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Nova Scotia, 1 penny token, 1856

Although issued only once, in 1856, Nova Scotia's Mayflower coins remain among Canada's most beautiful. John Sparrow Thompson, a fiercely patriotic teacher and journalist in Halifax, created the design after successfully lobbying to replace the Scottish thistle with the mayflower on the province's coins. Among the first flowers to appear in the cold

Maritime spring, the sweet-smelling pink and white blossoms are a symbol of strength in adversity and were popularly associated with Nova Scotia as early as 1830. In 1859, the province adopted decimal coinage and the remaining mayflower penny and half-penny tokens were gradually withdrawn from circulation.

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For further information, contact:

Public Information
Communications Department
Bank of Canada
Ottawa, Ontario, Canada K1A 0G9

Telephone: **613 782-8111**; **1 800 303-1282** (toll-free in North America)

Email: info@bankofcanada.ca

Website: bankofcanada.ca

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Inflation Dynamics in the Post-Crisis Period

Christian Friedrich, International Economic Analysis, and Marc-André Gosselin, Canadian Economic Analysis

- Inflation rates in advanced economies experienced two unusual patterns during the period following the global financial crisis—relatively high inflation with respect to the size of the output gap from the end of 2009 to 2011 and relatively low inflation from 2012 to the middle of 2014.
- There are a variety of explanations for these patterns, such as variation in the relationship between inflation and economic slack over time, the impact of movements in commodity prices or the evolution of inflation expectations.
- While the pattern of inflation dynamics in Canada appears, for the most part, similar to that in other advanced economies, Canadian inflation in the post-crisis period was also affected by elevated competition in the retail sector.
- The post-crisis experience has shown that models need to be regularly supplemented with additional sources of information. When modelling inflation, this means paying greater attention to inflation expectations from various sources.

The Bank of Canada conducts monetary policy by targeting 2 per cent inflation. Given delays in the transmission of monetary policy, it is important for the Bank to identify factors that are likely to have a persistent effect on inflation. While the output gap, defined as the difference between actual output and potential output, is the main driver of cyclical movements in inflation, many other drivers influence the assessment of inflation developments, such as the transitory effects of exchange rate variations on import prices or sector-specific price changes. Understanding the behaviour of inflation since the global financial crisis has been challenging because inflation evolved differently from what these drivers would suggest. In this article, we analyze the post-crisis behaviour of inflation and provide explanations for its evolution.

The Behaviour of Inflation

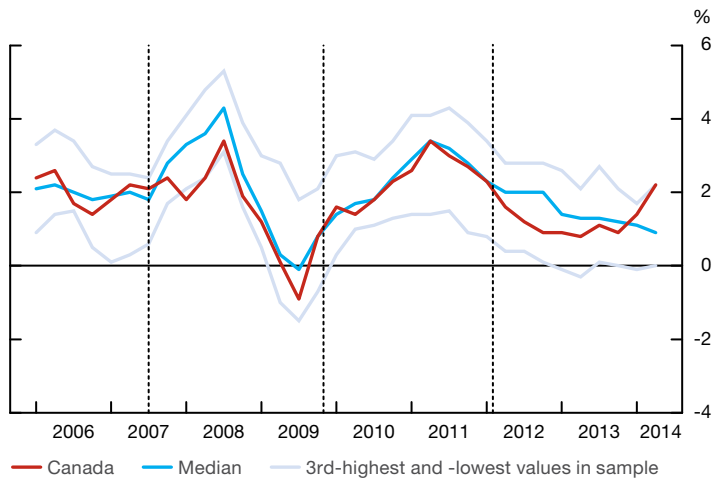
Inflation in advanced economies has fluctuated significantly since the onset of the global financial crisis. The period from the first quarter of 2006 to the second quarter of 2014 can be roughly divided into four distinct episodes (Chart 1):

- (i) **Pre-crisis period (2006Q1 to 2007Q3).** Inflation rates were relatively stable, and Canada's inflation rate was in line with the median inflation rate of a large sample of advanced economies.¹
- (ii) **Crisis period (2007Q4 to 2009Q3).** Inflation rates were very volatile but with a high synchronicity across countries. While Canadian inflation was slightly lower than the median in 2008, it joined the common inflation dynamics of the multiple-country sample afterward. The common dynamics of total inflation during this period was largely due to the significant swings in global oil prices and widening output gaps. The falling inflation rates during the crisis were well explained by Phillips curve predictions in many advanced countries (Box 1). This, however, changed in the post-crisis period, when inflation developments became increasingly inconsistent with output gap dynamics.
- (iii) **Early post-crisis period (2009Q4 to 2011Q4).** Inflation rates picked up and increased steadily. With few exceptions, this trend was common across countries, and Canada's inflation rate aligned strongly with the median inflation rate of the sample of advanced economies. The combination of constant or even rising inflation rates and the high level of economic slack constitutes the **first puzzle** of post-crisis inflation dynamics.

◀ *The combination of constant or even rising inflation rates and the high level of economic slack constitutes the first puzzle of post-crisis inflation dynamics*

Chart 1: Inflation dynamics around the global financial crisis

Headline inflation rates on a year-over-year basis



Note: The sample includes the countries listed in footnote 1, below, with the exception of Iceland and Ireland. Their inflation rates are excluded because they both contain outliers during the sample period. However, both countries will be included in the empirical analysis later on, where such differences can be taken into account.

Source: Organisation for Economic Co-operation and Development

Last observation: 2014Q2

¹ The countries in the sample are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, South Korea, Spain, Sweden, Switzerland, the United Kingdom and the United States.

Box 1

The Phillips Curve

The Phillips curve characterizes the relationship between inflation, inflation expectations and a measure of economic slack that represents the impact of the business cycle. In empirical studies, the measure of economic slack is often replaced by the output gap (i.e., the difference between actual and potential GDP) or deviations of the unemployment rate from its trend. Inflation expectations are usually approximated using inflation expectations of professional forecasters. The Phillips curve can contain additional terms to capture supply-side factors (e.g., commodity price inflation) or international factors (e.g., import price inflation or exchange rate variations). In this article, we describe inflation dynamics at two different levels of aggregation: at the global level and in Canada. In both cases, we rely on the following stylized Phillips curve specification to identify the drivers of inflation:

$$\pi_t = a + E_t(\pi_{t+1}) + b\text{ygap}_t + c\Delta\text{er}_t + \epsilon_t$$

This specification contains an intercept, a ; inflation expectations, $E_t(\pi_{t+1})$; a measure of economic slack, ygap_t ; and changes in the exchange rate, Δer_t .¹ Any other factor not captured by these determinants will be reflected in the error term, ϵ_t .

¹ The measure of exchange rates is included only in the Canadian analysis, since exchange rate dynamics would cancel out at the global level. The parameters b and c represent coefficients that capture the relationship between inflation and its drivers.

- (iv) **Late post-crisis period (2012Q1 to 2014Q2).** Inflation rates in advanced economies experienced a clear downward trend. Canadian inflation was somewhat different from the sample median, showing a stronger decline in 2012–13 followed by an increase in 2014. Overall, falling inflation rates were rather surprising at this point, since we observed gradually declining amounts of economic slack for many of the countries in the sample.² This is the **second puzzle** of post-crisis inflation dynamics.

◀ *The downward trend in inflation rates, along with gradually declining amounts of economic slack in advanced economies, is the second puzzle of post-crisis inflation dynamics*

Given the close appearance of the two puzzles, we refer to them jointly as the **twin puzzle**. The twin puzzle also exists for global core inflation dynamics, i.e., total inflation minus inflation in energy and food prices. Core inflation rates remained elevated globally, despite large amounts of economic slack during the first part of the post-crisis period, and started falling, despite the onset of the global recovery shortly after.³

The Twin Puzzle at the Global Level

Why were inflation dynamics inconsistent with the evolution of economic slack during the post-crisis period? To shed light on this question, we review potential explanations from the literature and highlight the results of recent work carried out at the Bank of Canada.⁴

² European countries were notable exceptions, since output gaps were still widening in light of the European debt crisis.

³ While there are many different measures of core inflation, we use the definition excluding food and energy prices for international comparability.

⁴ Although it would be preferable to assess both total and core inflation dynamics internationally, data on expectations for core inflation are generally not available; thus, the analysis focuses on total inflation only.

Explanations for the first puzzle

The **first puzzle** of inflation dynamics was initially noted in the context of U.S. inflation. Williams (2010) refers to a missing disinflation puzzle, noting that, “based on the experience of past severe recessions,” he would have expected “inflation to fall by twice as much as it has.” Empirical studies have subsequently provided explanations for the U.S. case: time variation in the sensitivity of inflation to economic slack (Ball and Mazumder 2011; Murphy 2014) and too little weight attributed to the impact of commodity price movements (Gordon 2013). In addition, Coibion and Gorodnichenko (2015) show that replacing inflation expectations by professional forecasters with inflation expectations by households restores the Phillips curve in the United States.⁵

Potential explanations for the first puzzle discussed in the theoretical literature include the following: the dependence of inflation on expected future marginal costs instead of the current level of economic activity (Del Negro, Giannoni and Schorfheide 2014); the impact of a firm balance-sheet channel that induces firms with weak balance sheets to raise prices and sacrifice future sales in order to boost current cash flows (Gilchrist et al. 2014); and the combination of a fall in productivity with rising costs of capital leading to upward pressure on inflation (Christiano, Eichenbaum and Trabandt 2014).

The generalization of the first puzzle internationally was documented by the International Monetary Fund (2013), which argued that stable inflation expectations arising from the credibility of the inflation-targeting efforts of central banks over the previous decades and a long-term decline in the sensitivity of inflation to economic slack were key explanatory factors of the observed resilience in inflation in the early post-crisis period.

Explanations for the second puzzle

Since it is a more recent phenomenon, the **second puzzle** has, to date, received less attention from academic researchers. Ferroni and Mojon (2014) examine the predictive content of global inflation for domestic inflation. They find that demand (rather than supply) shocks, which contain varying contributions of global and domestic components across countries, are likely the main drivers of inflation dynamics after 2009. Riggi and Venditti (2014) maintain that the failure of forecasts in the second part of the post-crisis period was caused by a break in the cyclical nature of inflation. They argue that the sensitivity of inflation to the output gap has recently increased, owing to a decline in the average duration of price shocks and fewer strategic complementarities in price setting resulting from a smaller number of firms in the economy.

Are the two puzzles connected?

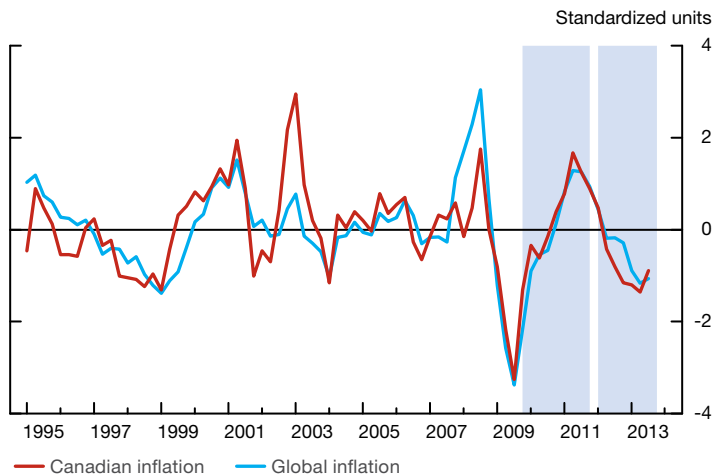
Given the close appearance of the two puzzles, the Bank has examined whether they could be connected. Following Friedrich (2014), we calculate a “global” measure of inflation based on information from the 25 countries in the sample. The global measure is obtained by extracting a common component among national inflation rates.⁶ In line with the evidence just discussed, our measure of global inflation rises at the beginning of the post-

⁵ This could reflect the possibility that small firms form their inflation expectations in a similar way to households, which, in turn, have inflation expectations that are highly dependent on oil price dynamics. See Ehrmann, Pfajfar and Santoro (2014).

⁶ The common component has been extracted through a static factor model. More details on this method and alternative extraction procedures are documented in Friedrich (2014).

Chart 2: Global inflation, Canadian inflation and the twin puzzle

Quarterly data



Note: Both the global measure of inflation dynamics and the measure of Canadian inflation have been standardized by subtracting the mean and dividing by the standard deviation. The measure of global inflation has been identified using the first factor of a static factor model with inflation rates for the same set of 25 advanced countries. The chart also marks the presence of the twin puzzle (shaded areas).

Source: Bank of Canada

Last observation: 2013Q3

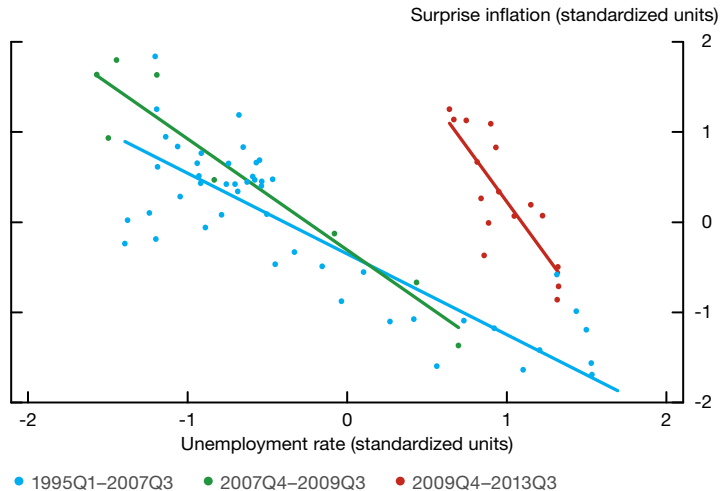
crisis period, i.e., during the first puzzle period, and trends downward during the second part of the post-crisis period, i.e., during the second puzzle period (Chart 2).

This measure of global inflation is then used to specify a global Phillips curve, whose determinants are also aggregated to the global level. As explained in Box 1, the analysis requires two frequently used determinants: inflation expectations by professional forecasters for the next calendar year and a measure of economic slack represented by the unemployment rate. Using data from the first quarter of 1995 to the third quarter of 2013, subtracting the inflation expectations of professional forecasters from the actual inflation rate, and thus abstracting from the behaviour of inflation expectations, we plot the resulting global Phillips curve (Chart 3). For the remainder of this section, we refer to this newly constructed variable as “surprise inflation.”

The blue line in Chart 3 indicates that surprise inflation has a negative relationship with economic slack in the years leading up to and including the pre-crisis period, i.e., positive inflation surprises are associated with less unemployment, consistent with economic theory. The green line suggests that the relationship between surprise inflation and economic slack during the crisis period is not very different from before the crisis. The red line, however, shows that the slope of the global Phillips curve is significantly steeper in the post-crisis period, indicating that surprise inflation has become more sensitive to economic slack.

A very good description of the data can be provided by estimating a global Phillips curve with inflation expectations by professional forecasters and a measure of economic slack that can take on a different slope and a different intercept during the post-crisis period. To give the variable used to let the slope and the intercept of the global Phillips curve differ during the post-crisis period (2009Q4 to 2013Q3)—the “post-crisis dummy”—an economic interpretation, a broad set of variables is added to the Phillips curve on a

◀ *The analysis in this article builds on two frequently used determinants: inflation expectations by professional forecasters for the next calendar year and a measure of economic slack represented by the unemployment rate*

Chart 3: The global Phillips curve

Note: Surprise inflation is defined as the difference between the first factor of headline inflation and the first factor of inflation expectations by professional forecasters for the next calendar year. The unemployment rate represents the first factor of national unemployment rates. A first factor is defined as the common component of a variable in all sample countries.

Source: Friedrich (2014)

one-by-one basis. These variables include alternative measures of inflation expectations and economic slack, commodity prices, measures of crisis-related government policies, and financial variables.⁷

After conducting an empirical analysis that considers the explanations presented earlier, we find that the variable that most improves the in-sample fit of the global Phillips curve with the advanced-economy data is inflation expectations by households. While moving in similar directions to inflation expectations by professional forecasters, inflation expectations by households show higher amplitudes around the crisis and therefore can largely replicate the effect seen in the post-crisis dummy. The finding that inflation expectations by households significantly improve the in-sample fit is close to that of Coibion and Gorodnichenko (2015).⁸

While household inflation expectations are highly correlated with food and energy prices and thus explain headline inflation dynamics well, there appears to be an orthogonal component in household inflation expectations that supplies additional information and might also be relevant for core inflation dynamics.⁹ Furthermore, the post-crisis experience showed that core inflation was also affected by the twin puzzle in many countries; it is therefore not sufficient to include commodity prices in the analysis to explain the behaviour of inflation.

Although it is firms' expectations that matter for inflation (since they are the ones that set prices), without measures of firms' expectations, household expectations may be a better proxy than the expectations of professional forecasters. In addition, since households are demanders of final goods and

◀ *The variable that most improves the in-sample fit of the global Phillips curve with the advanced-economy data is inflation expectations by households*

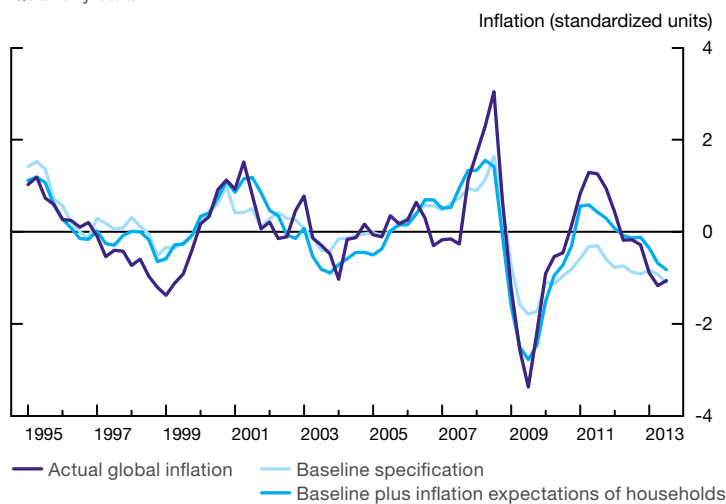
⁷ Increasing trade with China has likely affected global inflation dynamics as well. However, this effect seems to play out over a longer horizon than only the post-crisis period. This potential driver was therefore not considered for the analysis.

⁸ While the analysis in this article confirms the importance of household inflation expectations in general, it suggests adding them to the Phillips curve rather than using them as the only measure of inflation expectations.

⁹ Household inflation expectations remain highly significant even if we control for energy or food price inflation.

