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Abstract

Canada's international competitiveness has received increasing attention in recent years as exports have fallen short of expectations and Canada has lost market share. This paper asks whether the Bank of Canada's current effective exchange rate measure, the CERI, is still an accurate measure of Canada's international competitiveness. Overall, while the CERI represented an improvement over previous measures when it was introduced, we find that it has several drawbacks that make it less well suited to address current competitiveness issues. To address these deficiencies, we develop a new Canadian effective exchange rate (CEER) index using a methodology based on current international best practices. The new index includes a broader set of countries and uses annually updated competition-based weights. These weights account for both Canada's bilateral trade with another country and the competition Canada faces from that country on a product-by-product basis in third markets. We find that the CEER has depreciated less than the CERI in recent years, reflecting the greater importance of third-market competition from emerging-market economies in the CEER. This could help explain why Canada's share of the U.S. import market has continued to decline despite the recent large depreciation of the Canadian dollar against the currencies of a number of advanced economies.

JEL classification: F1, F31
Bank classification: Exchange rates; International topics

Résumé

La compétitivité du Canada sur les marchés internationaux est de plus en plus débattue depuis quelques années dans un contexte où l'évolution des exportations canadiennes ne répond pas aux attentes et où le pays perd des parts de marché. Ce document d'analyse cherche à déterminer si l'indice de taux de change effectif du dollar canadien (TCEC) qu'utilise la Banque du Canada est encore une mesure fidèle de la compétitivité des entreprises canadiennes à l'étranger. Dans l'ensemble, l'indice TCEC représentait un progrès par rapport aux mesures qui étaient alors employées lorsqu'il a été adopté, mais il apparaît aujourd'hui rendre moins bien compte de la compétitivité du Canada, du fait de plusieurs failles. Pour corriger ces défauts, nous avons mis au point un nouvel indice de taux de change effectif du dollar canadien (TEC) en nous fondant sur une méthodologie inspirée des pratiques internationales contemporaines. Ce nouvel indice englobe un plus grand nombre de pays et s'appuie sur des pondérations mises à jour annuellement. Ces pondérations rendent compte du commerce bilatéral du Canada ainsi que de la concurrence produit par produit sur les marchés tiers. Le taux de change s'est moins

déprécié selon l'indice TEC que selon l'indice TCEC au cours des dernières années. Ce constat reflète l'importance grandissante de la concurrence des pays émergents sur les marchés tiers dans le TEC. En soi, ce phénomène pourrait aider à comprendre pourquoi la forte dépréciation du dollar canadien observée récemment face aux monnaies de plusieurs pays avancés n'a pas empêché le Canada de continuer à perdre des parts de marché aux États-Unis.

Classification JEL : F1, F31
Classification de la Banque : Taux de change; Questions internationales

1. Introduction

A number of central banks, including the Bank of Canada, routinely publish effective exchange rates for their respective economies. Effective exchange rates attempt to encapsulate movements in a country's bilateral exchange rates with its important trading partners into a single index. Such indexes may be built for a variety of reasons, although they are typically intended to capture how an economy's exchange rate affects its competitiveness in global trade markets. Since 2006, the Bank of Canada has published the Canadian-dollar effective exchange rate index (CERI) on a daily basis.[1] The CERI was viewed as an improvement over the earlier C-6 index because the weights accounted for both direct trade links and third-market competitiveness effects.

Recent developments have focused attention on Canada's international competitiveness. Since 2002, Canadian exports have made up an ever smaller share of the U.S. non-energy import market (Barnett and Charbonneau, 2015). More recently, exports have underperformed what would have been expected, given growth in foreign economic activity and movements of the Canadian dollar vis-à-vis other currencies.

Against this backdrop, we ask whether the CERI is still an accurate measure of Canada's international competitiveness. Overall, we find that the CERI has several drawbacks that make it less well suited to address current competitiveness issues. Most importantly, the CERI focuses on a narrow set of trading partners and uses fixed weights based on trade patterns that are over 15 years old (1999 to 2001). Since that time, there have been large changes in global trade patterns, and emerging markets, particularly China, have become increasingly important drivers of global growth. Together, these factors suggest that the CERI assigns too little weight to emerging-market economies (EMEs). Unfortunately, the CERI's weights cannot be updated more frequently, since they are based on International Monetary Fund (IMF) calculations that are only released once every 10 years. In order to address these deficiencies, we develop a new measure, the Canadian effective exchange rate (CEER) index. The new measure includes a broader set of countries and has weights that are built in-house and can therefore be updated annually.

The remainder of the paper is structured as follows. First, we discuss the criteria for a desirable weighting structure and survey practices across a number of central banks and international organizations. Next, we construct weights based on our preferred methodology, compare these weights to the CERI and show how these changes affect the index. Finally, we investigate the

[1] See Ong (2006) for a description of the CERI.

implications of the new index for assessing Canada's relative competitiveness in recent years due to exchange rate movements.

2. International comparison of effective exchange rate methodologies

Nominal and real effective exchange rate indexes are constructed using a weighted average of a country's nominal and real bilateral exchange rates against a group of countries. These indexes are typically built to measure a country's overall international competitiveness compared with that of its trading partners. However, there is no universally agreed-upon method for calculating effective exchange rate indexes. Comparing approaches across a wide set of central banks and international organizations shows that weighting methodologies, the types of trade included and the frequency with which weights are updated vary significantly across countries (**Table 1**).

Among the central banks and international organizations that we surveyed,[2] two weighting methodologies are widely used:

- **Trade weighting:** Weights are based on direct export shares, import shares or both.
- **Competition weighting:** Weights account for the fact that a country's exports face competition from both domestic producers in the destination country and exports from other countries, referred to as third-market competition.

Trade weighting is the least common method for constructing weights and is used by Australia, New Zealand and Norway. Competition weighting, on the other hand, is by far the most popular methodology for constructing effective exchange rates, including the CERI.

