 to August 2006 (Chart 1). One reason for the very close relationship is the increase in the weight of the U.S. dollar in the CERI. Beginning in 1996, this weight increased from 0.5886 to 0.7618, which is much closer to the weight in the C-6 of 0.8584. Because of the high weight on the U.S. dollar in both indexes in the recent period, both series are essentially reflecting the Canadian dollar's appreciation against the U.S. dollar for that period.

**Chart 1**  
**The CERI and the C-6**

Monthly

1992 = 100



If the indexes are expressed in real terms, using the consumer price indexes (CPI) of the various countries, from 1981 to 1986 both the CERI and the C-6 were down by only 3.5 per cent (Chart 2).<sup>8</sup> From 1986 to 1988, the real C-6 rose by 15 per cent, while the real CERI was up by 6 per cent. Since then, the two indexes have tracked each other quite closely.

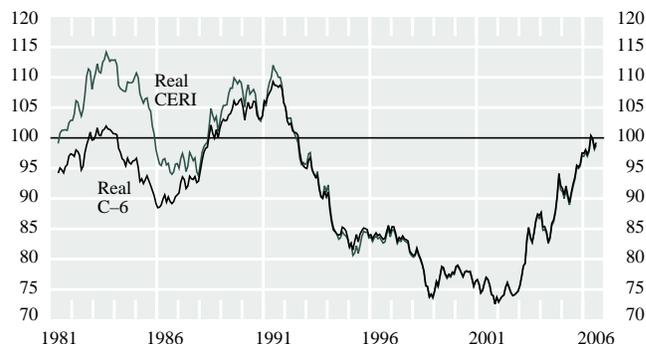
If the U.S. dollar is removed from the indexes, the difference between them becomes more noticeable (Chart 3). The CERI excluding the U.S. dollar appreci-

8. The data end in June 2006 because there is a lag in computing the real effective exchange rate, based on when some of the countries report their CPI.

**Chart 2**  
**The Real CERI and the Real C-6**

Monthly

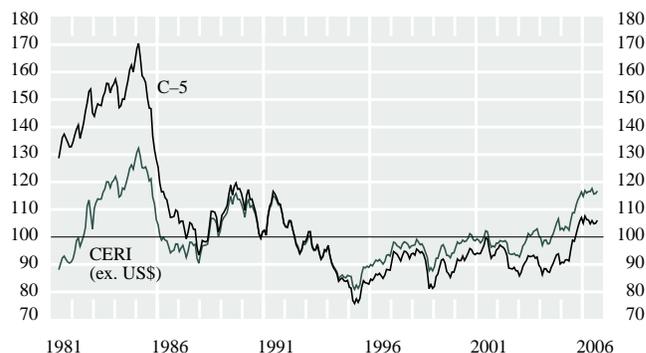
1992 = 100



**Chart 3**  
**The CERI (excluding US\$) and the C-5**

Monthly

1992 = 100



ated by 10.5 per cent from 1981 to 1986. However, the C-5 (i.e., the C-6 excluding the U.S. dollar) showed a depreciation of 15 per cent over the same period. The CERI excluding the U.S. dollar increased in value by about 22 per cent from 1987 onward, while the C-5 has returned to about its January 1987 level. The reason for the latter difference is that the CERI captures the significant appreciation of the Canadian dollar against both the Mexican peso and the Chinese yuan for the later period, while the C-5 did not. The C-5 reflects the sideways movement of the Canadian dollar against the yen and the euro.

From 1981 to 1986, however, the real CERI excluding the U.S. dollar declined by only 3 per cent, while the C-5 depreciated by 8 per cent (Chart 4). Over that period, for the real CERI excluding the U.S. dollar, the Canadian dollar's real appreciation against the Mexican peso and the South Korean won partially offset its real depreciation against the yen and the euro.