Chart 4: The in-sample fit of the resulting global Phillips curve

Quarterly data



Note: The chart shows actual global inflation (purple), defined as the first factor of standardized national inflation rates, together with two different global Phillips curve specifications. The first one (light blue) includes global aggregates of the unemployment rate and inflation expectations by professional forecasters. The second one (blue) includes additional global measures of inflation expectations. Details on the methodology and the underlying reasoning can be found in Friedrich (2014).

Source: Friedrich (2014)

Last observation: 2013Q3

suppliers of labour, there might be other effects that may not be fully accounted for by focusing exclusively on firms' inflation expectations. Identifying which of these explanations is dominant is an empirical question that should be investigated using microdata, which is beyond the scope of this article.

Chart 4 shows two different estimates of a global Phillips curve and actual global inflation dynamics (purple line). The first global Phillips curve or "baseline specification" (light blue line) includes aggregates of the unemployment rates and inflation expectations by professional forecasters (as seen in Chart 3) but fits the actual data rather poorly. The second global Phillips curve (blue line) adds a global measure of household inflation expectations to the specification and is significantly better at capturing post-crisis inflation dynamics.^{10, 11}

The Twin Puzzle in Canada

Canada was not immune to the twin puzzle because inflation remained steady, despite a sizable output gap in the early post-crisis period, and then declined as the economy started to recover. In line with the framework used for the analysis of inflation at the global level, we follow the Phillips curve relationship described in Box 1 to analyze the behaviour of Canadian inflation in the post-crisis period.

◀ *Canada was not immune to the twin puzzle, since inflation remained steady despite a sizable output gap in the early post-crisis period and then declined as the economy started to recover*

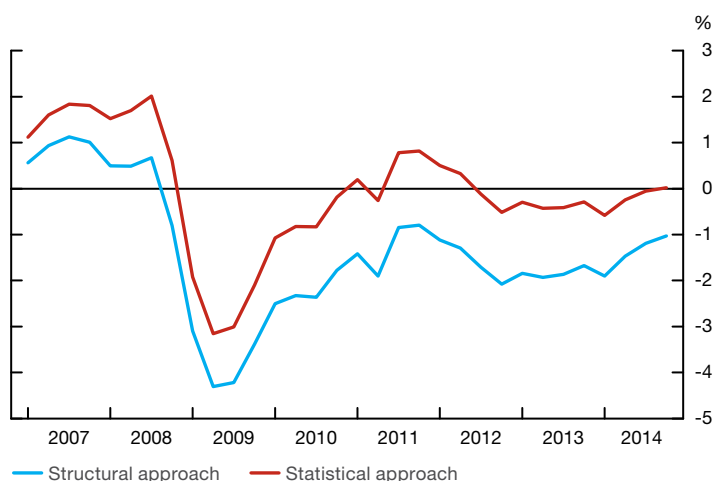
¹⁰ Currently, there is no data source for household inflation expectations that covers all sample countries. Therefore, the "global" measure of household inflation expectations is based on harmonized data from 11 European countries—the largest set of countries for which consistent data are currently available. However, the results also hold when inflation expectations by U.S. households are used instead.

¹¹ The remaining gap between actual inflation and the second specification that includes household inflation expectations can be explained by additional variables that have played an important role in the post-crisis period (e.g., government budget balances and energy prices). For details on the identification procedure and the associated economic interpretation, see Friedrich (2014).

Economic slack

The global recession created a large amount of unused resources in the Canadian economy. Historical estimates suggest that the output gap reached a trough of -3 to -4 per cent in 2009 (Chart 5). Although it started to close in the following year, the output gap has remained persistently negative, largely as a result of the weak recovery in Canadian exports.

Chart 5: Material excess capacity in the Canadian economy



Notes: The structural estimate of the output gap refers to the integrated framework, while the statistical approach refers to the extended multivariate filter. For details, see L. Pichette, P. St-Amant, B. Tomlin and K. Anoma, "Measuring Potential Output at the Bank of Canada: The Extended Multivariate Filter and the Integrated Framework," Bank of Canada Discussion Paper No. 2015-1.

Source: Bank of Canada *Monetary Policy Report* (April 2015).

Last observation: 2014Q4

This economic slack translated into significant disinflationary pressure. Empirical work at the Bank has estimated the coefficient on the output gap to be around 0.3 in the Canadian Phillips curve (Bank of Canada 2014a). Conditional on this estimate, the Phillips curve relationship would predict an average drag of roughly 0.3 percentage points coming from the output gap in the post-crisis period. Based on this contribution alone, it is difficult to explain the entire path of steady and then falling inflation observed in Canada during this period. While time variation in the sensitivity of inflation to economic slack could explain part of the post-crisis behaviour of inflation in other advanced economies, this finding does not seem to apply to Canada. Rolling estimates of the Canadian Phillips curve do not indicate a change in the sensitivity of inflation to economic slack in recent years.¹² And even if we take into account the significant uncertainty around estimates of economic slack, it is difficult to fully explain the dynamics of inflation over this period using only the output gap.

◀ *Based on the output gap alone, it is difficult to explain the entire path of steady and then falling inflation observed in Canada during the post-crisis period*

Exchange rate pass-through

In addition to its impact on economic activity through net exports, the value of the Canadian dollar plays an important role in determining import prices. However, the extent and timing of the pass-through of movements in the exchange rate from import to consumer prices will depend on many factors,

¹² A similar explanation could be related to the possibility that the sensitivity of inflation to the output gap increases as the gap becomes more persistent. However, empirical work incorporating the persistence of the output gap into various Phillips curve equations finds only a marginal improvement in the performance of inflation forecasts.

such as the share of imports in the CPI basket, the size and persistence of the exchange rate movement, the duration of currency hedges, and the expected response by the monetary authority. Recent evidence indicates that, while the exchange rate fell significantly during the recession, the depreciation was short-lived and did not likely fuel inflation in a material way in the early post-crisis period. The Canadian dollar remained close to parity with the U.S. dollar over the 2010–12 period and began to depreciate in 2013. The path of stable and then falling inflation observed between 2010 and 2013 is not in line with these exchange rate movements and therefore they provide little justification for the twin puzzle. The exchange rate depreciation that began in 2013 did, however, play a role in pushing inflation up in 2014.

◀ While the exchange rate fell significantly during the recession, the depreciation was short-lived and did not likely fuel inflation in a material way in the early post-crisis period

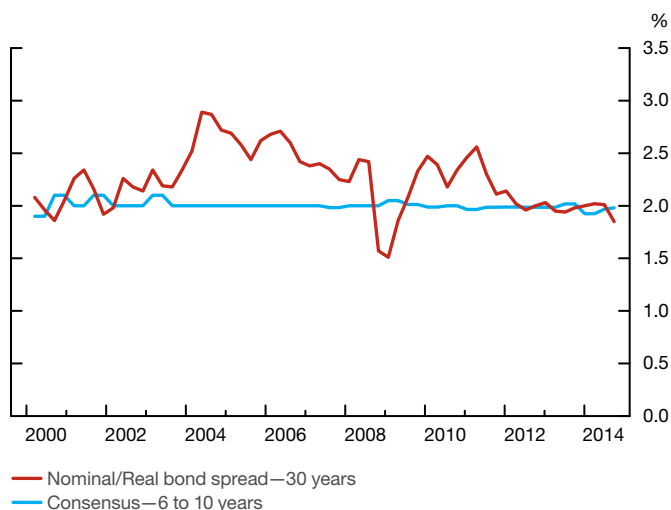
Inflation expectations

Since there are no historical time-series data on household inflation expectations for Canada, we cannot assess their role in driving Canadian inflation in a straightforward way. However, when assessing other measures of inflation expectations for Canada, we observe that they have remained relatively close to the target (Chart 6). Long-term inflation expectations of professional forecasters and financial markets have remained close to 2 per cent in the post-crisis period. In addition, since 2009, more than 80 per cent of firms have expected inflation to remain within the Bank’s 1 to 3 per cent target range over the coming two years. This stability in inflation expectations has likely contributed to the resilience of inflation in the early part of the post-crisis period and could help to explain the first puzzle. However, while we cannot determine whether household inflation expectations played a role, the second puzzle does not seem to be caused by a downward shift in firms’ expectations in Canada.

◀ The stability in inflation expectations could help to explain the first puzzle

Chart 6: Inflation expectations

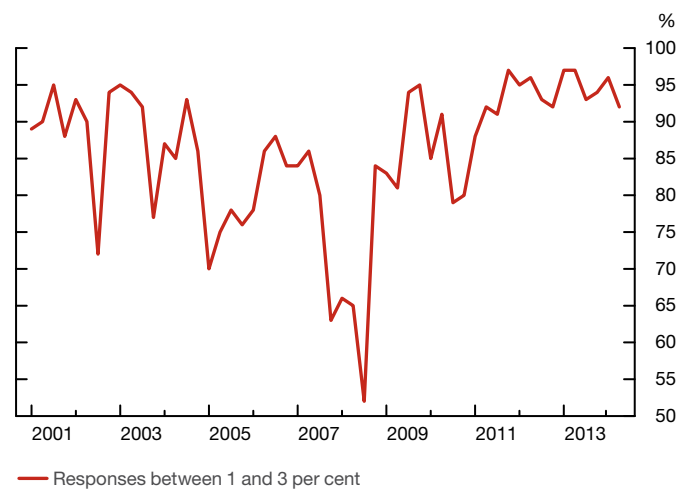
a. Financial markets and professional forecasters



Sources: Consensus Economics and Bank of Canada calculations

Last observation: December 2014

b. Business Outlook Survey



Note: Percentage of firms indicating that they expect inflation to be between 1 and 3 per cent over the next two years.

Last observation: December 2014

Increased competition in the retail sector

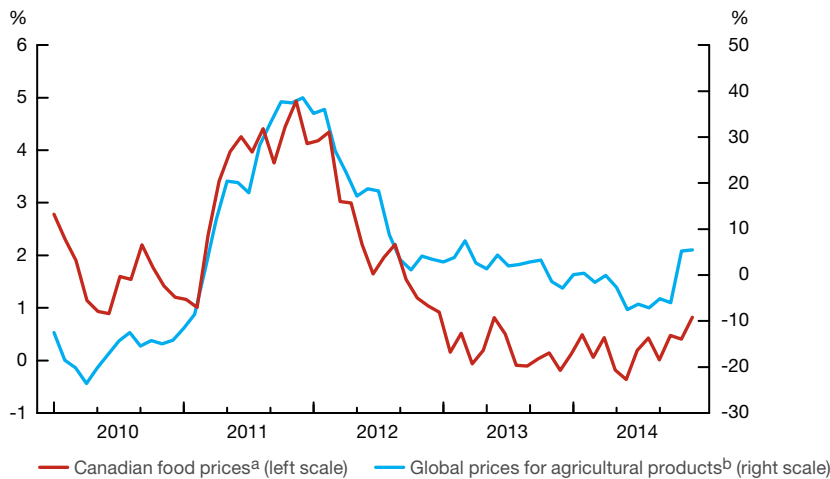
In the Phillips curve framework, other factors that could explain inflation behaviour will be captured by the error term. A wide range of evidence points to the effects of increased competition in Canada’s retail sector as a potential driver of negative inflation errors in 2012–13. Competitive pressures in this sector intensified in the post-crisis period with the appearance of new and bigger retailers.

Walmart, for example, transformed many of its stores into supercentres that offer food as well as general merchandise. This new retailing strategy, as well as Walmart’s pricing, increased the competitive pressures on traditional retailers. In addition, a number of other U.S. retailers entered the Canadian marketplace, and increased cross-border and online shopping were possibly reinforcing factors.

The effects of competition have been reflected in the unusual softness in the prices of food and non-durable goods, two sectors where anecdotal evidence suggests that competition has intensified. Canadian food price inflation (excluding meat) remained persistently lower than suggested by global prices for agricultural products (Chart 7), while prices for non-durable goods fell in the post-crisis period. Because of its impact on food and non-durable goods prices, more intense competition likely subtracted around 0.3 percentage points from inflation during this period (Bank of Canada 2014b). As discussed in Macklem (2014), more intense retail competition creates “good” disinflation, provided that inflation expectations remain well anchored. Consumers benefit from lower prices, and increased competition is likely to mean higher productivity in the sector—both of which are good things.

◀ *More intense competition likely subtracted around 0.3 percentage points from inflation during the late post-crisis period*

Chart 7: Food price inflation in Canada has been weaker than suggested by global developments



a. CPI for core food purchased from stores (excluding meat)

b. BCPI agricultural products (Can\$, lagged 8 months)

Sources: Statistics Canada and Bank of Canada calculations

Last observation: December 2014

To sum up, while persistent economic slack can explain part of the weakness in inflation observed in the late post-crisis period, the evidence suggests that the remaining dynamics of steady and then falling inflation in Canada could be explained by the resilience of inflation expectations in the earlier period, followed by a persistent drag coming from increased retail competition thereafter.

Conclusion

Advanced economies experienced two consecutive puzzles following the global financial crisis—high inflation relative to measures of economic slack from the end of 2009 to 2011 and relatively low inflation from 2012 to the middle of 2014. Our analysis indicates that looking at the behaviour of household inflation expectations provides a better understanding of the evolution of global inflation during this period. Given that firms are ultimately responsible for setting prices in the economy, it is possible that inflation expectations of households could serve as a good proxy for inflation expectations of small businesses that may not be able to afford professional forecasting services. It could also be that household inflation expectations play a role through other channels that may not be fully captured by firms' inflation expectations. However, it is difficult to identify the relative contribution of both explanations with aggregated data at the international level. Studying how closely household and firm expectations move together using micro-level data could shed light on this question.

These findings highlight two important practical considerations with respect to the Phillips curve framework used to analyze inflation. First, the post-crisis experience has shown that the Phillips curve relationship is subject to frequent shocks. As a result, models of inflation need to be regularly supplemented with additional sources of information. Second, household inflation expectations seem to add value to the Phillips curve relationship over and above what is already captured by the expectations of professional forecasters. While central banks monitor inflation expectations from various sources, it could be beneficial to formalize this approach when it comes to modelling inflation. As discussed in Côté (2015), the recent launch of a regular survey measuring household inflation expectations in Canada should help our understanding of inflation behaviour and eventually translate into improved models of inflation.

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The Slowdown in Global Trade

Michael Francis and Louis Morel, International Economic Analysis

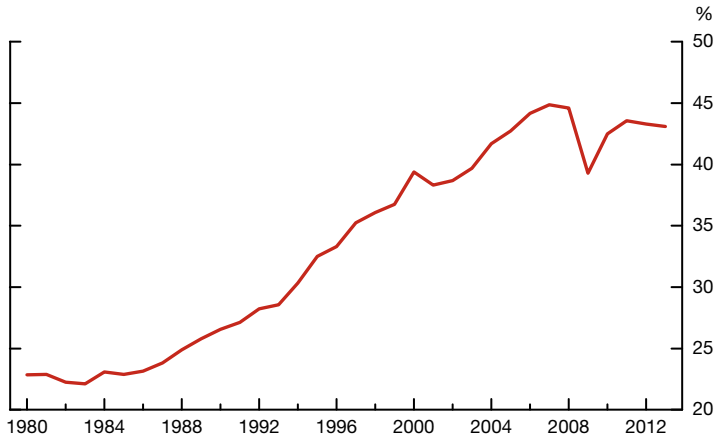
- Global trade has been disappointing following the 2007–09 financial crisis. After outpacing global GDP growth in the pre-crisis era, growth in global trade slowed and has barely matched the lacklustre pace of overall economic activity since 2010. As a result, the global propensity to trade (i.e., the ratio of trade to global GDP) has stopped rising.¹
- This flattening of the global propensity to trade has important implications for the Canadian economy, given its dependence on trade. Understanding the reasons behind the slowdown and the prospects for the future helps to shape the Bank’s outlook for the Canadian economy.
- There are a variety of factors beyond slow economic growth that explain the post-crisis slowdown in global trade. The most notable include diminished incentives to expand trade, the changing composition of global demand and increased protectionism.
- Some of these factors are likely to have only a temporary restraining effect on the global propensity to trade, but others could be more long-lasting. Overall, the findings suggest that the propensity to trade should resume its rise in the future, although at a slower pace than in the past.

Starting in the mid-1980s, the world economy entered a phase of rapid globalization. Lower tariffs negotiated as part of the Uruguay Round of multilateral trade negotiations and other trade agreements such as the North American Free Trade Agreement, the ability to break up the production process across geographic regions, lower transportation costs, and the integration of emerging markets like India and China into the global economy all helped to spur rapid trade growth. Between 1990 and 2008, the growth

¹ In this article, the propensity to trade is an indicator of the tendency of economic activity to involve international trade. Although the ratio of trade to GDP is a widely accepted indicator of the overall importance of trade in economic activity, it is problematic because the value of trade is a gross measure while GDP is a value-added measure. As such, the value of trade is overstated because exports typically include some imported content, the value of which is included in gross statistics but excluded from value-added statistics. Even though trade-related activity is a subset of GDP, the value of trade could exceed GDP in extreme cases. For example, Singapore’s trade recorded on a gross basis is 2.5 times larger than GDP. A better measure of the global propensity to trade would use value-added trade statistics. At present, however, value-added trade statistics are available for only a limited number of years and countries.

Chart 1: The global propensity to trade, 1980–2013

World merchandise trade volume (exports plus imports) as a percentage of world real GDP

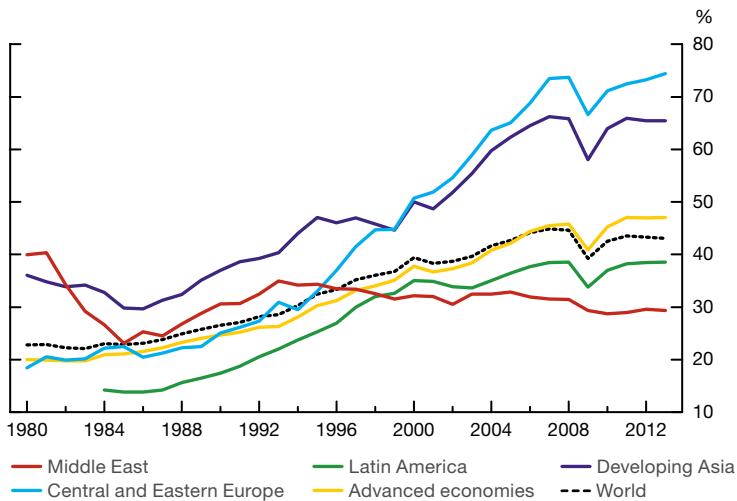


Sources: International Monetary Fund, *World Economic Outlook*, and Bank of Canada calculations

Last observation: 2013

Chart 2: The propensity to trade by region, 1980–2013

Merchandise trade volume (exports plus imports) as a percentage of real GDP



Note: Data for Latin America prior to 1984 are unavailable.