The type of trade that is included in calculations of country weights also varies considerably across institutions. Some institutions focus exclusively on manufacturing goods (for example the Bank for International Settlements (BIS) and the European Central Bank (ECB)); others focus only on goods (some with and others without oil), and a small number also include services (for example Australia, New Zealand and the United Kingdom).[3] Moreover, for those that calculate third-market competition effects, the level of disaggregation can vary. For example, the U.S. Federal Reserve calculates third-market competition effects using its aggregate export and

[2] For additional information, see Alsterlind (2006); Bayoumi, Lee and Jayanthi (2005); Klau and Fung (2006); Leahy (1998); Loretan (2005); Lynch and Whitaker (2004); Ong (2006); and Steenkamp (2014).

[3] Although including services is desirable, data limitations often make it difficult to do so. For example, two of the central banks that include services (Australia and New Zealand) both look just at direct trade links and have only incorporated services in recent years (2011 and 2009, respectively), thus introducing a break in their weights.

import weights, while the IMF calculates this effect using a slightly more disaggregated approach. The CERI uses IMF weights that include non-energy commodities, manufactured goods, domestic sales of manufactured goods, and services trade. However, it is important to note that the weights the IMF attributes to trade in services are assumed to follow a similar pattern to trade in manufactured goods, implicitly up-weighting manufactured goods in the calculation of the effective exchange rate (Bayoumi, Lee and Jayanthi, 2005).

Finally, the frequency at which trade weights are updated across countries typically falls into one of three time frames: annually, every 3 years, or approximately every 10 years. Annual updates of the weights is the most popular approach, with 6 of 8 central banks examined having at least one published index where the weights are updated yearly. Many of the central banks examined have moved to annual updating to ensure that the weight assigned to each trading partner reflects a country's current trade structure. The Canadian CERI and Swedish TCW, on the other hand, are the only central bank indexes that are updated every 10 years due to their reliance on the IMF weights. This feature implies that the trade weights can become quite out of date, particularly during periods of structural change. Moreover, although the weights were updated at the end of 2005, they are actually based on 1999 to 2001 trade patterns and thus do not reflect the rising importance of emerging markets in global trade. However, in Sweden, there is an alternative index (known as the KIX) that is updated annually, which the Riksbank has used to supplement the TCW weights due to the importance of changing trade patterns.[4]

[4] For more information see "KIX Index Better Reflects Sweden's International Dependence" in the Riksbank's October 2012 *Monetary Policy Report*.

Table 1: Comparison of effective exchange rate methodologies for selected countries

	Name of index	Weighting scheme	Number of countries	Trade captured	Weight update frequency
Central banks					
Australia	TWI	Trade	18 + euro area	Merchandise goods and services (since 2011)	Annually
Canada	CERI	Competition	5 + euro area	IMF weights	Approx. every 10 years
	Broad CEER	Competition	16 + euro area	Merchandise goods (excl. oil)	Annually
	Major currencies CEER	Competition	6 + euro area	Merchandise goods (excl. oil)	Annually
	OITP CEER	Competition	10	Merchandise goods (excl. oil)	Annually
ECB	EER-19	Competition	19	Manufacturing only	Every 3 years
New Zealand	TWI	Trade	16 + euro area	Goods and services (since 2009)	Annually
Norway	TWI	Trade	25	OECD weights	Annually
	I-44	Import	44	Merchandise imports	Annually
Sweden	TCW	Competition	21	IMF weights	Approx. every 10 years
	KIX	Competition	32	Manufacturing	Annually
United Kingdom	Broad ERI	Competition	42	Manufacturing and services	Annually
	Narrow ERI	Competition	35	Manufacturing and services	Annually
United States	Broad	Competition	25 + euro area	Goods only	Annually
	Major currencies	Competition	6 + euro area	Goods only	Annually
	OITP	Competition	19	Goods only	Annually
International organizations					
BIS	Broad	Competition	40 + euro area	Manufacturing only	Every 3 years
	Narrow	Competition	14 + euro area	Manufacturing only	Every 3 years
IMF	All fund members	Competition	184	Manufactured goods, primary products (excl. oil) and services (travel only)	Approx. every 10 years
	Advanced economies	Competition	26 + euro area	Manufactured goods, primary products (excl. oil) and services (travel only)	Approx. every 10 years
OECD	Nominal effective exchange rate	Competition	46	Goods only	Annually

3. Building a new Canadian effective exchange rate index

Given the comparison presented in the previous section, we believe a new Canadian effective exchange rate should be constructed by drawing on lessons from international experience. In particular, we believe a new Canadian effective exchange rate index should have the following features:

i) Country coverage should be broadened to better reflect Canada's trading patterns;
ii) Trade weights assigned to a given country should reflect both direct bilateral trade with a country and the competition Canada faces from that country in third markets;
iii) These weights should be updated on a regular basis, preferably annually, to ensure that they reflect Canada's trade patterns over time;
iv) A set of measures should be constructed, since different indexes can serve different purposes. For example some indexes better capture competitiveness-related issues, while others are more suited to assessing financial market pressures on the dollar;
v) Finally, both nominal and real indexes should be constructed. This is particularly important, since broadening the country coverage almost certainly ensures that some countries with much higher rates of inflation than Canada will now be included in the index, making nominal movements less relevant over longer time periods.

The CERI only meets the second criteria, and therefore we develop a new index, the Canadian effective exchange rate (CEER) index.

Selecting the currencies to include in the new index

In order to broaden the country coverage in the new index, we lowered the inclusion threshold so that countries with at least 0.5 per cent of Canadian imports or exports of non-energy goods trade, on average, over the past 10 years are now captured in the index. In contrast, the CERI uses a 2 per cent threshold with the IMF-calculated trade weights. Under this new criterion, 16 countries (Australia, Brazil, China, Hong Kong, Japan, South Korea, Malaysia, Mexico, Norway, Peru, India, Sweden, Switzerland, Thailand, the United Kingdom and the United States) plus the euro area are included in the new index, compared with the five countries (China, Japan, Mexico, the United Kingdom and the United States) plus the euro area in the CERI.

Although trade in energy products is important for Canada, they have been excluded for the purposes of calculating the weights, as they are in the CERI, to be consistent with the international standard. Typically, trade in energy is excluded, since prices are determined in global energy markets, and exchange rate movements are not expected to affect a country's

relative competitiveness in such primary commodities. Excluding energy products also has the potential benefit of minimizing swings in trade weights that could occur due to large swings in crude oil prices, such as those experienced in late 2014. To assess the importance of excluding oil, we also constructed indexes where oil was included. The results show that including oil would have had very little impact on the index (see **Appendix A**).