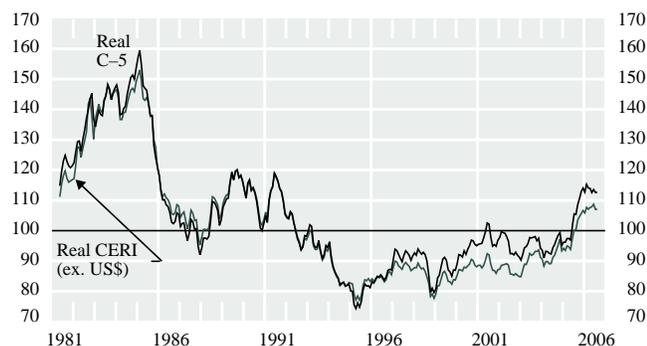
When the U.S. dollar is removed, the real CERI excluding the U.S. dollar is up by only 2.5 per cent since 1987, while the real C-5 is up 11 per cent (Chart 4). This is partly owing to the Canadian dollar's 30 per cent real depreciation against the Mexican peso from 1987 to 2006, and the 33 per cent real depreciation against the South Korean won from 1987 to 1995. As well, the CERI excludes the Canadian dollar's 30 per cent real appreciation against the Swedish krona and the 10 per cent real appreciation against the Swiss franc from 1987.

Chart 4

### The Real CERI (excluding US\$) and the Real C-5

Monthly

1992 = 100



## Conclusion

The Bank of Canada has created the CERI, an updated index reflecting recent changes in Canada's trade profile, to replace the C-6. The weights for the new index were derived using more recent trade data and a more comprehensive methodology than the one used in calculating the weights for the C-6. The IMF weights factor in both direct and third-market competition, while the C-6 used only bilateral trade data and uses 1999–2001 trade data compared with the 1994–1996 trade data used in the C-6.

Although the changes in the methodology translate into only small changes in the profile of the Canadian-dollar trade-weighted index when the United States is included, the profile is quite different when the United States is excluded, given its large weight in both indexes. The difference in the nominal indexes occurs primarily over the 1981 to 1986 period and is largely owing to divergences in the inflation patterns across countries.

The Bank will continue to refine its trade-weighted index as necessary. Specifically, it will periodically examine the methodology used in computing weights for the CERI. As well, corresponding real effective exchange rates using monthly unit labour costs may be constructed as data for China become available.<sup>9</sup>

9. China does not report unit labour costs.

## Literature Cited

- Bayoumi, T., J. Lee, and S. Jayanthi. 2005. "New Rates from New Weights." IMF Working Paper No. 05/99.
- Leahy, M. 1998. "New Summary Measures of the Foreign Exchange Value of the Dollar." *Federal Reserve Bulletin* (October): 811–28.

- Lafrance, R., P. Osakwe, and P. St-Amant. 1998. "Evaluating Alternative Measures of the Real Effective Exchange Rate." Bank of Canada Working Paper No. 98–20.

## Appendix

The formula for the CERI is

$$I_t = I_{t-1} \times \prod_{j=1}^{N(t)} (e_{j,t}/e_{j,t-1})^{w_{j,t}}$$

where  $I_{t-1}$  is the index in the previous period and  $e_{j,t}$  and  $e_{j,t-1}$  are the prices of foreign currency  $j$  per Canadian dollar at times  $t$  and  $t-1$ .  $N(t)$  is the number of foreign currencies in the index at time  $t$ ,  $w_{j,t}$  is the weight of currency  $j$  in the index at time  $t$ , and  $\sum_j w_{j,t} = 1$ . This is the same formula used by the Federal Reserve Bank to construct their U.S. dollar trade-weighted index (Leahy 1998).

A real CERI can be constructed by changing the nominal exchange rate to a real rate, using the formula  $e_{j,t} \times P_t / P_{j,t}$ , where  $P_t$  is the price deflator for Canada and  $P_{j,t}$  is the price deflator for country  $j$ . The real CERI presented in this article is constructed using the CPI as the price deflator for Canada and the other countries in the basket.<sup>1</sup>

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1. Based on a study by Lafrance, Osakwe, and St-Amant (1998), unit labour costs (ULC) explain movements in Canadian net exports and real output significantly better than those based on consumer price indexes. However, since there are limitations with respect to the availability and quality of ULC measures for emerging markets, the CPI can be used as a proxy because it appears to be highly correlated to ULC.