Sources: International Monetary Fund, *World Economic Outlook*, and Bank of Canada calculations

Last observation: 2013

in global trade outpaced growth in global output by a factor of two and, as a result, the volume of merchandise trade (exports plus imports) rose from around 25 per cent to 45 per cent of global GDP (Chart 1).²

This remarkable trend came to a sudden end following the onset of the global financial crisis. Starting in late 2008, the global propensity to trade fell sharply and, although it rebounded fairly quickly to pre-crisis levels, it has levelled off since 2010. The same story is broadly true across all regions of the globe (Chart 2).

◀ *The global propensity to trade has levelled off since 2010*

² In this article, we focus on trade in goods because of data limitations on services trade. We also use the volume-based propensity to trade because it is less sensitive to swings in commodity prices. The ratio of nominal global trade to nominal world GDP nonetheless shows a similar trend to that in Chart 1.

This article investigates two main explanations for why the global propensity to trade has stopped rising. The first is that cyclically induced changes have lowered the global propensity to trade since the crisis but have not affected its long-run growth rate. Hence, the recent flattening in trade relative to GDP is only a temporary phenomenon, and the upward trend should resume at some point in the future.

The second explanation is that the plateauing of the global propensity to trade reflects a long-term secular trend, with trade now growing at a slower pace relative to GDP than it had in the past. According to this view, trade reforms and technological innovations that lowered trade costs during the 1990s had a substantial effect on global trade by encouraging emerging markets to integrate into the global economy and by making global value chains economically viable. As a result, global trade rose relative to GDP. However, since this process is largely complete, the underlying incentives to expand trade are likely weaker now than they were in previous decades, leaving the world in a state where trade is neither rising nor falling relative to GDP.

The article finds evidence supporting both explanations, suggesting that the upward trend in the global propensity to trade should resume over time as cyclically induced headwinds dissipate, although the rate of increase will be more moderate than in the past.³

The Case for a Temporary Slowdown in Global Trade

We start by considering the hypothesis that there has been a temporary pause in the upward trend of the global propensity to trade. Two main explanations are consistent with this view. First, the propensity to trade has been temporarily reduced by changes in the composition of global demand. Second, it has been reduced because of a rise in protectionism. We consider each of these in turn.

◀ *A temporary pause in the rise of the global propensity to trade may be explained by changes in the composition of global demand or by a rise in protectionism*

Changes in the composition of global demand

At the global level, a change in the composition of GDP away from import-intensive components of demand (such as investment) and toward components that have higher degrees of local or non-traded content (such as consumption or government spending) would decrease the global propensity to trade.⁴

Morel (2015) estimates a model to explain the historical behaviour of exports in countries in the Organisation for Economic Co-operation and Development (OECD) using changes in the level and composition of global demand and relative prices.⁵ His results shed some light on how these factors have affected the global propensity to trade.

In the years leading up to the crisis, advanced-economy exports were growing quickly, reflecting not only the vigour of global demand but also the robust performance of investment relative to other demand components (Chart 3). The

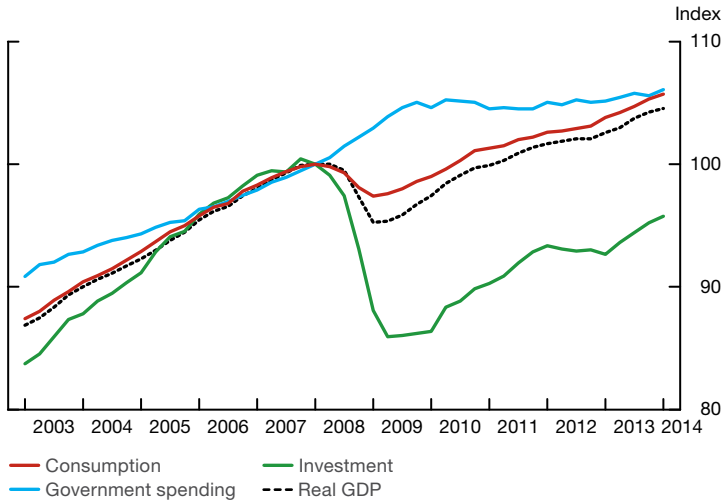
³ Other researchers have recently come to a similar conclusion. See, for example, World Bank (2015).

⁴ According to Bussière et al. (2013), the average import content of investment across countries in the Organisation for Economic Co-operation and Development was 32 per cent in 2005, compared with 25 and 10 per cent for private consumption and government spending, respectively.

⁵ Morel (2015) provides a new measure of foreign demand for exports by aggregating the demand for real imports in a country's trading partners. In turn, the demand for imports abroad depends on the relative strength and import content of domestic demand components (that is, consumption, investment and government spending) in these foreign countries. Using these country-specific foreign demand measures along with relative export prices, he estimates export demand equations for 18 OECD member countries.

Chart 3: Domestic demand components in OECD countries

OECD aggregates, 2008Q1 = 100



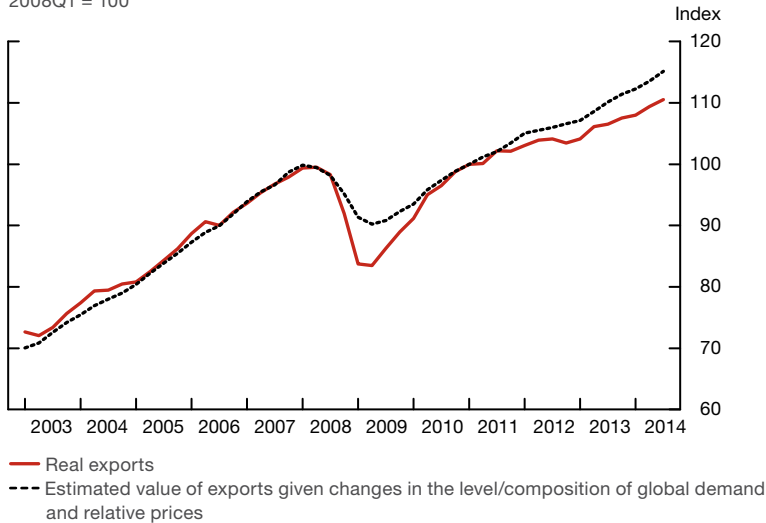
Note: Investment is gross fixed capital formation and comprises business, residential and government investment.

Source: Organisation for Economic Co-operation and Development
Main Economic Indicators

Last observation: 2014Q1

Chart 4: Real exports in OECD countries

Export-weighted average of 18 OECD countries' real exports and their fitted values, 2008Q1 = 100



Source: Morel (2015)

Last observation: 2014Q3

behaviour of exports during this period is explained well by the model (Chart 4), implying that the increase in the global propensity to trade before the crisis was largely due to the favourable shift in the composition of global demand.

In the post-crisis period, exports were sluggish. Weak global demand and the relatively poor performance of investment (especially in the euro area) can explain over half of this sluggishness.^{6,7} This suggests that other factors, in addition to the less-favourable composition of global demand, may have

6 The euro area (including intra-euro trade) accounts for about 40 per cent of the demand for advanced economies' exports.

7 This finding is consistent with those of Boz, Bussière and Marsilli (2014).

played a role in the flattening of the global propensity to trade since 2011. Similar findings apply to Canada: the slowdown in exports is only partly explained by the model and some unexplained weakness remains.

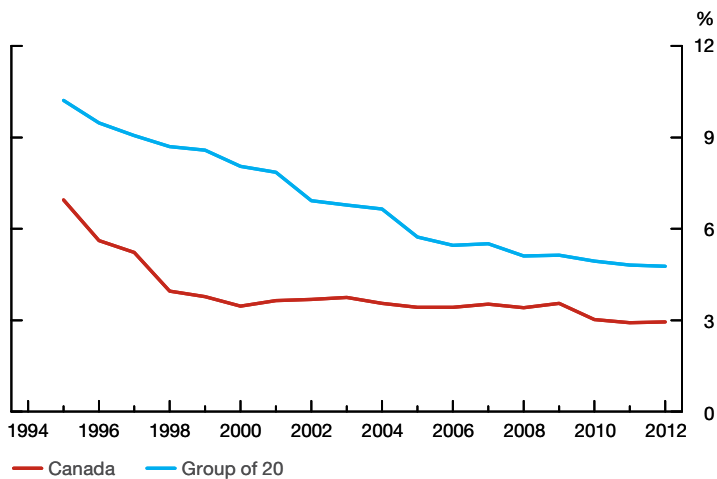
Protectionism

Often, when we think of protectionism, we think of tariffs. **Chart 5** shows the most-favoured-nation (MFN) tariff averaged across all product groups and all G-20 countries.⁸ On average, tariffs have not risen across the G-20 (or in Canada) following the crisis. If anything, they have continued to fall, albeit at a slower pace than in the pre-crisis period. One would therefore expect the trend increase in the global propensity to trade to be largely unaffected by changes to tariffs around the crisis years.

While tariffs have generally fallen since the crisis, additional non-tariff measures have been introduced. For example, the total number of restrictive measures introduced by G-20 members since 2008 had reached almost 1,000 by the end of 2014 (**Chart 6**), affecting about 5 per cent of G-20 trade.⁹ Of the various restrictive measures, it appears that the largest increase has been in the use of technical barriers to trade (such as labelling and safety regulations) (**Chart 7**).¹⁰ Although there is often merit to these types of measures, the costs of complying with them can be high, creating an impediment to trade.

Chart 5: Tariff rates in G-20 countries since the mid-1990s

Average of most-favoured-nation tariff rates

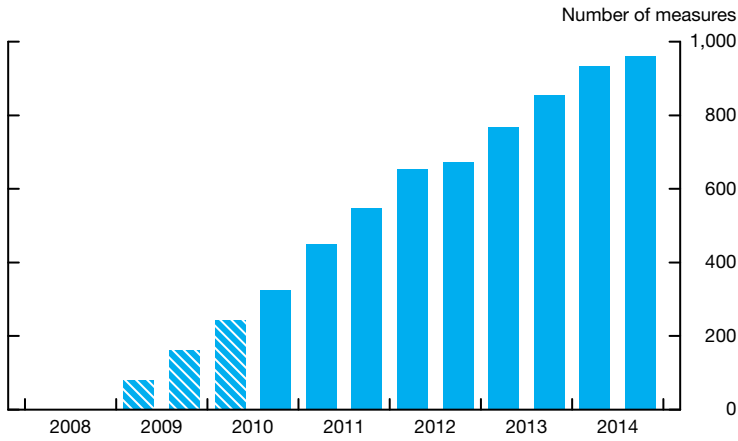


Sources: World Bank, World Integrated Trade Solution, and Bank of Canada calculations Last observation: 2012

- ⁸ The MFN tariff is the tariff rate that a country applies to imports from all members of the World Trade Organization (WTO). With some exceptions, it is equal to the lowest tariff offered by the country to any WTO member.
- ⁹ The series shown in Chart 6 is the number of measures currently in force, i.e., the number of measures introduced minus those that have been withdrawn. The data are compiled by the WTO from official and public sources.
- ¹⁰ The data in Chart 7 cover a different set of trade restrictions and are not directly comparable with those in Chart 6. For Chart 7, we use data on measures that G-20 countries are obliged to report to the WTO on actions they intend to implement each year. They do not take into account measures that have been withdrawn.

Chart 6: Restrictive trade measures

Cumulative number of restrictive measures introduced by G-20 countries since October 2008



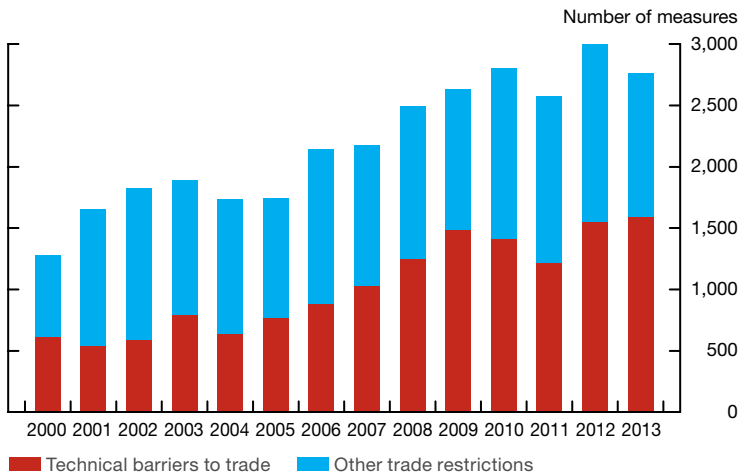
Note: The two observations per year take place in May and October/November. These data were not collected before October 2008 and have been published as a biannual time series only since November 2010; therefore, the dashed bars between October 2008 and November 2010 represent a linear interpolation.

Source: World Trade Organization

Last observation: October 2014

Chart 7: The use of technical barriers to trade and other trade restrictions

Number of restrictive measures that G-20 countries intended to implement each year



Source: World Trade Organization

Last observation: 2013

The non-tariff barriers introduced since 2008 have likely contributed to a modest reduction in the global propensity to trade. However, unless the pace at which restrictive measures are introduced picks up again in the future, the global propensity to trade should resume its upward trend, all else being equal.¹¹

◀ *Increased protectionism took the form of a greater use of non-tariff barriers*

To sum up, the 2007–09 global financial crisis induced a number of changes that seem to have paused the rise in the global propensity to trade: it altered the composition of global demand away from trade-intensive demand components, such as investment, and may have prompted countries to introduce more non-tariff barriers to trade.

¹¹ The WTO (2014) notes that between May and October 2014, G-20 economies applied import-liberalizing measures, accounting for 2.6 per cent of the value of G-20 merchandise imports. More liberalizing measures are likely in coming years as planned trade agreements come into effect.

The Case for a Secular Slowdown in Global Trade

We now turn our attention to the hypothesis that the slowdown in global trade reflects a secular trend, i.e., that the stabilization in the ratio of trade to global GDP may be permanent, or at least long-lasting. To this end, we take a high-level approach and explore how the underlying incentives to engage in international trade have changed over time. As discussed, to support this hypothesis, we expect to find evidence that the incentives to expand trade were strongest following the introduction of trade reforms in the 1990s, but have gradually diminished as value chains and emerging markets such as China have gradually become more fully integrated into the global economy.

Broadly speaking, international trade is divided into two types. The first, often referred to as horizontal intra-industry trade (HIIT) (or two-way trade in goods at the same stage of production), involves a country exporting and importing different varieties of the same type of good. This type of trade reflects the cost advantages from exploiting economies of scale combined with a general preference for variety. A country that exports one car model, while importing a different one, is a good example of HIIT.¹²

The second type of trade, called inter-industry trade, involves trade between countries in goods that are produced by different industries. Generally, this type of trade is thought to be driven by the principle of comparative advantage, which is simply the ability to produce a good at lower cost, relative to other goods, than another country could. Differences in productivity, labour costs and endowments of natural resources are usually important determinants of comparative advantage.¹³ The export of aircraft to finance the import of clothing is a good example of this type of trade. Trade that results from countries specializing in the different stages of a global supply chain, such as the production of computer parts versus computer assembly, is another example of inter-industry trade.

This section provides a discussion of how these two types of trade have changed since the mid-1990s, which may help to explain how the incentives to expand trade have changed over time.¹⁴ At the end of this section, we explore the changing nature of global supply chains and its possible effects on trade.

Horizontal intra-industry trade

To measure the underlying incentives to expand global trade arising from economies of scale and a preference for variety, we calculate a simple index of the degree of horizontal intra-industry trade, which we denote IHIIT. For a particular product, this measure is calculated by determining the share of a country's trade (imports and exports) that consists of two-way trade.¹⁵ For example, Canadian exports of passenger cars in 2012 amounted to about US\$45 billion, while Canadian imports amounted to US\$25 billion. Canada

◀ *The stabilization in the ratio of trade to global GDP may be permanent, or at least long-lasting, possibly reflecting a weakening in the underlying incentives to expand trade*

¹² The concept of intra-industry trade was introduced by Balassa (1963), while the empirical methods used in this paper to measure it were introduced by Grubel (1967) and Grubel and Lloyd (1971).

¹³ However, other factors, including, *inter alia*, the quality of a country's institutions (see, for example, Nunn and Trefler 2014), technology differences (Trefler 1995) and the dispersion of skills within the workforce (Bombardini, Gallipoli and Pupato 2012), could also affect comparative advantage.

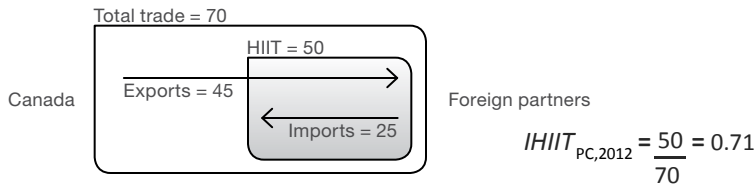
¹⁴ To abstract from the effect of commodity cycles, this section focuses on trade in manufactured goods, which accounts for roughly 60 per cent of global merchandise trade.

¹⁵ This measure is based on the standard Grubel-Lloyd (1971) index of HIIT:

$$IHIIT_{ij} = 1 - \frac{|x_{ij} - m_{ij}|}{x_{ij} + m_{ij}}$$

where x denotes to exports, m imports, i the type of good and j the specific country of interest.