Overall, we believe that our new nominal and real CEER measures strike an appropriate balance across a number of the criteria/weighting schemes currently used by other central banks and international organizations. Specifically, by including all countries that accounted for at least 0.5 per cent of Canadian non-oil exports or imports, our new measure accounts for over 93 and 91 per cent of Canadian non-oil exports and imports, respectively (**Table 2**).

Table 2 – Share of Canadian imports and exports, by economy (per cent)

	Exports		Imports	
	2000	**2014**	**2000**	**2014**
Euro area	3.3	4.8	6.5	8.3
Australia	0.3	0.5	0.6	0.3
Brazil	0.3	0.5	0.5	0.7
China	1.0	4.8	2.0	12.8
Hong Kong	0.4	1.2	0.6	0.1
India	0.1	0.8	0.2	0.7
Japan	2.3	2.5	5.8	2.9
Malaysia	0.1	0.2	0.6	0.5
Mexico	0.6	1.4	2.2	6.1
Norway	0.2	0.6	0.1	0.1
Peru	0.1	0.2	0.0	0.7
South Korea	0.5	0.9	1.3	1.5
Sweden	0.1	0.1	0.6	0.4
Switzerland	0.1	0.4	0.4	0.8
Thailand	0.1	0.2	0.5	0.6
USA	85.7	70.4	69.2	52.8
United Kingdom	1.6	3.8	1.8	1.8
CERI countries	94.5	87.7	87.5	84.7
Major currencies	93.4	82.5	84.9	67.4
OITP	3.4	10.7	8.0	23.7
Total CEER	96.9	93.2	93.0	91.1

Calculating the weights

To be able to update the weights on a regular basis, it was imperative that we move away from using the IMF's weights, which are updated only once every 10 years, and build the weights internally. We chose to use bilateral trade data from the United Nations (UN) Comtrade database rather than from the IMF's Direction of Trade database. The UN Comtrade data have the advantage of being available by disaggregated good. However, we also constructed the CEER using the IMF Direction of Trade data and found that it did not significantly change our results.

An added advantage of broadening the country coverage and constructing the weights ourselves is that it facilitated building alternative indexes, such as major currencies versus other important trading partners and export-weighted versus import-weighted indexes, which may provide different insights on how exchange rate movements are affecting other economic variables.

The calculation of the weights for the CEER follows a methodology similar to that used by the Federal Reserve and presented in Leahy (1998) and Loretan (2005).

The nominal CEER at time *t* is given by

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

where $e_{j,t}$is the bilateral exchange rate with country *j* at time *t* (the price of Canadian dollars in terms of the currency of country *j*), $\omega_{j,t}$is the weight given to country *j* at time *t* and N is the number of currencies included in the index. Note that $\sum_j \omega_{j,t} = 1$. In the real CEER, the nominal exchange rate,$e_{j,t}$, is replaced by its real counterpart, $e_{j,t} \cdot p_t/p_{j,t}$, where p_t and $p_{j,t}$ are the consumer price indexes of Canada and country *j*.

The weights are designed to capture the competitiveness of Canadian goods in international trade. A country can be important for Canada for three reasons: (1) because Canada imports a large amount from this country, (2) because Canada exports large amounts to this country, or (3) because this country exports large amounts to countries where Canada also exports significantly. The total weight given to a country in the effective exchange rate index is therefore a weighted average of import weights, export weights and third-market competition weights.

Import weights play a role in measuring Canada's international competitiveness because Canadian goods sold domestically compete with imported goods. The import weight of country *j* at time *t* is given by this country's share of total Canadian imports:

$$\mu_{CAN,j,t} = M_{CAN,j,t} / \sum_{j=1}^{N} M_{CAN,j,t},$$

where $M_{CAN,j,t}$ represents merchandise imports from country *j* to Canada in year *t*. Here, and for the calculation of the other weights, we exclude energy goods (category 3 in the Standard Industrial Trade Classification (SITC) revision 2) for the reasons discussed earlier.[5] Note that these weights, as with all other weights, are calculated using annual trade data and are therefore constant within a calendar year.

Canadian exports also compete with goods from country *j* in two different ways. First, country *j* can be a direct purchaser of Canadian goods. This is measured by the share of total Canadian exports that go to country *j* at time *t*:

$$\varepsilon_{CAN,j,t} = X_{CAN,j,t} \Big/ \sum_{j=1}^{N} X_{CAN,j,t},$$

where $X_{CAN,j,t}$ represents merchandise exports to country *j* from Canada in year *t*.

Second, Canadian exports may compete with country *j*'s exports in a third-market country, *k.* To measure this type of competition, we calculate third-market competition weights. One contribution of this paper is that we depart from more conventional methods by calculating these weights at the level of the good (2-digit SITC rev.2, which represents 55 different products). We believe that this method can better capture the competition Canadian exporters face in third markets by emphasizing trade in products that are important for Canada.[6] We define a product-specific import weight by

$$\mu_{k,j,t}^{h} = M_{k,j,t}^{h} \Big/ \sum_{j=1}^{N} M_{k,j,t}^{h},$$

where $M_{k,j,t}^{h}$ represents country *k*'s merchandise imports of product *h* from country *j* in year *t.*

[5] We also exclude special transactions (category 9 of the SITC rev. 2) due to data-reporting issues.

[6] We also constructed the indexes using total trade (excluding energy) as opposed to constructing the third-market competitiveness effect product-by-product. As illustrated in Appendix B, calculating the weights product-by-product had the largest impact on the other important trading partners index.

Similarly, we define a product-specific export weight by

$$\varepsilon^h_{CAN,j,t} = X^h_{CAN,j,t} \Big/ \sum_{j=1}^{N} X^h_{CAN,j,t},$$

where $X^h_{CAN,j,t}$ represents Canada's merchandise exports of product *h* to country *j* in year *t*.

We also define the share of product *h* in total Canadian exports as

$$\varepsilon^h_{CAN,t} = \sum_{j=1}^{N} X^h_{CAN,j,t} \Big/ \sum_{h=1}^{H} \sum_{j=1}^{N} X^h_{CAN,j,t},$$

where *H* is the total number of products exported by Canada.

With those weights, we can then build the third-market competition weight:

$$\tau_{CAN,j,t} = \sum_{h=1}^{H} \left(\varepsilon^h_{CAN,t} \cdot \sum_{k \neq j, k \neq CAN}^{N} \varepsilon^h_{CAN,k,t} \cdot \mu^h_{k,j,t} / \left(1 - \mu^h_{k,CAN,t}\right) \right).$$

Note that the multiplicative factor $1/\left(1 - \mu^h_{k,CAN,t}\right)$ ensures that the weights sum to 1. For each product *h,* the third-market competition weight for country *j* is a weighted average of the third-market countries' shares of Canadian exports of product *h*, where the weights are given by country *j*'s import shares of product *h* from those countries. The total third-market competition weight of country *j* is the weighted average of those product-specific competition weights, where the weights are given by the share of each product in total Canadian exports. Therefore, a country receives a large third-market competition weight if it has large import shares in countries with large export weights for Canada, and this weight increases as the similarity between the products traded increases.

The total weight of country *j* in year *t* is then given by

$$\omega_{j,t} = \frac{1}{2}\mu_{j,t} + \frac{1}{2}\left(\frac{1}{2}\varepsilon_{CAN,j,t} + \frac{1}{2}\tau_{CAN,j,t}\right).$$

This measure gives equal weight to imports and exports. We computed an alternative measure where the weights assigned to the three submeasures were given by the actual share of

imports and exports in Canada's international trade. Again, this made little difference to the overall index.

The weights attributed to some of Canada's trading partners, such as the United States, China and Mexico, differ greatly between the CERI and the CEER. For example, as of 2014, the CEER put 26.4 p.p. less weight on the United States, and 9.6 and 4.6 p.p. more weight on China and Mexico, respectively (**Table 3**). We also followed the Federal Reserve practice of calculating a "major currencies" index and an "other important trading partners (OITP)" index. The weights in the major currencies index are similar to those in the CERI, while the OITP index puts significant weight on countries like China and Mexico, primarily because of the competition Canada faces from them in third markets.

Table 3 – Currency weights across the broad CEER and the CERI

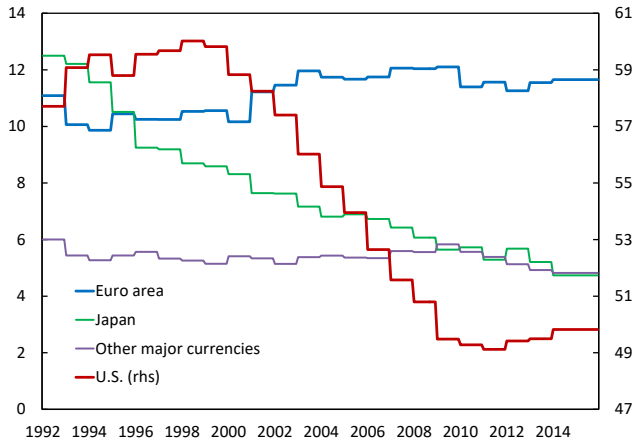
	Broad CEER	Major currencies	OITP	CERI
Australian dollar	1.1	1.5	--	--
Brazilian real	2.0	--	6.7	--
Chinese renminbi (yuan)	12.9	--	44.6	3.3
Euro	11.7	16.4	--	9.3
Hong Kong dollar	0.3	--	0.9	--
Indian rupee	1.2	--	4.2	--
Japanese yen	4.7	6.7	--	5.3
Malaysian ringgit	0.7	--	2.5	--
Mexican peso	7.8	--	27.1	3.2
Norwegian krone	0.4	--	1.4	--
Peruvian new sol	0.4	--	1.4	--
South Korean won	2.3	--	8.1	--
Swedish krona	0.6	0.9	--	--
Swiss franc	0.9	1.3	--	--
Thai baht	0.9	--	3.1	--
U.K. pound	2.2	3.1	--	2.7
U.S. dollar	49.8	70.1	--	76.2
Total	100.0	100.0	100.0	100.0

Over the past 20 years, the weights attributed to the United States and Japan have decreased steadily, while those given to China, Mexico and emerging markets in general have increased

(**Figures 1** and **2**). These trends reflect the rising competition that Canada faces in the U.S. market from emerging-market economies and can have a large impact on the short-run dynamics of the new exchange rate index.

Figure 1: Weights of major currencies

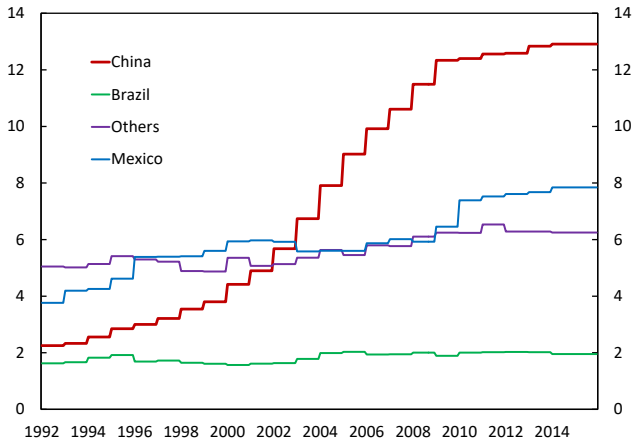
Per cent



Sources: United Nations Comtrade and authors' calculations

Figure 2: Weights of other important trading partners

Per cent



Sources: United Nations Comtrade and authors' calculations

Using these weights, we also constructed indexes based on direct imports from, direct exports to, and third-market competition against, our trading partners. Each index could provide different insights. For example, the import-weighted index could be used to assess inflationary pressures coming from abroad due to exchange rate movements, while the export index could help us understand how changes in our exchange rate affect the competiveness of our exporters relative to domestic producers in our main export markets. The index based on third-market competition, on the other hand, could be used to assess how exchange rate movements might affect our import market shares in key markets.