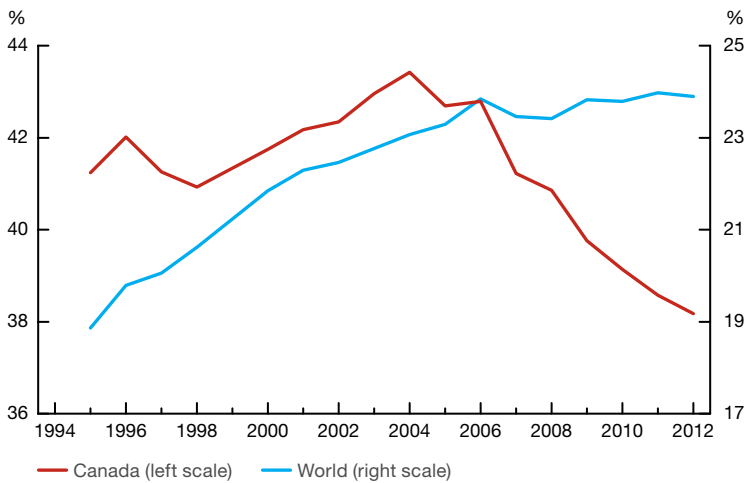
Figure 1: Canada's trade in passenger cars (2012, US\$ billion)



Sources: United Nations Comtrade Database and Bank of Canada calculations

Chart 8: Horizontal intra-industry trade

Share of horizontal intra-industry trade in total trade, average across all sectors and countries



Sources: United Nations Comtrade Database and Bank of Canada calculations

Last observation: 2012

thus had a trade surplus in cars of about 30 per cent of total car trade (US\$20 billion out of a total of US\$70 billion). The remaining 70 per cent (US\$50 billion) is the share of HIIT trade in cars (Figure 1). To obtain a global index of HIIT, the IHIIT score is calculated for about 2,500 different non-commodity products for almost 100 countries and then averaged across all observations.¹⁶

The importance of global HIIT had been rising until around 2006 (Chart 8).¹⁷ Given that trade had been growing quickly relative to global GDP, it appears as if HIIT was contributing positively to the global propensity to trade during this period. However, since 2006, the importance of HIIT has weakened.¹⁸ This reflects a weakening in the importance of HIIT in many advanced economies (including Canada, Germany and Japan), offset by a strengthening in HIIT in some middle-income countries. Some large sectors, such as automobiles and electronics, also began to experience noticeable declines in HIIT before the crisis. The fact that HIIT seems to have started weakening before the crisis suggests that secular forces may have played a role in the slowdown.

◀ Horizontal intra-industry trade has weakened as a driver of global trade growth since 2006

¹⁶ The data are from the United Nations Comtrade Database. We use annual export and import data for 96 economies. Sectors are disaggregated based on the five-digit Standard International Trade Classification (Revision 3).

¹⁷ The importance of HIIT in global trade is well documented (see, for example, Grubel 1967).

¹⁸ Brülhart's (2009) results are somewhat consistent with this observation, showing that HIIT started to moderate in the early 2000s.

As an advanced economy, Canada has an elevated level of HIIT and, like the global measure, Canada's IHIIT was rising in the period before 2006; however, it has declined consistently since. The smaller relative importance of HIIT in recent years likely reflects a displacement of Canadian production toward emerging-market economies, such as China or Mexico, in manufacturing sectors, such as clothing, furniture and motor vehicles.

Inter-industry trade

To understand how underlying incentives to expand trade arising from comparative advantage may have affected global trade, we develop an inter-industry trade specialization index (TSI) that measures how different a country's exports and imports are compared with the rest of the world. A simple example illustrates how the TSI is calculated. Newsprint paper represents around 0.5 per cent of Canada's exports, which is about 12 times the share of newsprint in global exports. At the same time, the share of newsprint in Canada's overall imports is about one fifth of the world average. Since Canadian trade consists of relatively large amounts of newsprint exports (compared with the rest of the world) and relatively few imports, Canada's trade is viewed as specialized in newsprint and therefore receives a high TSI score for this product.¹⁹

Using the same data set as for the IHIIT, a global TSI is calculated by computing a TSI score for every country-product observation and then taking the average. A large number means that countries are highly specialized and global trade patterns are very heterogeneous. This high degree of specialization implies that each country needs to import relatively more goods to supply a given amount of domestic demand, leading to more trade among countries for a given level of GDP. Conversely, a low TSI indicates that countries and trade patterns are more homogeneous, which should result in a low level of trade relative to global GDP. Thus, the TSI provides a different way of looking at how global trade may have been affected by the changing incentives to expand trade.

Chart 9 shows that the global measure of inter-industry specialization was rising from the mid-1990s to the early 2000s. Although the share of HIIT in total trade was rising during this time, the simultaneous rise in the TSI suggests that incentives related to comparative advantage strengthened as well and therefore explain part of the increase in the global propensity to trade over this period. This is not surprising, given the rapid integration of labour-abundant emerging markets, such as China and India, into the global economy at the time.

Starting in the early 2000s, however, the global measure of specialization began to fall, indicating that countries' trading patterns were becoming more homogeneous and therefore the incentives to expand trade arising from comparative advantage were diminishing. A variety of factors could explain this trend. For example, it could be that the spread of technology from advanced to emerging markets made it increasingly possible for emerging

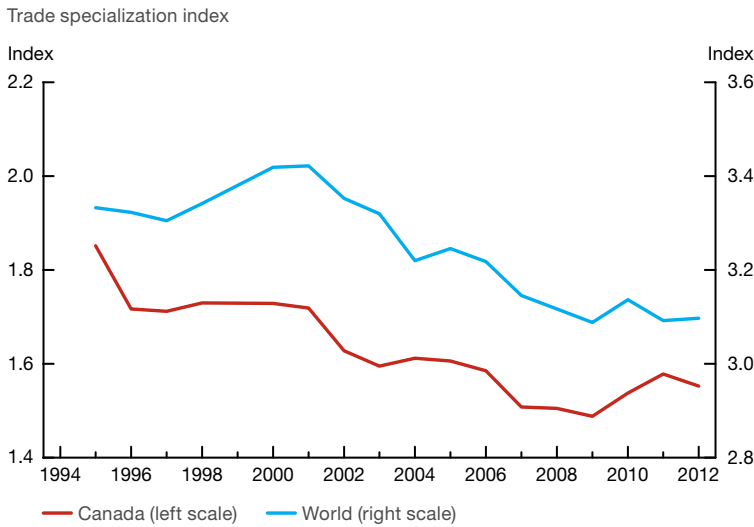
◀ *Global incentives to expand trade arising from comparative advantage start to diminish in the early 2000s*

¹⁹ The precise formula for our measure of inter-industry specialization is

$$TSI_{ij} = \left| \ln \left[\frac{\left(\frac{x_j}{x_T} \right) / \left(\frac{x_{TW}}{x_{TW}} \right)}{\left(\frac{m_j}{m_T} \right) / \left(\frac{m_{TW}}{m_{TW}} \right)} \right] \right|$$

where x denotes exports, m imports, i the specific good of interest, j the specific country of interest, T total exports/imports and W the world as a whole. By looking at the absolute difference between relative export and import shares, this measure abstracts from two-way trade (i.e., exporting and importing the same good) and treats countries that are dependent on imports of a good the same as countries that are specialized exporters of that good. This measure is adapted from Balassa (1965).

Chart 9: Global incentives to expand trade on the basis of comparative advantage



Sources: United Nations Comtrade Database and Bank of Canada calculations

Last observation: 2012

markets to compete in industries that were traditionally the domain of advanced economies. Canada also appeared to be subject to some of the same forces, as seen in a similar pre-crisis downward trend (although from a lower level of specialization than the global index).²⁰

The changing nature of global value chains

As the underlying incentives to expand trade (falling transportation costs, lower tariffs, etc.) strengthened during the 1990s, they helped redefine the way global production takes place; in particular, they contributed to the emergence of global value chains.²¹ Because the process of breaking up the production chain across different locations necessitates trade in intermediate goods, the rise of global value chains likely contributed to the increase in the global propensity to trade during the 1990s. Over time, however, as the underlying incentives to expand trade weakened, the impetus to further break up the supply chain likely diminished, thus restraining the rise in the global propensity to trade.

◀ *The emergence of global value chains likely contributed to fast trade growth in the 1990s*

China's capital-goods-producing sector provides a useful illustration of how China became heavily integrated into the global value chain, and how its participation in the global value chain has moderated in recent years. The red line in **Chart 10** shows the share of China's exports of final (i.e., finished) capital goods in its total exports relative to that of an average country. This is China's revealed comparative advantage (RCA) in exports of capital goods.²² In 1995, the share

²⁰ With their large industrial base, advanced economies, such as Canada, tend to exhibit a lesser degree of specialization than smaller, less-developed countries that often specialize in a few key industries and rely on trade to meet their domestic needs.

²¹ The production of any good typically occurs in stages. During each stage, value is added to the input from previous stages in a manner that progressively transforms raw materials into a final good. Together, these stages of production form a supply chain. Value is added at each stage, often in different countries, thus the term "global value chain."

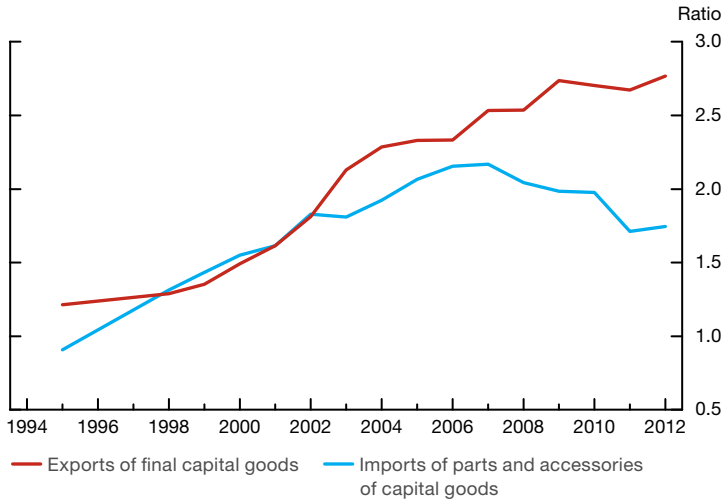
²² The formulas for revealed comparative advantage in exports (RCA_x) and imports (RCA_m) are given by

$$RCA_{xij} = \left[\frac{x_{ij}}{x_{iW}} \right] / \left[\frac{x_{jW}}{x_{TW}} \right] \text{ and } RCA_{mij} = \left[\frac{m_{ij}}{m_{iW}} \right] / \left[\frac{m_{jW}}{m_{TW}} \right].$$

The denotation is the same as in footnote 19. The RCA measure allows for a separate analysis of a country's export and import performance relative to the world's.

Chart 10: China's revealed comparative advantage in the trade of capital goods

Share of China's trade taken by capital goods relative to that for an average country



Sources: United Nations Comtrade Database and Bank of Canada calculations

Last observation: 2012

of capital goods in China's total exports was about equal to that of other countries, on average, with an RCA score of around 1.

The importance of capital goods in China's overall exports quickly increased, becoming nearly twice as large as in other countries by about 2002. One reason China was able to achieve such rapid growth in exports of capital goods was that it relied heavily on imported parts.²³ This is shown by the blue line in **Chart 10**. In 1995, parts and accessories of capital goods as a share of China's total imports were about the same as in other countries, but grew rapidly, largely matching the rise in its exports of final capital goods. By 2002, this import share was about twice that of other countries.²⁴ Starting as early as 2003, however, the relationship between the relative importance of exports of final capital goods and imports of parts began to weaken. Nevertheless, the process largely continued until 2007, at which point China started to reduce its dependence on imported parts and increasingly used domestic sources.²⁵

More broadly, China appears to have gradually reduced its dependence on foreign-produced inputs across a range of industries, as seen in the declining share of its total imports accounted for by imports used for processing into exports (from over 40 per cent in 2006 to less than 30 per cent in 2014). Given the importance of China to the global economy, and its

◀ *As China's experience shows, it is possible that global value chains are not the driver of the global propensity to trade that they once were*

²³ The use of imported intermediate goods to produce goods for export is often referred to as processing trade. It is thought that China's processing trade expanded in response to economic reforms introduced during the 1990s, particularly the combination of (a) China's "grasp the large, let go of the small" reforms, which resulted in the privatization of many small to medium-sized state-owned enterprises, mostly in downstream sectors (i.e., those sectors involved in the final stages of production, such as product assembly); and (b) trade liberalization measures introduced in preparation for China's accession to the WTO in 2001.

²⁴ Since we use imports to calculate this RCA measure, it provides an indication of China's revealed comparative disadvantage in parts of capital goods.

²⁵ Kee and Tang (2013) document the rise in domestic value-added content in Chinese exports during the pre-crisis period. They find that tariff reductions introduced after China's accession to the WTO on inputs used by upstream industries (i.e., those industries that produce intermediate goods as inputs into the final stages of production) helped reduce the cost of producing intermediate goods in China. This made it more profitable for China's downstream producers to rely on domestic inputs rather than imported ones.

apparent diminished participation in global value chains, it is possible that global value chains are not the driver of the global propensity to trade that they once were.

Taken together, the IHIT and TSI, along with evidence from China, suggest that the incentives for a rapid expansion in trade, which arose from economic reforms and trade liberalization during the 1990s, have now dissipated. Consequently, the post-crisis slowdown in global trade is likely to also have a secular component.²⁶

◀ *The incentives for a rapid expansion in trade, which arose from economic reforms and trade liberalization during the 1990s, have now dissipated*

Conclusion

The post-crisis slowdown in global trade has received considerable attention, reflecting the ongoing debate on whether the slowdown is cyclical or structural, as well as on the reasons for the slowdown. In this article, we find that the slowdown seems to be related to both cyclically induced and structural factors. On the cyclical side, the changing composition of global demand (and particularly the weakness in post-crisis investment expenditures) accounts for a significant amount of the weakness in the global propensity to trade. We also find that the crisis appears to have spurred the introduction of additional restrictive non-tariff measures during the post-crisis period that may have also constrained the increase in the global propensity to trade, though the effect has most likely been modest. On the structural side, we find that the incentives to expand trade related to the underlying determinants of trade, which previously brought on a phase of rapid globalization, appear to have weakened in the years before the crisis. This partly reflects the rapid industrialization of emerging-market economies, such as China, where participation in global supply chains seems to have diminished in relative importance over the past decade. As a result, these structural factors have caused the rate of increase in the ratio of global trade to GDP to gradually decline and approach zero over time. Thus, overall, the evidence suggests that while global trade growth should pick up as cyclically induced headwinds dissipate, its growth rate could be lower and more in line with global GDP growth than in the past. Given that a large share of Canada's economy depends on trade, a resumption of global trade growth would bode well for the Canadian economy and the well-being of Canadians.

²⁶ While the underlying secular trend was likely weakening before the crisis, as noted previously, the global propensity to trade continued to rise as a result of the cyclical upswing in trade-intensive global investment growth during that time.

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Improving the Foundation of Canada's Payments System

Lana Embree and Paul Miller, Financial Stability Department

- The Canadian payments environment has evolved with enhancements in technology and changes in user expectations. However, the existing regulatory framework and core payments infrastructure have not fully responded to these changes.
- Following a review of the payments system, the Government of Canada, in collaboration with the Bank of Canada, has begun to implement improvements to the governance and regulation of the payments system to better reflect the changes in the environment.
- In addition, the Canadian Payments Association is beginning a multi-year project to re-examine and redesign its payments system infrastructure.

Every day, individuals, businesses and governments in Canada make payments to buy goods and services, distribute social benefits, and give money to friends and family. These transactions, which are critical for economic activity and the daily lives of Canadians, are made using many different payment instruments, such as cash, cheques, debit cards, credit cards or electronic transfers. Underlying these transactions are payment networks and infrastructures that facilitate the actual movement of funds—the exchange, clearing and settlement of payments. In fact, most transactions are ultimately cleared and settled through two systems, the Automated Clearing Settlement System (ACSS)¹ and the Large Value Transfer System (LVTS),² which are operated by the Canadian Payments Association (CPA).³ These systems are at the core of the Canadian financial system.

1 The ACSS is Canada's main retail payment clearing system. It clears cheques and other paper-based transfers, debit card transactions, and electronic transfers of funds (debits and credits).

2 The Large Value Transfer System (LVTS) is an electronic funds transfer system that allows financial institutions and their customers to send large payments securely in real time, with certainty that the payment will settle.

3 In 2011, 99 per cent of the value and 76 per cent of the volume of all payments in Canada were settled through ACSS and LVTS. (These are internal Bank of Canada calculations based on data from the CPA, the Canadian Bankers Association, Interac and the Bank for International Settlements.)

The payments environment has changed significantly since the CPA was established in 1980, with advances in technology, the introduction of new payment service providers, the establishment of new risk-management standards and changes in end-user expectations. Given these developments and the importance of the payments system to the financial system and economy, in 2010, Canada's Minister of Finance established the Task Force for the Payments System Review to conduct a comprehensive review of the Canadian payments sector. The Task Force identified concerns with the regulatory framework, governance and the functionality of the payments system in Canada. In response to these concerns, in 2012, the Minister began a review of payments system governance issues, including the governance of the CPA, to ensure the continued safety and soundness of the payments system, spur innovation, and promote the consideration of user interests. The Department of Finance, in collaboration with the Bank of Canada, has been conducting the review, which has included consideration of related developments in other countries and consultations with key stakeholders.⁴ Important changes to the payments system have commenced as a result of this review.

This article describes the two key outcomes of the Payments System Governance Review: (i) changes to CPA governance and (ii) an enhanced regulatory framework. It also describes a CPA project to renew its core infrastructure(s) to incorporate the new technologies, standards and other developments needed for the next generation of payment systems. As well, it discusses the Bank's role in each of these three areas. With these updates, the Canadian payments system will have a strong foundation and thereby be able to support a modern and vibrant economy more effectively by serving the payments needs of Canadians safely and efficiently, as the payments industry continues to evolve.

◀ *With these updates, the Canadian payments system will have a strong foundation and thereby be able to support a modern and vibrant economy more effectively by serving the payments needs of Canadians safely and efficiently*

Background

In recognition of the importance of a safe and efficient payments system, the Government of Canada established, in 2010, a Task Force for the Payments System Review with the mandate to identify public policy objectives; assess the regulatory and institutional structures best suited to achieve them; and assess the safety and soundness, competitiveness and other aspects of the Canadian payments system.⁵ The Task Force highlighted in its December 2011 final report gaps in governance, the regulatory framework and functionality:

- **Governance:** The Task Force raised concerns regarding the governance of the payments system and the CPA, noting that the ability of all relevant stakeholders, including users and traditional or emerging payment service providers, to collaborate is limited (Task Force for the Payments System Review 2011c).
- **Regulatory framework:** The report noted that the regulatory framework is fragmented and can result in different levels of oversight for payments depending on the provider (Task Force for the Payments System Review 2011a). For example, with advances in technology, non-bank service

⁴ Consultations included the Finance Canada Payments Consultative Committee (FinPay), the CPA and the Canadian Bankers Association. FinPay is a forum of public and private sector representatives that advises the government on payments-related issues, including policy and emerging and ongoing challenges and/or opportunities in the payments system. More information on FinPay and its membership can be found at <http://www.fin.gc.ca/activity/pcc-ccsp-eng.asp>.