Overall, the weights from these alternative indexes highlight that while the major currencies have the largest weight in our new index, this is largely attributable to the importance of direct bilateral trade with these countries (**Table 4**). On the other hand, the weight associated with our other important trading partners is due to the importance of third-market competition effects. As noted earlier, these third-market competition effects are particularly important for China and Mexico because of the competition Canada faces from them in third markets, such as the United States.

Finally, when considering mainly advanced economies, inflation differentials between countries are relatively limited, and, therefore, the nominal exchange rate measure can provide a fairly accurate representation of the relative competitiveness of Canadian goods. However, with the larger set of countries included in the CEER, inflation differentials must be taken into account. Most importantly, the high rates of inflation in some countries can cause a nominal appreciation of the Canadian dollar that has no impact on our competitiveness. For example, the Canadian dollar has appreciated significantly against the Brazilian real since 1992, but this has largely reflected the hyperinflation Brazil experienced in the early 1990s. Moreover, many emerging-market economies have experienced periods of high inflation over the past two decades, while inflation has been low and stable in Canada and most advanced economies.

Table 4 – CEER indexes weights, by type of trade in 2014

	Total	Import	Export	Third-market
Total	**100.0**	**100.0**	**100.0**	**100.0**
Major currencies	***71.0***	***73.8***	***88.2***	***48.3***
U.S.	49.8	57.7	77.2	6.7
Euro	11.7	9.5	5.7	21.9
Japan	4.7	3.3	2.9	9.5
U.K.	2.2	1.7	1.5	4.0
Switzerland	0.9	0.9	0.2	1.6
Australia	1.1	0.3	0.5	3.2
Sweden	0.6	0.4	0.1	1.4
Other important trading partners	***29.0***	***26.2***	***11.8***	***51.7***
China	12.9	14.4	5.7	17.1
Mexico	7.8	6.7	1.7	16.3
South Korea	2.3	1.7	1.0	4.9
Brazil	2.0	0.7	0.6	5.8
India	1.2	0.8	0.9	2.4
Thailand	0.9	0.7	0.2	2.0
Peru	0.4	0.3	0.2	0.8
Malaysia	0.7	0.6	0.2	1.5
Hong Kong	0.3	0.1	0.7	0.3
Norway	0.4	0.1	0.7	0.8

4. The CEER: performance and limitations

The nominal indexes

Like the Federal Reserve, we selected currencies to include in three separate indexes: the broad index, the major currencies index and the other important trading partners (OITP) index. The broad index includes all 16 countries plus the euro area, following the criteria and methodology detailed in the previous section. The major currencies index includes seven currencies that are traded widely in currency markets outside their respective home areas: the U.S. dollar, euro, Japanese yen, British pound, Swiss franc, Australian dollar and Swedish krona.[7] The remaining 10 currencies are included in the OITP index. These last two indexes allow us to disentangle competitiveness-related issues that are closely tied with the OITP index from financial pressure on the Canadian dollar, which is better captured by the major currencies index.

Overall, the broad index puts increasing weight on EMEs, mainly reflecting the rising importance of these countries in global trade and, consequently, in third-market competition for Canadian goods. Increasing the weight on EMEs has important implications, especially for the nominal measure, because doing so boosts the level of the nominal CEER (**Figure 3**). The upward pressure on the broad CEER is exclusively related to the OITP index, due to the significant inflation rate differentials between Canada and some EMEs over the past two decades. In particular, the hyperinflation in Brazil during the early 1990s accounts for almost all the large appreciation of the OITP index over that period. To address this issue, we introduce real indexes in the next subsection.

[7] To select these currencies, we followed the same rule as the Federal Reserve and included the currencies of the G-10 countries plus the Australian dollar.

Figure 3: Nominal Canadian effective exchange rates
Index, January 1992 = 100

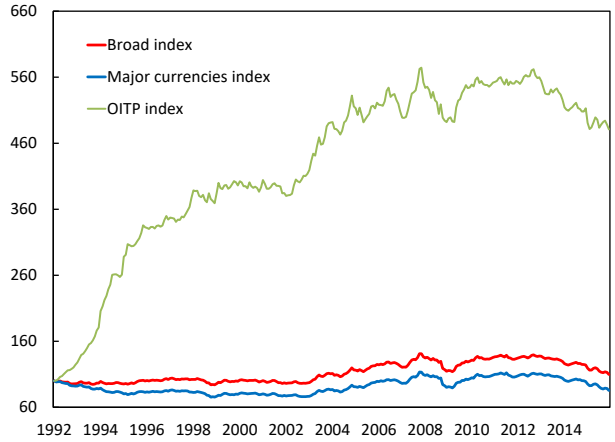
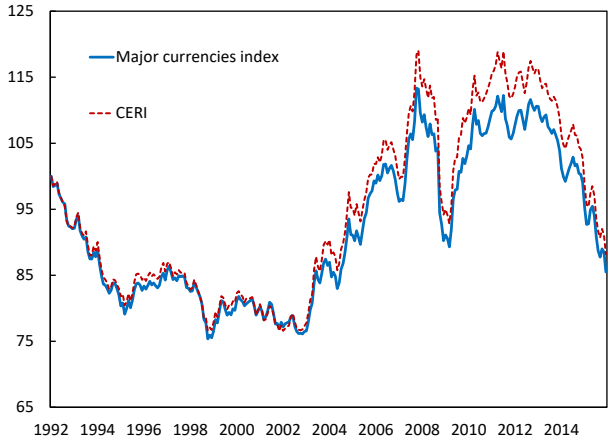


Figure 4: Nominal CERI versus major currencies index
Index, January 1992 = 100



Sources: U.N. Comtrade, *Wall Street Journal* and authors' calculations

On the other hand, the CERI is very similar to the major currencies index (**Figure 4**), which highlights the fact that the difference between the CERI and the broad CEER is mainly due to the inclusion of a larger set of countries rather than to the difference in the weights attributed to the main countries.

The real indexes

As mentioned above, we also compute real measures of the effective exchange rate using CPI differentials between Canada and each of our trading partners. All of the indexes are much more alike once we control for relative inflation differentials (**Figure 5** and **Figure 6**). We believe the real indexes to be more accurate indicators of Canadian competitiveness, especially with respect to our OITP. In particular, the real OITP better reflects the competition that Canadian exporters face in our most important market (i.e., the United States) and may help explain the performance of Canadian exports. Over history, the real OITP has, at times, diverged from the major currencies index. For example, it did not appreciate as much as the major currencies index after the global financial crisis, but it also depreciated less in recent years.

Figure 5: Real Canadian effective exchange rates

Index, January 1992 = 100

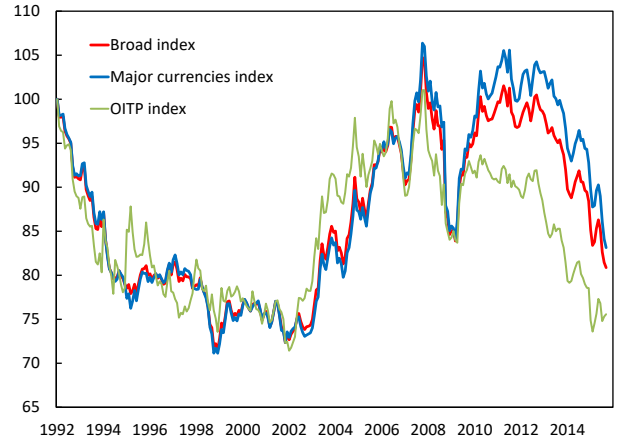
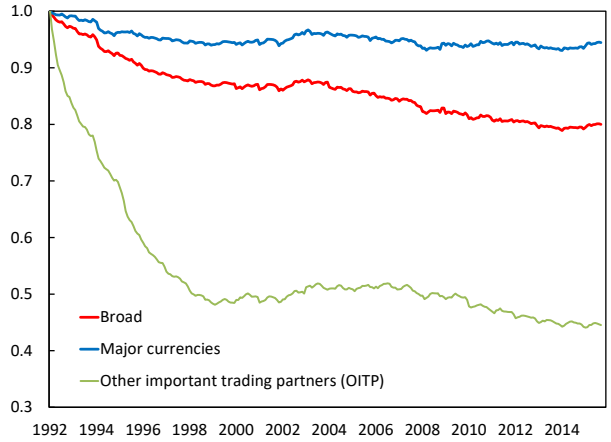


Figure 6: Relative CPI differentials with Canada

Index, January 1992 = 1



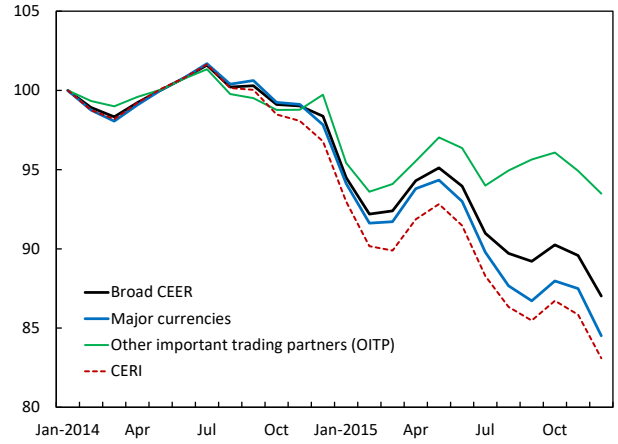
Sources: U.N. Comtrade, *Wall Street Journal* and authors' calculations

Since 2014, the major currencies index and the CERI have diverged considerably from the OITP index (**Figure 7**). The first two have depreciated by more than 15 per cent, while the latter depreciated by only 6 per cent. In fact, since February 2015, the OITP index has remained largely unchanged, while the major currencies index and the CERI have depreciated significantly. This reflects an appreciation of the Canadian dollar vis-à-vis the Mexican peso and the Brazilian real. Compared with previous periods, the Canadian dollar depreciated less than the Chinese renminbi (considering the depreciation of the Canadian dollar against the U.S. dollar), due to the decision by Chinese authorities to allow the renminbi to depreciate relative to the U.S. dollar.

Another way to decompose recent movements of the broad CEER is to look at what an exchange rate index that is based on each of the three types of weights included in the CEER would suggest. Effective exchange rate measures based on direct trade—either imports or exports—have depreciated considerably since the middle of 2014—by 17 per cent and 15 per cent, respectively (**Figure 8**). In contrast, the index based on third-market competition weights has depreciated by only 5 per cent. Since this index largely reflects competition in the U.S. market, this could help explain why Canada's share of the U.S. import market has continued to decline despite the recent large depreciation of the Canadian dollar against the currencies of a number of advanced economies, especially the U.S. dollar.

Figure 7: Effective exchange rates, by type of currency

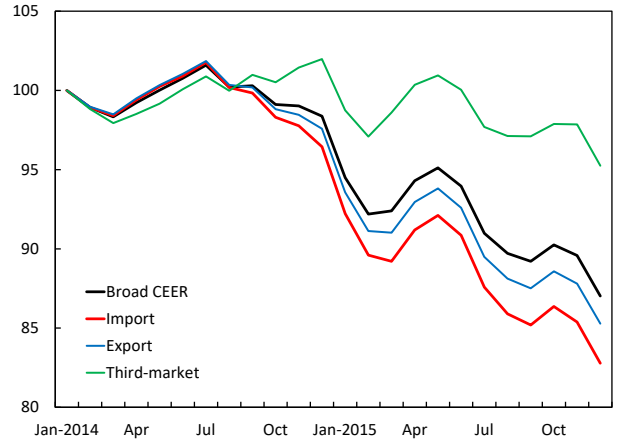
Index, January 2014 = 100



Sources: United Nations Comtrade and authors' calculations

Figure 8: CEER, by type of trade

Per cent



Sources: United Nations Comtrade and authors' calculations

Limitations

Although we view our new measure as an important improvement over the CERI, the CEER still has a couple of limitations related to data availability that are worth noting.

First, unlike the CERI, the weights used in the CEER do not include services, primarily due to data limitations. As detailed in Section 2, trade in services is frequently excluded when building effective exchange rate indexes, with most countries limiting themselves to trade in manufacturing or merchandise goods. Some, for example, the IMF, include services but have to make simplifying assumptions in order to do so. Given current data limitations, we opted to exclude trade in services for the time being.