⁵ More information on the Task Force is available at http://www.fin.gc.ca/n12/data/12-030_1-eng.asp.

providers are increasingly involved in the provision of payments; however, they may be subject to less oversight than traditional payment service providers because they are not subject to the same regulations as banks.

- **Functionality:** Canadians increasingly expect to be able to make payments anywhere at any time to anyone, safely and efficiently (Task Force for the Payments System Review 2011b). For example, businesses and consumers would benefit from a digital alternative to cheques that would be faster and allow the recipient to access the funds sooner. In addition, a widely available alternative to cheques would improve efficiency by linking invoicing and reconciliation processes.

In light of these recommendations, fundamental changes were needed to the foundation of the Canadian payments system for it to continue to be safe, efficient and meet end-user interests in this new and evolving payments environment. As a result, following the release of the Task Force's final report, the Minister of Finance committed to undertake the Payments System Governance Review, in which the government would "review the governance framework for the payments sector, including the Canadian Payments Association, to ensure the continued safety and soundness of the payments system, spur innovation and promote the consideration of user interests" (Department of Finance Canada 2012).⁶

Changes to the Governance of the Canadian Payments Association

The CPA owns and operates Canada's core national payments infrastructure: the LVTS and the ACSS. The CPA's mandate, as outlined in the Canadian Payments Act (CP Act), is to (i) establish and operate national systems for the clearing and settlement of payments, (ii) facilitate interaction of its systems with other systems, and (iii) facilitate the development of new payment methods and technologies. The existing governance structure of the CPA needed to be enhanced to improve the CPA's ability to respond to changes in the payments environment and upgrade the core infrastructure (Task Force for the Payments System Review 2011d). For example, while the LVTS and ACSS are well maintained and have been very reliable, these systems should be modernized to better achieve the government's public policy objectives (of safety, efficiency and meeting the needs of Canadians) as the payments environment continues to evolve.

The Payments System Governance Review identified a number of measures to better position the CPA to operate and strengthen the national clearing and settlement infrastructure to ensure that it remains responsive to the evolving needs of Canadians, while also supporting public policy objectives. These changes have recently been introduced through amendments to the CP Act (Department of Justice 2015) and can be divided into two broad categories—Board composition and accountability framework.

◀ *The Canadian Payments Association will be better positioned to ensure that it remains responsive to the evolving needs of Canadians while also supporting public policy*

⁶ The commitment had two other components: (i) establish a senior-level advisory committee, FinPay; and (ii) review, in close consultation with stakeholders, the application of the Code of Conduct for the Credit and Debit Card Industry in Canada to emerging mobile payment products. See Department of Finance Canada (2012).

Board composition

The CPA Board currently has 16 directors (12 CPA members,⁷ 3 independent directors appointed by the Minister of Finance and a Bank of Canada representative as Chair). Voting on major recommendations, including annual operating and capital budgets, is weighted by members' payment volumes (i.e., the number of transactions), thereby concentrating decision-making power with the largest members, which may not be representative of the broader payments stakeholder community.

Changes to the CP Act have been made, with input from the CPA, to improve representation and better align with best practices in governance. In particular, the Board will be smaller; more independent, especially from the interests of the direct participants;⁸ and more reflective of the current payments environment. The new Board will be composed of 13 directors: 7 independent directors, 3 CPA members that are direct participants in the system,⁹ 2 CPA members that are not direct participants and the President of the CPA. One of the independent directors will act as Chair. The Bank will no longer have a role on the CPA Board. Voting will be based on the principle of one member, one vote.

To complement the existing Stakeholder Advisory Council, a new Member Advisory Council is being established to provide technical knowledge and operational expertise to CPA Management and the Board.¹⁰ Such advice will be a particularly useful input for independent Board directors not familiar with the details of payment operations.

Accountability framework

A new accountability framework will ensure that the activities of the CPA are consistent with its mandate, as well as public policy objectives, and will provide further assurance that the views of both stakeholders and members are being considered.

The CPA will have greater accountability to the Minister of Finance and the public (including broader stakeholders). Each year the CPA will publish an annual report that includes audited financial statements, the auditor's report, a review of performance against corporate plan objectives, a statement of forward-looking priorities for the year and a report from the Stakeholder Advisory Council.

The CPA will also be required to submit, for ministerial approval, an annual five-year corporate plan. This plan will provide a means by which the Minister can consider, for example, whether stakeholder and member views are being taken into consideration, whether sufficient forward planning is taking place, and whether the CPA is supporting achievement of public policy objectives. To help ensure that appropriate outcomes are achieved,

◀ *Changes to the Canadian Payments Act have been made, with input from the Canadian Payments Association, to improve representation and better align with best practices in governance*

◀ *A new accountability framework will ensure that the activities of the Canadian Payments Association are consistent with its mandate, as well as public policy objectives*

⁷ The Bank of Canada and all banks operating in Canada are required to be CPA members. Also eligible for CPA membership are credit union centrals, federations of caisses populaires, trust companies, loan companies and other deposit-taking institutions, life insurance companies, securities dealers that are members of the Investment Industry Regulatory Organization of Canada or the Bourse de Montréal, and money market mutual funds that meet certain requirements.

⁸ Direct participants are those CPA members that participate directly in the ACSS or LVTS. Other CPA members may participate in these systems indirectly by relying on services provided by direct participants.

⁹ Two of the three must be domestic systemically important banks.

¹⁰ The Member Advisory Council will include representatives from CPA's membership, while the Stakeholder Advisory Council draws from the CPA's broader stakeholder base, including consumers, businesses, retailers and governments, as well as related service providers.

the Minister will also have expanded power to issue a directive in any situation if it is in the public interest to do so.¹¹

These governance changes will affect the Bank of Canada's role with respect to the CPA. When the CPA was established, a Bank official was named as Board chair (i) to act as a neutral agent to arbitrate competing industry objectives and (ii) to exert government or public policy influence over the CPA. These objectives will now be achieved, first, through the improved representation on the CPA Board of a broader set of stakeholder views; and, second, through the new accountability measures and the Bank's oversight role under the Payment Clearing and Settlement Act (PCSA).¹²

It is anticipated that these changes will better position the CPA to adopt a forward-looking strategy and respond to changing technological capabilities and stakeholder needs. The changes to the governance of the CPA are expected to commence in mid-2015.

Regulatory Framework

Background

In its findings, the Task Force identified several areas of concern, including the fact that the regulatory framework, while relatively complete, was fragmented and that the payments system lacked comprehensive oversight.¹³ For example, certain players in the payments industry, such as non-bank payment service providers, were not subject to the same oversight as others, such as banks.

Under this regulatory framework, the PCSA gave the Bank its oversight mandate for designated payment systems, which are those that have the potential to pose systemic risk.¹⁴ Such systems are referred to as "systemically important." The Bank has designated five systems as systemically important, including the LVTS, Canada's main interbank payment system owned and operated by the CPA.¹⁵ In addition, the Department of Finance had oversight responsibility for the CPA, and the Minister of Finance had the power to designate other systems if it was considered in the public interest to do so.

New framework

The government has begun to develop and implement a new regulatory framework that will expand the scope of the current oversight regime in order to cover the entire spectrum of payment systems. This proposal, outlined in the Department of Finance's public consultation document on the

◀ *A new regulatory framework will expand the scope of the current oversight regime in order to cover the entire spectrum of payment systems*

¹¹ The Minister's directive power is currently limited to situations when making, amending or repealing bylaws, rules or standards. The Minister's directive power is distinct from the power of the Governor of the Bank of Canada to issue directives to systems that have been designated under the Payment Clearing and Settlement Act.

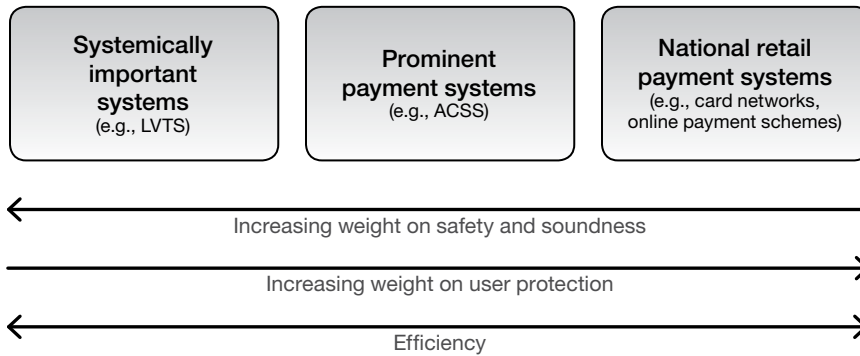
¹² The PCSA is available at <http://laws.justice.gc.ca/PDF/P-4.4.pdf>.

¹³ As described by the Task Force (2011c), certain systems are subject to Bank oversight as systemically important, while the existing oversight of other systems includes broad laws such as competition and privacy laws, as well as payments-specific legislation (Canadian Payments Act and Payment Card Network Act); codes of conduct (e.g., the Code of Conduct for the Credit and Debit Card Industry in Canada); and private sector rules, policies and standards.

¹⁴ Systemic risk is defined in the PCSA as the risk that a disruption or failure could transmit financial problems throughout the system, causing other institutions to be unable to meet their obligations ("knock-on defaults") or adverse economic effects on the stability or integrity of the Canadian financial system.

¹⁵ The other systemically important systems are the CLS Bank, CDSX, Canadian Derivatives Clearing Service and LCH.Clearnet Limited's SwapClear Service. For more information on the Bank's oversight role, see <http://www.bankofcanada.ca/core-functions/financial-system/oversight-designated-clearing-settlement-systems>.

Figure 1: Conceptual framework for oversight of the Canadian Payments System



oversight of national payment systems (Department of Finance Canada, 2015), complements the category of systemically important systems with two new categories of payment systems:

- (i) **Prominent payment systems:** systems where a disruption or failure has the potential to adversely affect Canadian economic activity and general confidence in the payments system.
- (ii) **National retail payment systems:** systems of national scope that process lower-value transactions. Because users have alternatives, a shock or disruption in a single system would have a limited impact on individuals and businesses and would be unlikely to affect the Canadian financial system and economy.

Under the new framework, payment systems will be classified as systemically important, prominent or national retail payment systems and would be subject to oversight and regulation proportional to the risks they pose. This classification recognizes that the issues that are most relevant for each type of system differ. For example, as shown in **Figure 1**, safety and soundness are crucial for systemically important systems, while they are relatively less so for national retail payment systems, for which user-protection issues are of greater importance.

◀ *Payment systems will be classified as systemically important, prominent or national retail payment systems and would be subject to oversight and regulation proportional to the risks they pose*

Prominent payment systems and an enhanced role for the Bank of Canada

To begin implementing this framework, the government has amended the PCSA to give the Bank responsibility to designate and oversee systems that have the potential to pose “payments system risk.”¹⁶ Such systems will be categorized as “prominent payment systems.” The Bank has been given this responsibility because it has a comparative advantage in the oversight of risk management of financial market infrastructures, including payment systems.

To fulfill this new responsibility, the Bank will establish criteria that will be used to identify prominent payment systems. It will also establish risk-management standards that it considers appropriate for prominent payment systems and will publish these standards as part of its Guideline Related to Bank of Canada Oversight Activities under the Payment Clearing and

¹⁶ Payments system risk is the risk that a disruption or failure in a system could cause a significant adverse effect on economic activity in Canada by (i) impairing the ability to make payments or (ii) producing a general loss of confidence in the overall Canadian payments system.

Settlement Act.¹⁷ The standards will be based on those applied to systemically important systems—the Principles for Financial Market Infrastructures—but modified to reflect the different nature and magnitude of risks relevant to prominent payment systems (Schembri 2014). The Bank will consult publicly on both the criteria and standards.

Once the criteria and standards are established, the Bank will review existing payment systems and determine which should be designated as prominent payment systems.

Framework for national retail payment systems

National retail payment systems will be subject to oversight that is proportional to the risks that are present in that type of system. As shown in **Figure 1**, user protection will be of relatively greater importance for these systems, and safety and soundness less so. The type of oversight that will be appropriate for these systems is therefore different than that for systemically important or prominent payment systems. The Department of Finance is currently working with stakeholders and consulting publicly to understand the nature of risks associated with these systems as well as the appropriate scope of and approaches for oversight.

Given that the focus of oversight for retail payment systems is expected to be weighted more heavily on user protection, other authorities may be better suited than the Bank to oversee them. However, because it is important that oversight of each category be complementary, the Bank expects to communicate and coordinate, when needed, with the authority or authorities that will be responsible for these systems.¹⁸

Next Generation Payment System(s)

In addition to a need for change in the governance and regulatory frameworks, the infrastructure and functionality of payment systems need improvement. The ACSS and LVTS were first introduced in 1984 and 1999, respectively. While these systems have been upgraded periodically to allow them to continue to function soundly and accommodate new payment instruments, they have not taken full advantage of the possibilities made available by changes in technology or fully adapted to end-user expectations. Adapting to such changes would allow for greater safety and efficiency as well as an improved ability to meet end-user needs. For example, enhancements could facilitate safe, faster and more efficient domestic and cross-border payments.¹⁹ Improvements to the core infrastructure could also offer efficiencies for direct users of the system by consolidating common activities and potentially reducing duplication of back-office processes at each participant.

¹⁷ Under the PCSA, the Bank can issue guidelines and has traditionally used its Guideline to describe sound risk-management practices. The Guideline is available at <http://www.bankofcanada.ca/core-functions/financial-system/oversight-designated-clearing-settlement-systems/oversight-and-legislation/guideline-related-oversight-activities>.

¹⁸ The Bank collaborates and coordinates, both domestically and internationally, with other overseers and regulators of important financial market infrastructures. For example, the Bank has arrangements with the Department of Finance and with provincial regulators (the Autorité des marchés financiers, the British Columbia Securities Commission and the Ontario Securities Commission) to facilitate co-operation and collaboration related to the oversight of systems with shared responsibility. Such co-operation allows for efficient and effective oversight.

¹⁹ Schembri (2014) discusses these desirable characteristics in greater detail.

The CPA has identified the modernization of its systems as an important part of its strategic direction and has begun a multi-year project to renew the core infrastructure(s), which may include the redesign of ACSS, LVTS or both.²⁰ The objective of the Next Generation Clearing and Settlement System Program is to meet the needs of Canadians and achieve the public policy objectives for years to come. While this is a CPA initiative, it will require input, collaboration and support from industry and regulatory authorities to achieve this objective. Those involved will need to take a long-term view and ensure that the core system will be sufficiently flexible to accommodate further changes in the payments industry, including innovations such as new payment instruments.

Industry participants, including direct and indirect system participants, other payment service providers, and end-users (e.g., merchant and consumer groups), are expected to provide their views regarding the new core payments infrastructure.

The Department of Finance has reaffirmed in the CP Act the public policy objectives that the CPA's payment systems should meet and has updated the governance framework, which is expected to support the CPA in successfully completing the Next Generation project. The Department is expected to closely follow developments to ensure that the public policy objectives are achieved.

The Bank is contributing to the Next Generation project in several ways.

Setting risk-management expectations. Under the PCSA, the Bank can issue guidelines related to its oversight role. The Bank uses this power to issue guidelines that describe what it considers to be sound risk-management practices. As discussed above, the Bank is developing standards, to be included in its guideline, for prominent payment systems.

Because of the importance of the ACSS and LVTS, it is reasonable to expect that any new CPA system resulting from the Next Generation project would be a systemically important or prominent payment system and will therefore need to meet the Bank's risk-management standards. As a result, it is useful for the CPA to be aware of the Bank's risk-management expectations when considering options for the design of the new system(s).

Contributing technical expertise. The CPA is currently undertaking research and analysis to inform the design of the Next Generation system(s), and the Bank is contributing technical expertise to this effort. This research and consultation with stakeholders will help the CPA to develop a conceptual design that articulates the desired attributes and characteristics of the core infrastructure.

Once the CPA has determined the appropriate design of the new system(s), the building and implementation phase will begin. At that time, the Bank's operational departments will increase their involvement, since the Bank will be a participant, and, as the central bank, will continue to play unique roles in the system(s).²¹

◀ *The Canadian Payments Association has identified the modernization of its systems as an important part of its strategic direction and has begun a multi-year project to renew the core infrastructure(s)*

²⁰ See the *Canadian Payments Association Annual Report 2013* at <http://www.cdnpayannualreview.ca>.

²¹ Currently, the Bank plays several unique roles in the LVTS and ACSS infrastructures. For example, the Bank is settlement agent for both systems and extends collateralized credit in the LVTS.

Encouraging involvement from stakeholders. The Bank will actively encourage and support collaboration from all stakeholders, since it is critical for the success of the Next Generation project. The more input the CPA receives from stakeholders, the better the system will be at meeting and balancing diverse stakeholders' needs.

Conclusion

The payments system landscape has been undergoing change for some time. Through the Payments System Governance Review, the governance of the CPA is being modernized and the oversight framework is being enhanced. The CPA has also begun a project to redevelop core infrastructure where it is needed. These changes are expected to reposition the Canadian payments system to ensure that it continues to meet the public policy objectives of safety and soundness, efficiency, and meeting end-user needs as the payments industry continues to evolve.

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The “Bank” at the Bank of Canada

Thérèse L. Couture and Christian Bélisle, Funds Management and Banking Department

- The Bank of Canada, within its Funds Management function, is responsible for providing banking services to specific types of clients, thereby supporting the implementation of Canada’s monetary policy framework, the well-functioning of the domestic financial system and global financial stability.
- Banking services comprise the provision of bank accounts, securities accounts and safekeeping services, Canadian-dollar payments, settlement services to payment clearing and settlement systems, and fully collateralized loans.
- These services are limited in terms of scope and client base and are currently provided to the Government of Canada, financial market infrastructures, Canadian financial institutions, foreign central banks and official international financial organizations, and a Crown corporation.

As Canada’s central bank, the Bank of Canada’s principal role is “to promote the economic and financial welfare of Canada,” as defined in the Bank of Canada Act. Supporting this overarching objective, the Bank has four main responsibilities: monetary policy; promoting a safe, sound and efficient financial system¹ within Canada and internationally; designing and issuing bank notes; and acting as fiscal agent and banker to the Government of Canada, including managing the public debt programs and foreign exchange reserves.

In support of these functions, the Bank offers banking and securities safekeeping services to specific types of clients. This article describes the range of banking services that the Bank offers and explains why the Bank provides these services.