A second limitation is that the CEER does not account for domestic production. This implies that when calculating the weights, we do not take into account Canada's propensity to import or that of its trading partners. We know that, in certain cases, for example, motor vehicles, domestic competition (U.S. production of motor vehicles in the U.S. market) has important implications for Canadian exports. However, consistent data on domestic production across the trading partners and goods we examined are not currently available and are thus also excluded from our current weights. For now, both trade in services and measuring domestic production remain interesting topics for future work.

5. Conclusion

In this paper, we developed a new Canadian effective exchange rate (CEER) index. We believe the CEER is an improvement over the CERI because it better reflects Canada's current and future trade patterns by increasing the number of trading partners included in the index and by introducing annual updating of the weights. To accomplish this, we have had to construct the weights as opposed to relying on the IMF's weights. This has the added advantage of allowing us to construct a number of complementary indexes based on different weight schemes. We hope these indexes will prove to be useful for other researchers.

Overall, we find that the new index increased the weight assigned to EMEs, primarily reflecting the competition Canada faces against these countries in our most important export markets. The increasing importance of EMEs may explain part of the underperformance of exports in recent years and could help explain why Canada's share of the U.S. import market has continued to decline despite the recent large depreciation of the Canadian dollar against the currencies of a number of advanced economies, especially the U.S. dollar.

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Appendix A: The Broad, MC and OITP CEER with and without oil