◀ *The Bank offers banking and securities safekeeping services to specific types of clients*

Central Bank Money

The Bank of Canada is unique in its ability to provide a risk-free settlement asset for Canadian-dollar transactions. Financial transactions can be settled using different forms of money, including deposits held with commercial banks, credit extended by commercial banks, bank notes in circulation and deposits held at the Bank of Canada. While the first two forms involve some

¹ The financial system consists of payments systems, financial institutions and financial markets.

credit risk (that of the commercial bank), the latter two options, as direct liabilities of the central bank (i.e., central bank money), can provide risk-free final settlement since the central bank has no risk of default or bankruptcy.² As well, the central bank is operationally sound and therefore the provision of its settlement services is assured on a continuous basis. The Bank can also provide liquidity to ensure the completion of the settlement process and thus the smooth functioning of the financial system overall.

The ability to settle payments safely and efficiently is vital to the smooth functioning of the financial system. Bank notes, while useful for retail transactions, cannot provide an efficient means of settling large transactions across financial institutions. To facilitate this activity, the Bank provides services to a limited group of eligible clients where there is a clear financial stability rationale to do so.

The Bank's Banking Services and Clients

The legal framework for the banking services that the Bank can offer is provided in the Bank of Canada Act and the Payment Clearing and Settlement Act (PCSA). In line with these acts, some of the Bank's clients, such as members of the Canadian Payments Association (CPA) that are direct participants in the payments system, must hold accounts at the Bank. Other clients, such as foreign central banks, choose to do so. The Bank's intention is not to compete with the private sector and, while the Bank earns some revenues from these activities, they are done strictly on a cost-recovery basis. Rather than being guided by a profit motive, the Bank's underlying policy objective is to provide services to promote financial stability.

The banking services that the Bank offers its clients generally comprise the provision of Canadian-dollar overnight deposit accounts, securities accounts and safekeeping services for Canadian-dollar securities, Canadian-dollar payments, settlement services to payment clearing and settlement systems, and fully collateralized loans to specific clients. As described below, the services provided depend on the category of client. These banking services are highly integrated with the systems used by the Bank for the daily implementation of monetary policy in the Canadian economy and the various initiatives and services that support the well-functioning of the domestic financial system and global financial stability.³

As a central bank, the Bank does not offer retail banking services (such as deposit accounts) to private businesses or individuals. In contrast to most private sector institutions, the Bank performs a relatively small number of transactions, although with a large total value. On average, the Bank processes roughly 600 transactions per day, with a total value of around Can\$30 billion on behalf of itself and over 90 clients worldwide.

◀ *On average, the Bank processes roughly 600 transactions per day, with a total value of around Can\$30 billion on behalf of itself and over 90 clients worldwide*

The main categories of eligible clients are the following:

- the Government of Canada
- clearing and settlement systems (also known as financial market infrastructures)⁴

² See CPSS (2003) for more information on central bank money.

³ Examples of this are the Bank's open market operations, such as the securities lending program, and bilateral liquidity swap arrangements with various central banks. See Engert, Gravelle and Howard (2008) for more examples.

⁴ For a complete list of the designated systems, see the Bank of Canada website at <http://www.bankofcanada.ca/core-functions/financial-system/oversight-designated-clearing-settlement-systems>.

- financial institutions that are direct participants in the Large Value Transfer System (LVTS) and Automated Clearing Settlement System (ACSS), including the large Canadian commercial banks and other members of the CPA⁵
- foreign central banks and official international financial organizations
- the Canada Deposit Insurance Corporation (CDIC), a Crown corporation

Rationale for the Provision of Banking Services

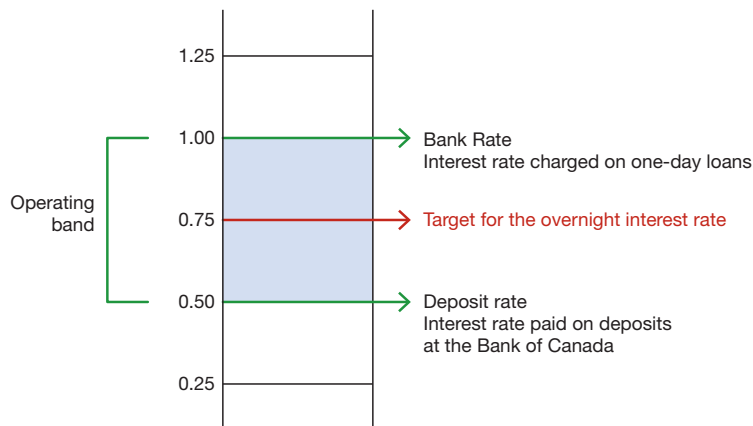
The provision of banking services to members of the CPA that are direct participants in the LVTS facilitates the implementation of monetary policy. The Bank conducts its monetary policy within the LVTS using an *operating band* in which the target for the overnight interest rate is set and reinforced (Figure 1). LVTS participants have a settlement account with the Bank, and those that have a short net position in their LVTS account at the end of the business day and are unable to obtain a loan from another direct participant must apply for a collateralized overnight advance from the Bank of Canada, the lender of last resort, under the Standing Liquidity Facility (SLF).⁶ The rate of this advance is the Bank Rate, or the top of the band. Any overnight deposits from LVTS participants are remunerated at the deposit rate, or the bottom of the band.⁷

The provision of these banking services to eligible clients also supports the stability and resilience of the Canadian financial system. The Bank has a number of features that make it uniquely placed to deliver critical banking services to clients and to mitigate a range of risks in the financial system.

The first is the elimination of banker risk, which is the risk of loss or diminution in the value of the client’s assets held with a financial institution, or the inability to access these assets in a timely manner as a result of the insolvency or failure of the financial institution. For obvious reasons, most clients would like to minimize the extent of banker risk they face. This is particularly true if they hold large, unsecured balances with the financial institution or if a temporary lack of access to funds or assets could cause significant stress

◀ A number of features make the Bank uniquely placed to deliver critical banking services and to mitigate risks in the financial system

Figure 1: Operating band with the target for the overnight rate at 0.75 per cent



⁵ Information on the LVTS and ACSS can be found on the Canadian Payments Association website at www.cdnpay.ca.

⁶ See Daniel, Engert and Maclean (2004–05) for more information on the Bank’s role as lender of last resort.

⁷ The operating band is a simple yet effective tool that creates the incentive for direct participants to lend to and borrow from each other at or near the target rate. See Howard (1998) for more information on the implementation of monetary policy.

in the financial system (for example, in the case of the federal government or a central counterparty).⁸ The Bank is the only entity that can fully eliminate banker risk for Canadian-dollar transactions, since it can create Canadian-dollar liquidity as required (and therefore can always meet its Canadian-dollar obligations) and cannot be declared bankrupt or insolvent.⁹

A second, related, feature is access to a risk-free settlement asset, that is, central bank money. In the case of Canada, this takes the form of either bank notes in circulation or settlement balances held at the Bank of Canada. These balances provide a risk-free means for commercial banks to settle large interbank obligations that arise, for example, from payments made between clients who hold accounts at different commercial banks.

Finally, an account held with the Bank facilitates access for certain clients to some lender-of-last-resort facilities.¹⁰ For example, in its day-to-day operations, the Bank supplies overnight credit on a routine basis through the SLF to direct participants in the LVTS. This credit is extended through the participants’ settlement account at the Bank. This virtually automatic extension of liquidity provides assurance to all participants in the system that they will be able to cover temporary shortfalls in settlement balances that can arise in the daily settlement of payments.

Given the benefits of holding an account at the central bank and the fact that it does not compete with commercial banks, the range of services offered and types of customers served are limited, typically by legislation. However, in some cases, the Bank must exercise judgment when deciding whether to offer certain services or accept certain clients. In these cases, the overarching principle is whether the provision of services to the client is required to support domestic or global financial stability.

Types of Clients

Table 1 shows the types of banking services provided to the different categories of clients, including the services the Bank provides to itself. Many of the services performed for clients leverage the processes in place for the Bank’s own operations.

Table 1: Banking services offered to each type of client by the Bank of Canada

	Canadian-dollar overnight deposit accounts	Securities accounts and safekeeping services	Canadian-dollar payments executed via LVTS	Settlement of securities transactions in CDSX	Settlement accounts and services	Lender of last resort
Bank of Canada	X	X	X	X		
Government of Canada	X	X	X	X		X ^a
Financial market infrastructures	X		X		X	
Direct participants in the Large Value Transfer System and the Automated Clearing Settlement System			X		X	X ^b
Members of the Canadian Payments Association						X ^b
Foreign central banks	X	X	X	X		
Crown corporation	X	X	X	X		

a. Refer to the Bank of Canada Act

b. Daniel, Engert and Maclean (2004–05)

⁸ Central counterparties mitigate and manage counterparty risk in a market by standing between the original counterparties and guaranteeing they will meet their obligations. See Fontaine, Pérez Saiz and Slive (2012).

⁹ The Bank of Canada Act specifies that the Bank can be wound up only by order of Parliament.

¹⁰ Having an account at the Bank does not automatically entail access to any of the Bank’s liquidity facilities. It merely facilitates access.

Government of Canada

The Bank's principal and largest client is the Government of Canada. The provision of banking services to the government supports financial stability by eliminating the banker risk that the government would otherwise face if these services were provided by a commercial bank. Reducing banker risk is important, given the large size of deposits and the critical role that the federal government plays within the financial system. Other reasons to support this role of the Bank are confidentiality and the elimination of conflicts of interest that could arise if one commercial bank had access to information not available to other financial institutions.

◀ *The provision of banking services to the Government of Canada supports financial stability by eliminating the banker risk that the government would otherwise face if these services were provided by a commercial bank*

The banking services are provided to the Receiver General for Canada, which manages the operations of the federal treasury and issues and accepts payments on behalf of the government. As fiscal agent for the government, the Bank deposits receipts into and executes payments from the bank account for the Consolidated Revenue Fund (CRF) held at the Bank.¹¹ The Bank also works closely with the government to ensure that the government maintains sufficient funds in the CRF to meet its daily payment obligations.

The banking services provided by the Bank to the Receiver General have evolved. The Bank has moved away from retail activities, such as the daily clearing and reconciliation of Government items, to focus on processing net payments to and from commercial banks. With this move, the Receiver General began to rely on "concentrator accounts" for its various revenue programs. Concentrator accounts were established at commercial banks for several Government programs to collect payments from the public (such as income tax and commodity tax payments for the Canada Revenue Agency). Bulk payments related to specific programs are transferred on a daily basis using LVTS from the commercial banks to the Bank for deposit to the CRF account.

The Receiver General also relies on a bulk transfer process for the redemption and settlement of its retail items, including Canada Savings Bonds (CSBs) and government cheques. In this process, financial institutions make payments on behalf of the government to their clients who cash in or redeem their CSBs or cheques issued by the government. Financial institutions that are participants in the ACSS then claim lump sums to recover these payments.¹² The Bank processes these claims daily and makes the reimbursement payments from the CRF to the eligible financial institutions via the LVTS.

Other changes to how the Receiver General operates have been introduced. A major initiative, announced in the 2011 federal budget, was the creation of the Prudential Liquidity Fund (PLF), which safeguards the ability of the Receiver General to meet payment obligations in situations where normal access to funding markets may be disrupted or delayed. A portion of the PLF is held as a Can\$20 billion deposit with the Bank.

Finally, as fiscal agent, the Bank manages the government's issuance of Canadian-dollar debt securities in CDSX, the central securities depository and securities settlement system operated by the Canadian Depository for

¹¹ The CRF is defined as the aggregate of all public monies that are on deposit at the credit of the Receiver General for Canada. See the Public Accounts of Canada 2014 at <http://www.tpsgc-pwgsc.gc.ca/recgen/cpc-pac/2014/pdf/2014-vol1-eng.pdf>.

¹² For more information, see the Automated Clearing Settlement System (ACSS) Rules and Standards, Section G, at https://www.cdnpay.ca/imis15/eng/Act_Rules/Automated_Clearing_Settlement_System_ACSS_Rules/eng/rul/Automated_Clearing_Settlement_System_ACSS_Rules.aspx#G.

Securities Limited.¹³ The Bank is responsible for the issuance, interest payments and redemption of government debt securities. Funds are transferred accordingly between the CRF account held at the Bank and CDSX to cover interest and maturity payments or deposit proceeds of issuances.¹⁴

Financial market infrastructures and LVTS direct participants

Financial market infrastructures (FMIs) include payment systems, central counterparties, central securities depositories and securities settlement systems. Since they play a critical role in supporting the stability of the financial system—virtually all financial transactions are cleared and settled through them—it is crucial for FMIs to adopt appropriate risk-management controls to reduce credit risk and ensure that they will continue to operate safely in times of severe market stress.

The Bank generally limits the provision of services to those FMIs that are designated as “systemically important;”¹⁵ that is, they have the potential to pose systemic risk, whereby the failure of one participant to meet its obligation in the system causes another participant to fail to meet its obligation and could, therefore, disrupt the entire system.¹⁶ The Bank oversees those FMIs that have been designated as systemically important by the Governor according to the PCSA. The Bank provides Canadian-dollar payment, settlement and collateral services to these FMIs and, by doing so, contributes to the reduction of risk in the overall system.¹⁷

Each day, FMIs typically receive large amounts of funds from their direct participants for settlement of their obligations. For FMIs that are systemically important, these funds are collected from the direct participants and held at the Bank in a single bank account (known as a concentration or settlement account). The corresponding outgoing payments are then made from the settlement account to those direct participants that are in a receiving position. The account is brought to a zero balance at the end of each day, as the payments received equal the payments paid out. The banking services the Bank provides allow this settlement process to be executed with central bank money, thereby eliminating the banker risk that would otherwise exist if settlement was executed with a commercial bank. This is in line with the Principles for Financial Market Infrastructures, which state that an FMI should “conduct its money settlements in central bank money where practical and available, to avoid credit and liquidity risks” (CPSS-IOSCO 2012).

◀ *The Bank provides Canadian-dollar payment, settlement and collateral services to systemically important financial market infrastructures and, by doing so, contributes to the reduction of risk in the overall system*

¹³ Information on CDSX can be found on the Bank’s website at <http://www.bankofcanada.ca/core-functions/financial-system/oversight-designated-clearing-settlement-systems/clearing-and-settlement-systems/#securities> or on The Canadian Depository for Securities Limited’s website at www.cds.ca.

¹⁴ The Bank also provides non-Canadian-dollar services to the Government. These services are part of the Exchange Fund Account (EFA). The foreign currency accounts for the EFA are held at various central banks, not at the Bank of Canada. However, the Bank acts as fiscal agent in managing the EFA and in executing the investment transactions. More information on the EFA can be found on the Department of Finance website at www.fin.gc.ca.

¹⁵ For more information on the Bank’s oversight of systemically important FMIs, see <http://www.bankofcanada.ca/core-functions/financial-system/oversight-designated-clearing-settlement-systems>.

¹⁶ FMIs may also be designated as posing payment system risk if problems within them could disrupt the ability of individuals or businesses to make payments or undermine confidence in the national payments system as a whole.

¹⁷ This business area has expanded in recent years with the addition of two newly designated systemically important FMIs: Canadian Derivatives Clearing Corporation in 2012 and LCH.Clearnet Limited’s SwapClear Service in 2013. The other FMIs designated as systemically important, for which the Bank provides payment and settlement services, are the LVTS, CDSX and the Continuous Link Settlement Bank (CLS). Embree and Miller (this issue) provide a discussion of the governance and regulation of the Canadian payments system, including the Bank’s oversight role.

The settlement of the LVTS is achieved by transferring the end-of-day net positions into the settlement accounts held at the Bank for each of the direct participants and onto the books of the Bank. In addition to providing settlement services, the Bank is also involved in managing the collateral pledged by the direct participants of the system in support of their LVTS payments and any advances by the Bank under the SLF. The Bank holds the securities pledged as collateral in CDSX. As a lender of last resort, the Bank provides fully collateralized advances to participants that are in a short LVTS position at the end of the day and are experiencing a temporary deficiency in liquidity. These activities support the implementation of monetary policy within the LVTS.

Foreign central banks and official international financial organizations

The Bank offers banking and securities safekeeping services to foreign central banks and official international financial organizations that hold Canadian-dollar assets. These institutions hold Canadian-dollar assets for the following main reasons:

- as reserves, to provide foreign currency liquidity in the event that market intervention is called upon to protect the external value of the domestic currency;
- as reserves for the provision of foreign currency liquidity to domestic financial institutions if access to capital markets were temporarily lost or delayed;¹⁸ or
- as an operating account, where the funds are used to pay various expenses (bank-to-bank transfers, embassy-related expenses, pension payments, etc.).

There are a number of reasons why a central bank would offer banking and safekeeping services to foreign central banks and why these institutions look to other central banks for the provision of these services. Central banks offer these services to each other and are therefore clients of one another. This reciprocity allows the central banks to form strong relationships and networks, which can facilitate collaboration to support global financial stability, as seen during the financial crisis. The provision of banking and safekeeping services can also contribute to the smooth functioning and liquidity of domestic financial markets, since it can facilitate the ability of foreign central banks to actively trade their securities portfolios. Another benefit is the acquisition of market intelligence by the central bank providing the services.

The primary appeal for the client is the elimination of banker risk. The foreign central bank is able to trade safely in foreign markets. Another benefit to the client is the confidentiality of the holdings and transactions within the central bank. Some central bank clients of the Bank of Canada also leverage their relationship with the Bank to allow the use of Canadian securities by their counterparties as collateral, supporting their own monetary policy operations.

Traditionally, foreign reserves have been primarily held in five currencies: the U.S. dollar, the euro, the Japanese yen, the British pound and the Swiss franc. However, by the end of 2012, the amount of reserves invested in the Canadian dollar had grown significantly. Recognizing this growth, in

◀ *The reciprocity of providing services to each other allows central banks to form strong relationships and networks, which can facilitate collaboration to support global financial stability*

¹⁸ For more information, see Pomorski, Rivadeneyra and Wolfe (2014).

2013, the International Monetary Fund (IMF) began to separately identify the Canadian dollar (as well as the Australian dollar) in its regular reporting of reserve holdings.¹⁹ According to IMF data, as of the end of the second quarter of 2014, the Canadian dollar was the seventh most widely held reserve currency.

The amount of Canadian-dollar securities held in safekeeping by the Bank for foreign central bank clients has grown significantly in recent years. Approximately 80 per cent of the securities held by central bank clients are Government of Canada debt securities; the remainder are mostly debt instruments issued by Crown corporations and provincial governments. These assets are held in a safekeeping capacity and are not part of the Bank's balance sheet.