Chart A1: Nominal broad CEER

Index, January 1992 = 100

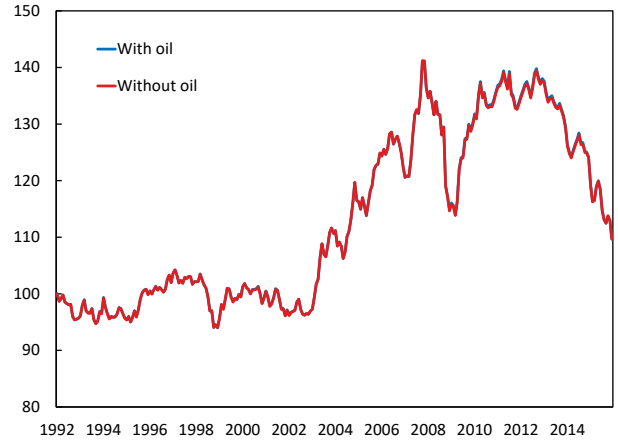


Chart A2: Nominal major currencies CEER

Index, January 1992 = 100

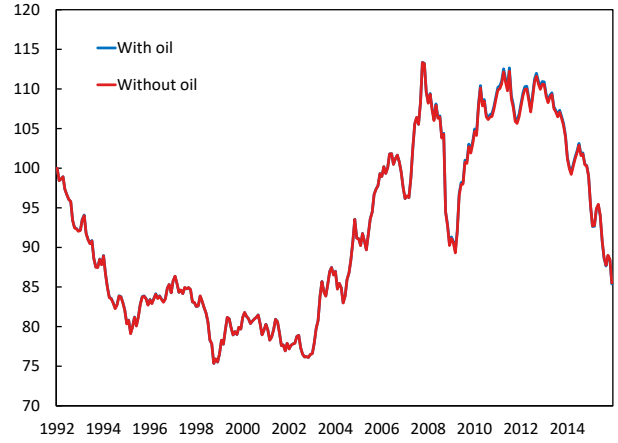


Chart A3: Nominal OITP CEER

Index, January 1992 = 100

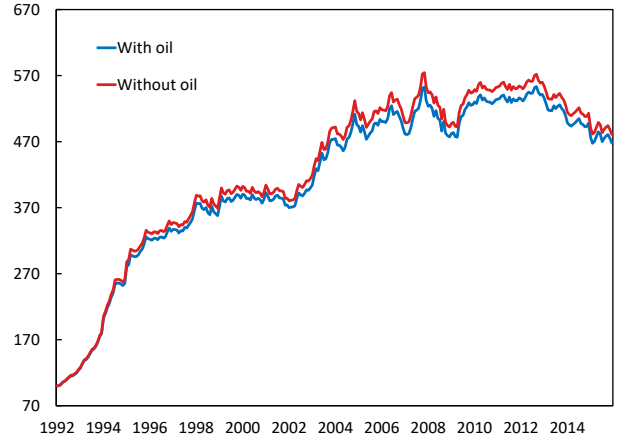


Chart A4: Real broad CEER

Index, January 1992 = 100

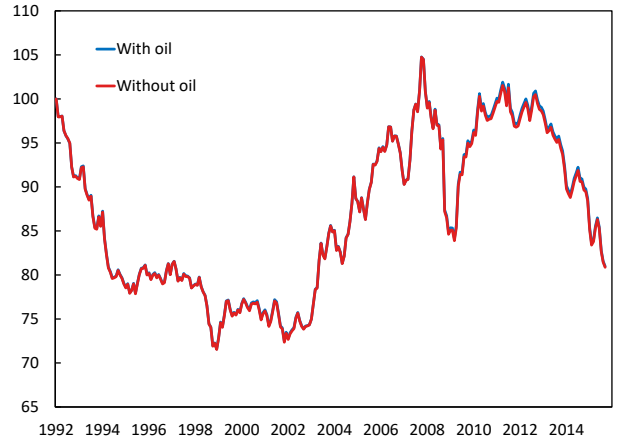


Chart A5: Real major currencies CEER

Index, January 1992 = 100

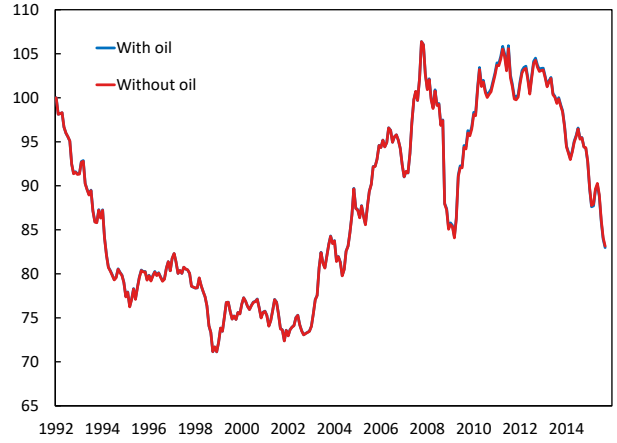
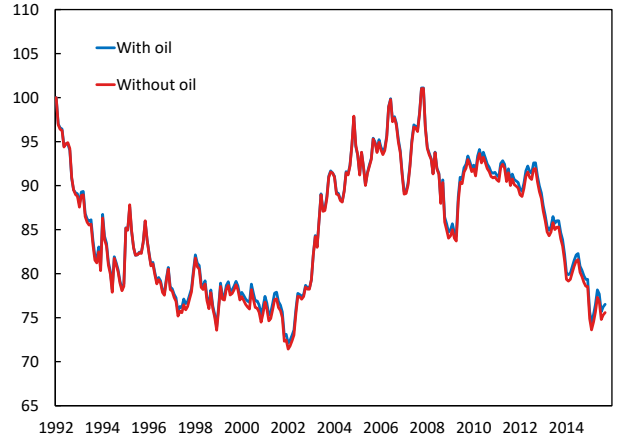


Chart A6: Real OITP CEER

Index, January 1992 = 100



Appendix B: The Broad, MC and OITP CEER by total trade or product-by-product

Chart B1: Nominal broad CEER

Index, January 1992 = 100

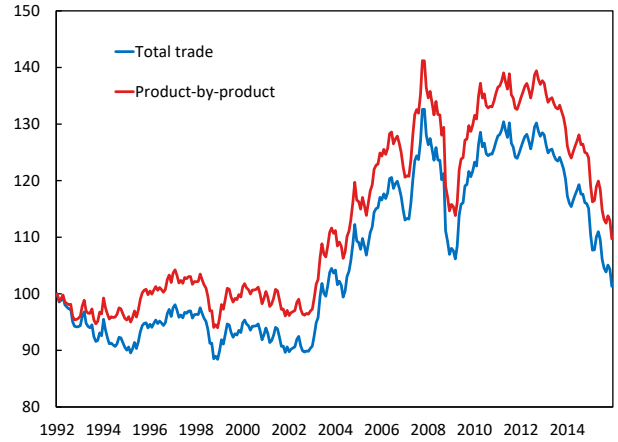


Chart B4: Real broad CEER

Index, January 1992 = 100

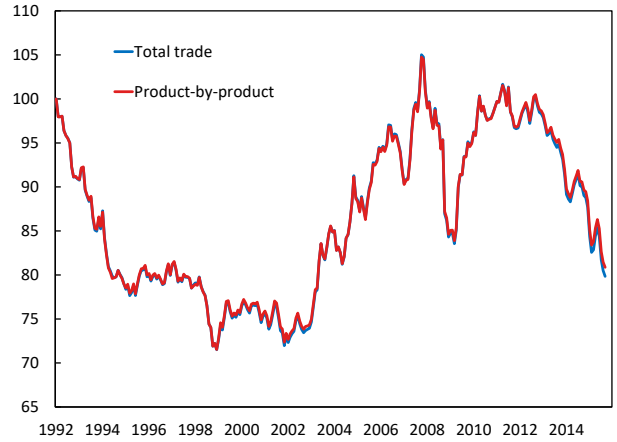


Chart B2: Nominal major currencies CEER

Index, January 1992 = 100

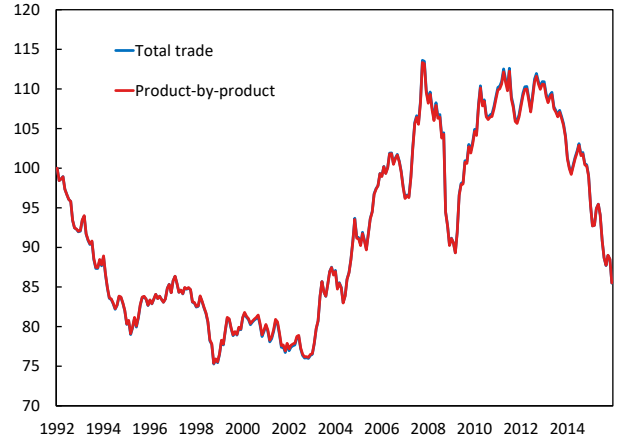


Chart B5: Real major currencies CEER

Index, January 1992 = 100

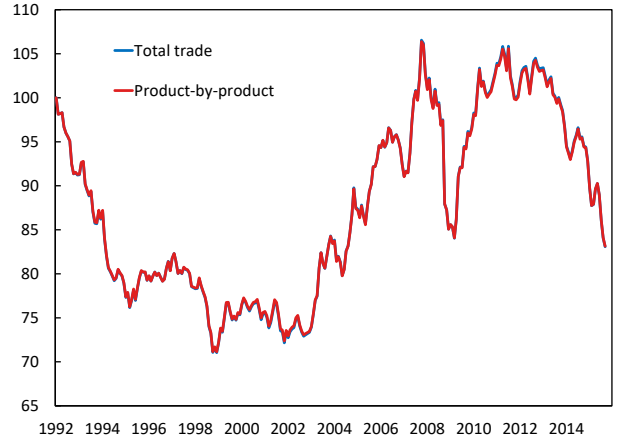


Chart B3: Nominal OITP CEER

Index, January 1992 = 100

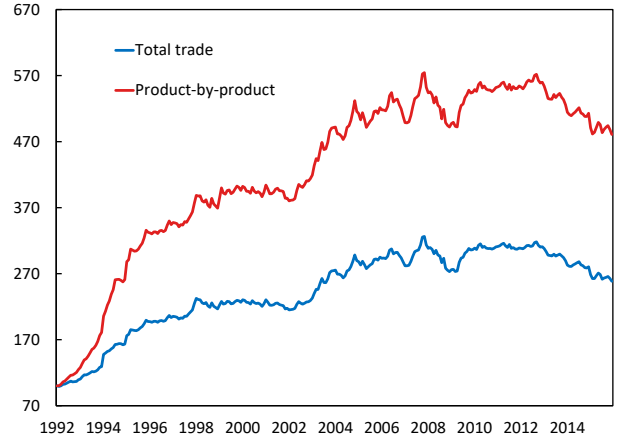


Chart B6: Real OITP CEER

Index, January 1992 = 100