The Bank offers two types of accounts to its foreign central bank clients: Canadian-dollar cash accounts (currently there are over 70 central bank and official international financial organization clients) and securities safekeeping accounts (for over 30 central bank clients currently).

The cash accounts are overnight deposit accounts (the Bank does not offer term deposits). The banking services offered include executing, on behalf of the client, Canadian-dollar payments through the LVTS. The Bank does not permit client accounts to go into overdraft, and it does not offer any intraday credit facility. Clients must ensure that sufficient funds are available in their accounts to cover their transactions.

With respect to safekeeping services, the Bank offers securities accounts that are linked to CDSX. Bank of Canada clients are permitted to hold only Canadian-dollar-denominated securities in their securities account.²⁰ The safekeeping services involve holding the client's Canadian-dollar securities portfolio electronically within internal Bank systems and within CDSX, settling within CDSX the client's trades to buy or sell securities, and distributing funds from interest payments or maturities of the securities.

The increased interest in the Bank's banking and safekeeping services has resulted in the need to review certain aspects of the services offered and the level of automation of the processes. Although the Bank offers a relatively limited range of services, it is reviewing them to determine whether additional services should be implemented in response to increased demand from its clients. For example, increased automation recently allowed the removal of the Bank's restriction on the volume of client trading activity. Given the large size of Government of Canada debt securities held with the Bank on behalf of its central bank clients, allowing clients to actively trade their portfolio is expected to support the smooth functioning of Canadian markets, especially the repo markets.

The Bank also offers gold safekeeping services to foreign central banks and official international financial institutions. These services are quite limited and could be qualified as "deep storage," meaning the gold is stored and is not expected to be traded by the client.²¹

◀ *Although the Bank offers a relatively limited range of services, it is reviewing them to determine whether additional services should be implemented in response to increased demand from its clients*

¹⁹ See the IMF news release at <http://www.imf.org/external/np/sec/pr/2013/pr13236.htm>.

²⁰ The securities must be able to be delivered through CDSX.

²¹ The government sold a portion of gold coins held at the Bank for the EFA through the Royal Canadian Mint in 2012. See <http://www.mint.ca/store/news/a-national-treasure-resurfaces-as-the-royal-canadian-mint-offers-rare-opportunity-to-own-canadas-first-gold-coins-crafted-with-pride-from-19121914-17400003?cat=News+releases&nld=700002&parentId=600004&nodeGroup=About+the+Mint>.

Crown corporation

A new category of clients emerged with the announcement in the 2014 federal budget that the Bank will provide banking and custodial services to the Canada Deposit Insurance Corporation (CDIC). The Bank has the authority to provide these services specifically to the CDIC as a result of amendments to the Bank of Canada Act.

The Bank provides cash accounts and securities safekeeping accounts to the CDIC, similar to the services it provides to foreign central bank clients, to eliminate banker risk and support the stability of the Canadian financial system. The CDIC maintains a securities portfolio to provide liquidity for different purposes, including in the event that it is called upon to provide deposit insurance to account holders of a member financial institution that has failed. To ensure that the assets of the portfolio could be easily and discretely accessed if required, the decision was made to transfer them to be held in custody by the Bank. Similar to the banking services provided to foreign central banks, the Bank, on behalf of the CDIC, executes payments in the LVTS and settles purchases and sales of securities in CDSX.

◀ *To ensure that the assets of the Canada Deposit Insurance Corporation's securities portfolio could be easily and discretely accessed if required, the decision was made to transfer them to be held in custody by the Bank*

Other Systems Settled by the Bank

Automated Clearing Settlement System

The ACSS is Canada's main retail payment clearing system, owned and operated by the CPA and in place since 1984. It is the system through which the vast majority of low-value payment items (e.g., cheques and electronic payments such as automated banking machine withdrawals and direct deposits) are cleared in Canada.

Financial institutions that are direct participants in the ACSS have a settlement account at the Bank. Net positions are settled daily, with participants that are in a negative position funding their shortfall by depositing funds to their settlement accounts via LVTS payments. Once all the shortfall positions are covered, these funds are transferred to participants that are net long as a deposit in their settlement account. The deposit amount is then paid out to the participant via an LVTS payment. The sum of funds received from the participants in a short position equals the sum of all the funds paid out to the participants in a long position.

Note Exchange System

The Bank is the sole supplier of bank notes.²² Each day, financial institutions across the country buy and sell bank notes from the Bank to maintain their inventory at the desired level and return bank notes that are unfit for circulation. Financial institutions must pay for the bank notes they request and receive a payment from the Bank for bank notes they return. These transactions are tracked by the Note Exchange System, and payments are settled daily with the Bank via the LVTS.

²² See the Bank of Canada Act, section 25, at <http://laws-lois.justice.gc.ca/PDF/B-2.pdf>.

Conclusion

The banking services offered by the Bank are limited in terms of both scope and client base, as set out in the Bank of Canada Act and the PCSA. The services are offered in Canadian dollars only and leverage the processes in place for the Bank's own operations. They are well integrated with the Bank's monetary policy framework and are a key function in supporting the Bank's role as the country's central bank. The limited group of clients receiving these services comprises the Government of Canada, financial market infrastructures, Canadian financial institutions, foreign central banks and official foreign financial institutions, and a Crown corporation.

The provision of banking services to CPA members that are direct participants in the LVTS facilitates the implementation of monetary policy, while the broader range of banking services offered supports financial stability. The provision of banking services has evolved over time and continues to grow, driven in part by the increasing demand for the Canadian dollar as a reserve currency and as the Bank contributes further to domestic and global financial stability.

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The Use of Cash in Canada

Ben Fung, Kim P. Huynh and Gerald Stuber, Currency Department

- The market share of cash in terms of the number of retail transactions continues to decrease, according to the Bank of Canada's most recent Methods-of-Payment Survey. Increased use of credit cards, particularly contactless credit cards, was a key factor in this development.
- The cash share of the value of retail purchases was, however, virtually unchanged from 2009 to 2013. In particular, the value share of cash transactions above \$50 has increased.
- Automated banking machines (ABMs) remain the major source of cash for Canadians, although people were using ABMs less often in 2013, compared with the previous survey in 2009.
- Cash use in Canada appears to be broadly similar to that in Australia and the United States.

The objective of this article is to study cash use in Canada. The Bank of Canada, as the sole issuer of Canadian bank notes, needs to understand the public's demand for cash. However, measuring cash use is difficult because it is an anonymous payment method. Given this, cash use is typically inferred through indicators such as aggregate cash withdrawals from automated bank machines (ABMs). Because of their aggregate nature, such measures do not provide any information on the typical characteristics of the users of cash. The Bank has therefore commissioned the Methods-of-Payment (MOP) Survey, first conducted in 2009 and repeated in 2013.

A key component of these surveys is the payment diary, in which users record all their cash and non-cash payments over a three-day period.¹ These surveys provide a detailed picture of the demand for cash and the characteristics of its users. By comparing the results from 2013 with those from 2009, we assess shifts in the use of cash and changes in cash-management practices, as well as the impact of innovative payment instruments such as contactless payment cards.

◀ *The Methods-of-Payment surveys provide a detailed picture of the demand for cash and the characteristics of its users*

¹ Bagnall et al. (2014) provide a detailed discussion of how extensively other central banks and organizations are using this methodology to measure cash and non-cash payments. Arango and Welte (2012) provide a discussion of the 2009 MOP Survey.

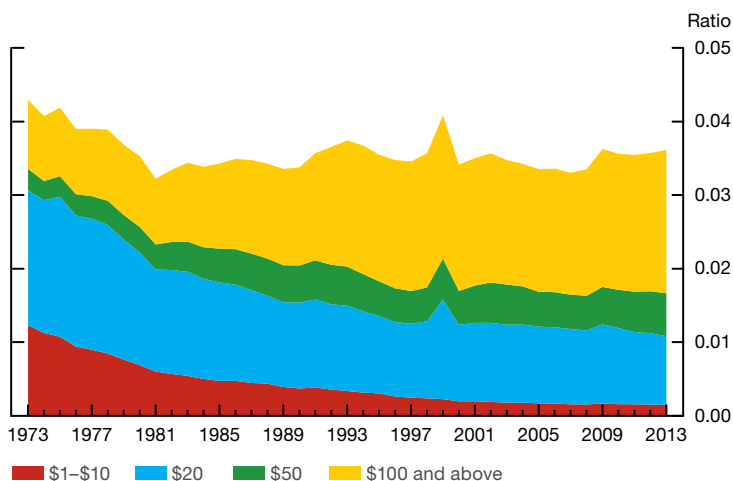
The article begins with a review of the Canadian retail payment landscape, followed by a brief overview of the 2013 MOP Survey methodology and findings. We then compare retail payment behaviour in Canada, Australia and the United States, based on payment survey data for all three countries. Finally, we provide some concluding remarks.

Retail Payment Landscape

The gradual shift away from cash toward electronic means of payment for purchases by Canadians at the point of sale (POS), especially in terms of transaction volumes, has continued in recent years.² In particular, the credit card share of POS purchases has continued to rise, at the expense of both cash and debit cards. At the same time, as shown in **Chart 1**, the annual rate of growth in the value of bank notes in circulation has remained similar to that for gross domestic product.

◀ *The gradual shift away from cash toward electronic means of payment has continued*

Chart 1: The ratio of bank notes outstanding to GDP



Notes: The chart shows the value of bank notes outstanding divided by nominal gross domestic product (GDP). The GDP values used are the unadjusted income-based nominal GDP from Statistics Canada. The value of bank notes outstanding is measured by the yearly average value of bank notes in circulation.

Sources: Statistics Canada and Bank of Canada calculations

Last observation: December 2013

Innovation in retail POS and online payment systems continues to be significant, particularly in enhancing the speed and convenience of the payment process for lower-value transactions, an area where cash still dominates. Payment products with a contactless or “tap-and-go” feature are the best example of this type of innovation.³ Contactless credit cards, in particular, are seeing strong growth in use, while Interac debit cards with the tap-and-go feature (“Flash”) are at a relatively early stage of market development.⁴

◀ *Innovation in retail point-of-sale and online payment systems continues to be significant, particularly for lower-value transactions, an area where cash still dominates*

Mobile wallet products, typically the outcome of partnerships between financial institutions and mobile phone companies, are currently being used in Canada mainly as a novel way to make POS purchases involving

² For a discussion of longer-term trends in the use of retail payment instruments in Canada, see Arango et al. (2012).

³ For example, the number of users of contactless payment cards is estimated to have nearly quadrupled between 2009 and 2013 (12.5 million), while the number of payment terminals able to accept tap-and-go cards also rose rapidly over this period (Technology Strategies International 2014).

⁴ However, since 2012, a growing number of major retailers have started to accept Interac debit cards with the Flash feature.

tap-and-go transactions from credit card accounts. Many of these mobile wallet products are in the early stages of expanding consumer payment choices to include all payment card accounts as well as retailer-specific rewards programs. To date, potential customers have been able to use only a limited selection of smartphone models that generally have a Subscriber Identity Module (SIM) card with near field communication (NFC) technology capability inside the phone.

New payment acceptance products have also been introduced in the past three years that make it feasible for merchants to use smartphones or other mobile devices to accept credit card payments. These products are more cost-effective than conventional payment terminals for smaller retailers and for merchants that do not have a fixed location. Such unconventional merchants have begun to use these products to some degree. Visa and MasterCard have recently made voluntary commitments to reduce the fees they charge merchants for accepting credit cards to an average 1.50 per cent from 1.65 per cent for a five-year period (Department of Finance Canada 2014)⁵; this fee reduction should make this payment method slightly more attractive for merchants.

In mid-April, the federal government released an update to the *Code of Conduct for the Credit and Debit Card Industry in Canada* to address unfair business practices and improve transparency for both merchants and consumers (Department of Finance Canada 2015). Among the new provisions was a requirement that the recent reductions in interchange rates be fully passed-through to merchants because merchants would otherwise be allowed to cancel contracts without penalty.

Digital currencies, such as Bitcoin, have also emerged in the past few years⁶; however, their overall functionality, acceptance and use remain extremely limited in Canada and elsewhere. They appear to be most useful for online transactions and are also often treated more as a financial asset rather than a means of exchange, so it is likely that they currently have little impact on the use of cash.

2013 Methods-of-Payment Survey Methodology

The objective of the 2013 MOP Survey was to (i) measure the various payment instruments that consumers are adopting and using, (ii) provide a detailed picture of consumers' cash-management practices, (iii) describe payment patterns in terms of demographics and POS characteristics, and (iv) elicit consumers' perceptions of the various payment instruments. The types of payment channels covered in the survey include payments at the POS, person-to-person (P2P) payments and online payments. As in most diary studies, however, recurrent bill payments (such as for mortgages or rent) are excluded. Henry, Huynh and Shen (2015) provide a detailed discussion of the 2013 MOP Survey.

In terms of survey design, the 2013 MOP Survey retains most of the core of the 2009 MOP Survey to facilitate comparison. However, in the 2013 MOP Survey, the three-day diary incorporated improvements in the

⁵ More specifically, the commitment concerns the interchange rates established by a credit card network for fees paid by an acquirer to a credit card issuer in relation to a credit card transaction. An acquirer is a participant in a payment network that provides services to allow them to accept payment card transactions. Interchange rates represent the largest part of the fees paid by merchants to their acquirer to facilitate credit card transactions.

⁶ For a discussion of digital currencies, see Fung and Halaburda (2014) or the e-money section on the Bank's website at <http://www.bankofcanada.ca/research/e-money>.

measurement of cash-management practices, such as asking respondents to provide more information on how cash was used in addition to making POS purchases (e.g., storing cash at home for emergencies). The 2013 survey questionnaire also collected more detailed information on alternative payment methods to cash and conventional debit and credit cards.⁷ In total, about 3,600 respondents from across the country participated in the survey. Their responses were weighted to ensure that the sample is representative of the Canadian population and to help correct for coverage and non-response bias.⁸

Major Findings of the 2013 Methods-of-Payment Survey

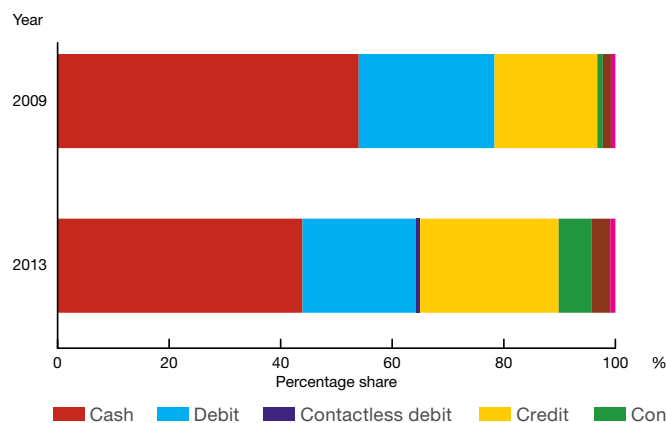
According to the survey results, cash accounted for about 44 per cent of the volume and 23 per cent of the value of payments (Chart 2). Relative to the 2009 MOP Survey, this constituted about a 10-percentage-point decrease in volume and virtually no change in value. Debit card use decreased in terms of both volume and value. In contrast, credit cards made significant inroads, particularly in their volume share, with an increase of 11 percentage points; a large part of this rise was due to the tripling of contactless credit card transactions. Stored-value cards also saw an increase in use. The findings of both the decreased cash volume share and almost no change in the value share are of considerable interest, and factors behind these developments, will be analyzed in detail in the remainder of this article.

◀ Cash accounted for about 44 per cent of the volume and 23 per cent of the value of payments

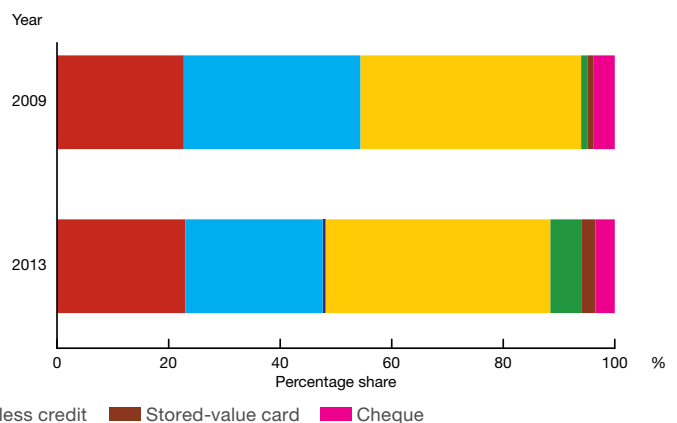
The use of cash tends to vary across demographic groupings based on region, age, income and education. Table 1 shows the shifts in the use of cash between 2009 and 2013 for these selected groups. In terms of volume, the cash share decreased across all regions, as well as age, income and education groups, as the volume of credit card use increased. In terms of value, however, the share of cash payments edged up in some regions

Chart 2: Payment shares

a. By volume



b. By value



Notes: The charts show the proportion of the total volume and value of transactions by method of payment, across all diaries. The scope of the surveys is to measure payments at the point of sale, person-to-person and online. Transaction values include cashback by debit card. However, as in most diary studies, recurrent bill payments (i.e., mortgages or rent) are excluded.

Sources: 2009 and 2013 Methods-of-Payment Surveys (2009 diary and 2013 survey questionnaire weights used)

⁷ Bagnall et al. (2014) discuss results for Australia, Austria, Canada, France, Germany, the Netherlands and the United States. In addition, they provide an in-depth discussion and comparison of the usefulness of payment diaries to measure cash and non-cash payments across the seven countries. However, payment diaries have also been used in Denmark and Hungary.

⁸ Vincent (2015) provides a detailed technical discussion of the statistical methodology used to ensure a nationally representative sample, while Chen and Shen (2015) discuss the methodological approach for constructing confidence intervals.

Table 1: Cash use by demographic groups

Per cent

	Volume		Value	
	2009	2013	2009	2013
Overall	53.6	43.9	22.9	23.1
Region				
Atlantic	57.5	43.2	25.1	29.2
Quebec	53.8	44.4	24.3	25.6
Ontario	56.5	43.2	22.7	21.1
West	50.5	44.6	21.2	22.6
Age				
18–34	48.7	40.8	22.9	24.6
35–54	54.1	40.1	23.0	19.5
55–75	58.8	49.3	22.8	23.8
Income				
Low	60.4	52.0	31.6	31.8
Medium	56.3	45.2	24.4	23.1
High	48.1	35.7	17.4	16.7
Education				
High school	60.6	49.5	33.0	30.8
Technical/comm. college	56.1	42.3	24.0	21.8
University	48.6	38.5	16.6	16.2

Notes: These shares include only purchases and exclude automated banking machine withdrawals or cashback at the point of sale. Data are from the 2009 and 2013 MOP diaries.

(Atlantic, Quebec and West) and among the 18–34 and 55–75 age groups. In contrast, the value share of credit card use increased in virtually every demographic category. The largest gains were in the Atlantic and West regions, among the 35–54 age group and low-income respondents.

In both 2009 and 2013, cash was used mostly for travel/parking, entertainment/meals and other types of goods and services (i.e., financial services, charities and in specialty shops) with transaction volume shares over 50 per cent (Table 2). Cash was also the main payment instrument for P2P transactions, accounting for 69 per cent in volume and 38 per cent in value in 2013. The types of goods and services that had a large decrease in volume were entertainment/meals (69 per cent to 56 per cent), travel/parking (74 per cent to 57 per cent) and other (65 per cent to 54 per cent). One possible reason for the decrease in volume was the increase in the use of contactless credit cards. Chart 3 shows that the cash volume share fell for every transaction value range, but the cash value share increased for purchases above \$50.

Chart 4 provides a measure of consumer perceptions of the relative importance of using cash versus using debit and credit cards. In the 2013 MOP Survey, cost and security were respondents' highest-rated reasons for using cash rather than debit and credit cards, consistent with the 2009 MOP Survey. Also, as shown in Table 2, the cash value share increased considerably for the types of goods and services for which ease or convenience is unlikely to be the most important reason for using cash, such as health care (10 per cent to 16 per cent), professional and personal services (12 per cent to 25 per cent) and durables (10 per cent to 17 per cent). Some of these increases may be driven by cost or security concerns.

◀ In both 2009 and 2013, cash was used mostly for travel/parking, entertainment/meals and other types of goods and services

Table 2: Cash payment shares by type of good or service and channel
Per cent

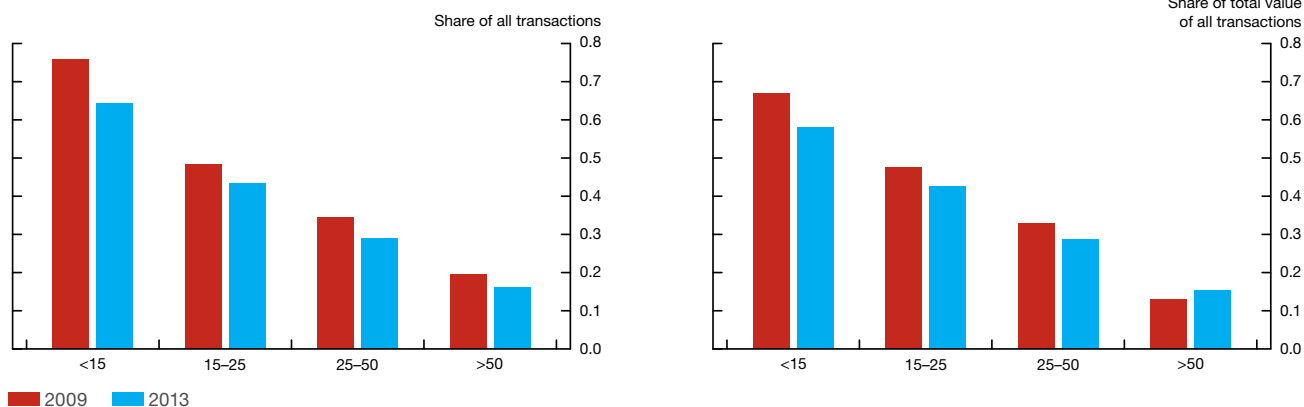
Type of good or service	Volume		Value	
	2009	2013	2009	2013
Durable goods	35	29	10	17
Entertainment/meals	69	56	45	37
Gasoline	36	22	29	17
Groceries/drugs	49	39	28	24
Health care	38	35	10	16
Hobbies/sporting goods	46	44	18	19
Personal attire	36	26	16	13
Professional/personal services	42	41	12	25
Travel/parking	74	57	36	22
Other goods and services	65	54	24	26
Channel				
Mail	12	11	3	4
Online	10	5	6	1
Person to person	80	69	47	38
Phone	30	9	7	1
Store	51	38	22	18
Other	71	51	24	18

Note: The table shows the proportion of the total volume and value of transactions for cash, conditional on the type of good or service purchased or the channel through which the transaction is undertaken. Data are from the 2009 and 2013 MOP diaries.

Chart 3: Cash shares for selected transaction value ranges (in dollars)

a. Volume

b. Value



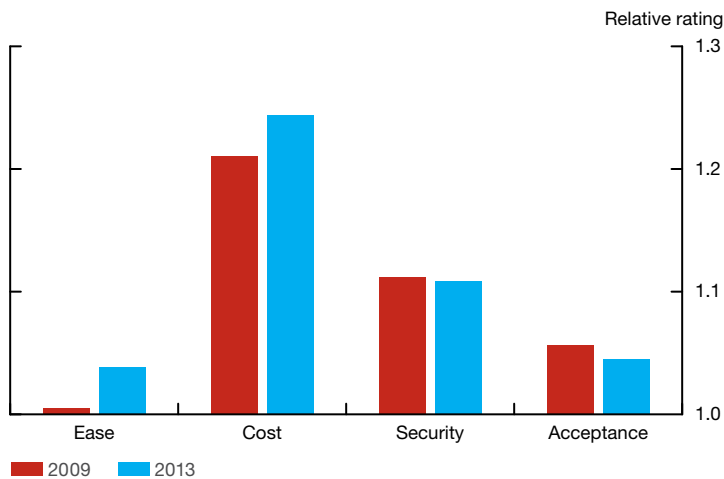
Source: Bank of Canada calculations based on the 2009 and 2013 MOP diaries

Last observation: December 2013

Cash is still mainly used for small-value transactions, but its share for such transactions is decreasing. The continued use of cash is consistent with research by Arango, Huynh and Sabetti (2015) and Wakamori and Welte (2012), who predict that, despite the possibility of increased merchant acceptance of cards, cash is still the preferred method of payment because of its low cost, security and ease of use. However, the decrease in the volume of cash use is in line with the findings in research based on the 2009 MOP Survey conducted by Fung, Huynh and Sabetti (2014), who predict that

◀ *Cash is preferred because it is perceived to be low cost, secure and easy to use*

Chart 4: Perception ratings of cash relative to debit and credit cards



Notes: The columns indicate the perceptions of cash relative to payment cards (debit and credit cards) with respect to different attributes. The attributes for which respondents had a positive perception of the use of cash have a rating greater than 1.

Source: Bank of Canada calculations based on the 2009 and 2013 MOP diaries

Last observation: December 2013

the introduction of contactless credit and stored-value cards would lead to a decrease in cash use, particularly in terms of volume. Further, Chen, Felt and Huynh (2014) use longitudinal data (2010–12) from the *Canadian Financial Monitor* and find a smaller albeit statistically significant reduction in cash use resulting from the introduction of contactless credit cards.⁹ These findings indicate that it is important to continue to study and monitor the use of payment innovations.

The decrease in the volume share of cash use is not surprising in light of the introduction of payment innovations such as contactless payment cards and some stored-value cards, which were designed to mimic the desirable properties of cash, i.e., they are easy to use and fast.¹⁰ Using data from the 2013 MOP Survey, **Table 3** shows the proportions of those who have used a payment innovation at least once in the past year. Overall, contactless credit card use (33 per cent) was much more common than contactless debit card use (9 per cent).¹¹ About 48 per cent of respondents had used a stored-value card of some sort. Overall, mobile payment use was low at 7 per cent, with the highest propensity to use it among 18–34 year olds (16 per cent). For online payment services using Interac Online, credit cards and online payment accounts (e.g., PayPal, Google Wallet), the rates of penetration were 27 per cent, 41 per cent and 31 per cent, respectively. Not surprisingly, the 18–34 year olds, those with higher incomes or university-educated respondents had the highest rate for use of payment innovations.

⁹ Increased use of contactless credit cards could also decrease debit card use. This effect requires more data to gain a better understanding.

¹⁰ Contactless credit cards were still at a nascent stage of introduction into the marketplace in 2009.

¹¹ Contactless debit cards were introduced only in 2011.

Table 3: Use of payment innovations
Per cent

	Contactless				Online payment methods		
	CTDC	CTCC	SVC	Mobile	Interac	Credit	Account
Overall	9	33	48	7	27	41	31
Region							
Atlantic	14	30	54	7	28	38	29
Quebec	8	24	32	5	33	45	31
Ontario	11	42	52	7	27	41	33
West	7	31	53	7	22	37	29
Age							
18–34	13	36	59	16	40	53	48
35–54	9	34	52	5	29	45	33
55–75	6	31	35	1	15	28	16
Income							
Low	8	21	38	4	20	26	22
Medium	10	36	50	6	26	40	30
High	9	44	56	10	35	56	42
Education							
High school	9	23	40	5	20	26	22
Technical/comm. college	10	34	51	7	30	45	35
University	7	47	52	9	31	55	39

Notes: CTDC: contactless debit card; CTCC: contactless credit card; SVC: any stored-value card, including those issued by Visa and MasterCard and store-branded cards; Mobile: mobile payment application. Interac, Credit and Account represent online payments made using Interac Online/e-Transfer, a credit card and an online payment account, respectively. The table shows the proportion of respondents who reported using a particular method of payment at least once in the past year out of all those who answered the corresponding question in the survey questionnaire (SQ). Data are from the 2013 MOP SQ (SQ weights used).

Since there has been a decrease in cash transaction volumes and a marked increase in the use of contactless credit card payments, the question remains whether people are still retaining cash holdings. **Table 4** shows that the number of cash withdrawals from ABMs fell substantially from an average of 4.4 per month in 2009 to 2.7 in 2013. However, the mean amount withdrawn remained relatively stable at \$118 in 2013. During this time, withdrawals from a bank teller and cashback requests at the POS both fell from 1.6 to 0.7 and 1.9 to 0.7, respectively. Compared with 2009, the variation across demographic groups was generally similar in 2013. Overall, cash holdings on hand increased from an average \$70 to \$84. The increases in cash on hand were the largest in the Atlantic and Ontario, among those in the 55–75 age group and with medium-income earners.

◀ Overall, cash holdings on hand increased

Since the number of withdrawals has decreased and the amount withdrawn has remained relatively unchanged, while, on average, cash holdings have increased, it appears there has been a reduction in the turnover but not a disappearance of cash. Huynh, Schmidt-Dengler and Stix (2014) compare Canada (2009 MOP Survey results) with Austria, a cash-intensive country, and find that an increased acceptance of card payment methods reduces cash use and cash holdings, although they predict that cash will not disappear. They indicate that part of the motive to hold cash is precautionary, for situations when cash is needed because cards are not accepted. To understand whether cash was held for non-transactional purposes, considerable effort was expended in the 2013 MOP Survey to measure other cash holdings, including questions on whether cash was stored at home for emergencies. Since there was a wide dispersion of responses, we report the median amount of other cash held, which was approximately \$300.

◀ Cash is held for situations when cards are not accepted

Table 4: Cash withdrawals and cash holdings

	ABM frequency (per month)		ABM mean amount (\$)		Cash on hand mean (\$)	
	2009	2013	2009	2013	2009	2013
Overall	4.4	2.7	115	118	70	84
Region						
Atlantic	5.7	2.8	111	126	75	93
Quebec	3.5	2.9	132	136	65	76
Ontario	4.7	2.9	109	111	66	89
West	4.3	2.4	114	113	76	82
Age						
18–34	4.8	2.7	96	96	56	61
35–54	4.7	2.9	115	113	68	69
55–75	3.5	2.7	135	135	86	108
Income						
Low	4.4	2.6	122	117	65	75
Medium	4.4	3.0	111	118	69	95
High	4.4	2.6	112	118	74	82
Education						
High school	4.1	3.0	108	123	72	87
Technical/comm. college	4.7	2.7	124	114	67	79
University	4.3	2.4	110	117	70	85

Notes: Calculations of the mean withdrawal exclude zero withdrawal amounts. Data are from the 2009 and 2013 MOP survey questionnaire (SQ) (SQ weights used).

Comparison with Australia and the United States

To better understand the use of cash in Canada, it is instructive to compare it with other countries. In a cross-country comparison involving seven countries, Bagnall et al. (2014) find that, although cash use is the lowest in Canada, Australia and the United States, it has not disappeared. Both Australia and Canada conducted payment diary surveys in 2013, while the United States has an ongoing annual payment survey, allowing the comparison of information on the evolution of cash use in the three countries (Table 5).¹² Following are some key observations.

First, cash is still widely used, especially for small-value transactions. In all three countries, cash accounted for 40 per cent or more in volume shares and between 14 per cent and 23 per cent in value shares. The average value of a cash transaction was only about 40 per cent of the average value of all transactions, and consumers conducted an average of about two transactions per day with one of them being a cash payment.

Second, cash shares continue to decline in all three countries. Compared with its 2010 survey, both the value and volume shares of cash in Australia declined. In Canada and the United States, however, only the volume share decreased.

◀ *In Canada, Australia and the United States, cash is still widely used, especially for small-value transactions*

¹² Bagnall et al. (2014) compare 2009 MOP Survey data for Canada with 2010 and 2012 data for Australia and the United States, respectively. Unlike Bagnall et al., the numbers reported here are not harmonized and are in local currencies.

Table 5: Comparison of cash use in Canada, Australia and the United States

Cash spending	Canada		Australia		United States	
Cash share (volume)	44%		47%		40%	
Cash share (value)	23%		18%		14%	
Average value of all payments	\$43		\$67		\$59	
Average value of cash payments	\$18		\$26		\$21	
Cash share (volume) in person-to-person (P2P) payments	69%		55%		67%	
Average value of P2P cash payments	\$30		\$98		\$32	

Cash withdrawal	Canada		Australia		United States	
	Number per month ^a	Value per withdrawal	Number per month ^a	Value per withdrawal	Number per month ^a	Value per withdrawal
Automated banking machine	2.7	\$118	2.8	\$138	1.3	\$105
Bank teller	0.7	\$236	0.4	\$297	0.6	\$217
Cashback	0.7	\$43	1.6	\$71	0.5	\$30

Cash holdings	Canada	Australia	United States
Average cash holdings in wallet	\$84	\$112	\$64
Average number of bank notes	4.4	5.0	5.7

a. The monthly figures are calculated by multiplying the number of withdrawals per week by 4.

Notes: Dollar values are in local currencies. Canadian data on payments and the number of bank notes are from the 2013 MOP diaries, while average and median cash holdings are based on respondent-level data from the 2013 MOP survey questionnaire. Results for Australia are based on the 2013 Survey of Consumers' Use of Payments Methods and are taken from Meredith, Kenney and Hatzvi (2014), Ossolinski, Lam and Emery (2014), and additional Reserve Bank of Australia calculations. Data for the United States are from the 2012 Diary of Consumer Payment Choice. See Bennett and Schuh (forthcoming).

Third, cash is still being used frequently for P2P payments, accounting for at least two-thirds of these transactions in Canada and the United States and over half in Australia. The average values ranged from Can\$30 for Canada and US\$32 in the United States to Aus\$98 in Australia. In all three countries, P2P payments were considerably larger than the average value of a cash payment.¹³

Fourth, ABMs remain the major source of cash, although people were using ABMs less often than in previous years. In 2013, Canadians and Australians withdrew cash from an ABM about three times a month, while Americans did so about once. In terms of value, on average, Canadians withdrew enough cash to pay for seven average cash transactions, while Australians and Americans withdrew enough for about five transactions.¹⁴ This result suggests that while Canadians used an ABM as often as Australians, they tended to withdraw more cash.

Finally, Americans and Canadians had average cash holdings in their wallets of US\$64 and Can\$84, respectively, while the Australians held the largest amount of Aus\$112. On average, Canadians held enough cash on hand to pay for almost five cash transactions, while Australians and Americans could pay for about four and three transactions, respectively. Again, this result is consistent with the observation that Canadians tended to withdraw more cash relative to the value of their average cash transactions. However,

¹³ The definitions of P2P are not harmonized across countries.

¹⁴ Comparing the dollar value of cash withdrawals or cash holdings across countries is problematic because of differences in the exchange rate and purchasing power. One simple measure of cash withdrawals and holdings for comparison is the ratio of the average cash withdrawal or holding to the average cash purchase value, which provides a sense of the number of possible cash purchases that could be made with cash withdrawn or cash on hand. For example, in Canada, the average value of an ABM withdrawal is \$118 and the average value of a cash payment is \$18; thus, the cash withdrawn from an ABM could be enough to pay for seven cash transactions, on average.

Canadians held the lowest number of bank notes at about four compared with five for Australians, while Americans held the most at about six, possibly because of the use of the \$1 bank note.

Conclusions

The 2013 MOP Survey provides detailed data on cash use and payment habits. Many Canadians are still using cash for payments, especially for small-value transactions. However, relative to the 2009 MOP Survey, cash use in terms of volume has fallen, while the cash value share has remained relatively constant. This decrease is partly due to the increased use of payment innovations, such as contactless cards and stored-value cards, that compete with cash in terms of ease of use for small-value transactions. Respondents to the 2013 MOP Survey rated the attributes of cost and security higher than acceptance and ease in their decisions to use cash. The reduction in counterfeiting in recent years, along with the launch, beginning in late 2011, of the polymer series of bank notes, with their enhanced security features and increased durability, may have contributed both to the high perception ratings of cost and security and the increase in the number of large-value cash transactions (above \$50). These possible relationships, however, warrant further study.

Advances in technology and new business models may result in more payment innovations that could further affect the use of cash in Canada. The MOP Survey provides insights into consumer adoption and use of a wide spectrum of payment instruments. In addition, it provides important information on both preferences for different payment methods and perceptions regarding merchant acceptance of different payment instruments. In addition to conducting more consumer MOP surveys, the Bank of Canada is currently undertaking a cost-of-payments study to address issues regarding merchant cost and acceptance of cash and payment cards. The data from the MOP surveys and the cost study could be combined to investigate issues related to the interactions of consumers with merchants, which are important to understanding cash use and other payment methods in a market characterized as two-sided.¹⁵

◀ *Advances in technology and new business models may result in more payment innovations that could further affect the use of cash in Canada*

¹⁵ See Rysman (2009) for more information on two-sided markets.

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