

**FOR
AGENDA**

SM/10/305
Correction 1

December 14, 2010

To: Members of the Executive Board
From: The Secretary
Subject: **Canada—Selected Issues**

The attached corrections to SM/10/305 (11/29/10) have been provided by the staff:

Mischaracterizations of the Views of the Authorities

Page 3, footnote 2, line 3: for “While the latter measure adjusts for quality, in the flavor of”
read “While the latter is similar to”

Page 5, para. 6, bullet 1, line 7: for “around 10 percent in British Columbia and Alberta in”
read “around 6.5 percent in British Columbia and 10 percent in Alberta in”

Page 38, para. 1, line 3: for “peaking in the mid-2000s,”
read “peaking in the early to mid-2000s,”

Factual Errors Affecting the Presentation of Staff’s Analysis or Views

Page 38, para. 2, bullet 1, line 3: for “This has driven down sales, especially”
read “This has affected sales, especially”

Page 38, footnote 3, line 2: for “the corresponding share is 53 percent.”
read “the corresponding share is 53 percent and 49 percent, respectively.”

Factual Errors Not Affecting the Presentation of Staff’s Analysis or Views

Page 6, para. 6, chart on “Cumulative Nominal Changes in House Prices”: replaced to add a row for Halifax, NS.

Page 6, para. 7, line 7: for “November 2005).” read “December 2005).”

Page 6, para. 8, line 7: for “rising by around 10 percent” read “rising by around 12 percent”

Page 32, line 9: for “financial shocks on TFP. However, the puzzling collapse of the Okun’s law during the current conjecture might mirror the puzzling improvements in TFP; though both puzzles need to be explained.⁵”

read “financial shocks on TFP. The explanation probably lies on several cyclical and composition effects, common during severe recessions—for instance, less skilled workers tend to be fired first and less productive firms tend to be weeded out during recessions; both effects raising observed TFP growth. To avoid this large cyclical, estimates of potential growth use smoothed TFP growth rates.”

Page 33, line 4: for “We also expect that the recent uptick in total factor productivity (which as noted remains a puzzle) is mostly a one-off effect with minimal implications over the medium term; aggregate TFP growth is relatively smooth, rising by around 0.4 percent per year in the last decade,”

read “We also expect that the recent uptick in total factor productivity is mostly a one-off, cyclical effect with minimal implications over the medium term; overall, trend TFP grew by around 0.4 percent a year in the last decade,”

Page 40, Table 2: replaced to add footnotes for clarification purposes.

Page 40, para. 7, line 2: for “over the sample.”

read “over the sample.⁶”

footnote 6: added to read “The estimated coefficient on U.S. output is 7.3 with a t-static of 8.1” Subsequent footnotes renumbered.

Page 41, Table 3: replaced. Source expanded to provide further clarification.

Page 41, para. 8.2, line 2: for “depressing yearly growth in 2010 and 2011, and continued low growth in 2012.”

read “depressing yearly growth in 2010 and continuing path of low growth in 2011 and 2012 (0.5 percentage points lower than the October WEO forecast each year).”

Page 41, para. 9, line 2: for “in the United states in the mid-2000s have been abnormally high,” read “in the United States in the mid-2000s, which comprises the majority of North American sales, have been abnormally high,”

Page 42, para. 11, bullet 3, line 2: for “strong competition including from key emerging countries like China, India, and South Korea. Wages and non-wage costs are also higher which makes North American markets highly contestable.”

read “strong competition from other world regions. Significant variation in wages and non-wage costs within the region and relative to abroad makes North American markets individually and collectively highly contestable.”

Page 42, footnote 8: for “aggregate that comprises two thirds of all”
read “aggregate that comprises about two thirds of all”

Page 44, Box 1, para. 2, line 8: for “Chrysler has repaid USD2.2 billion to the United States and GM had repaid USD1.5 billion”
read “GM had repaid USD1.5 billion”

Typographical Errors

Page 32, line 3: for “experienced a peak to trough drop of”
read “experienced a peak-to-trough drop of”

Page 37, Table 1: replaced to add missing footnote reference (3) in the fourth row.

Page 44, Box 1, first chart (on vehicle production): replaced to correct typo.

Page 44, Box 1, para. 3, line 1: for “The crisis let to a top” read “The crisis led to a top”

Questions may be referred to Ms. Batini, WHD (ext. 38568).

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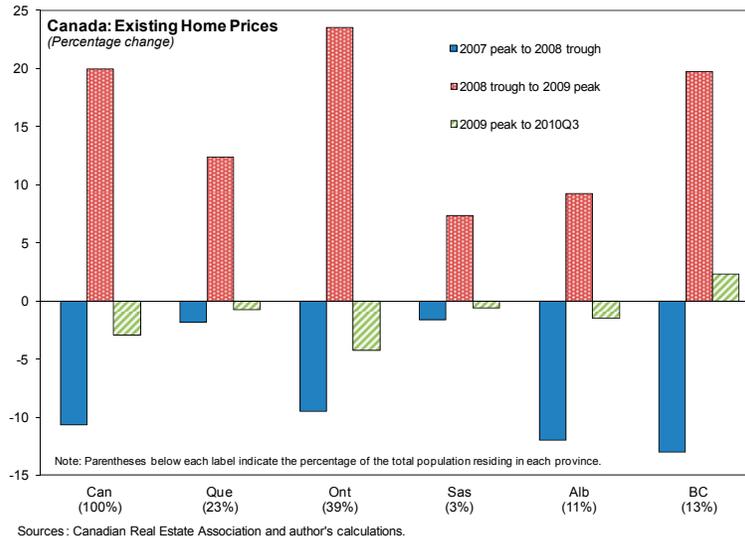
Att: (11)

Other Distribution:
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I. THE POST-CRISIS CANADIAN HOUSING MARKET¹

A. Introduction

1. **Canadian house prices recovered strongly in the post-crisis era but recently stalled.** After falling by over 10 percent from their pre-crisis peak levels, Canadian Real Estate Association (CREA) existing house prices have recovered rapidly following the financial crisis, rising by over 20 percent from their 2008Q4 trough levels.² However, since end-March 2010, house price increases have come to a halt, with prices stabilizing or falling slightly. Across regions, Quebec essentially experienced no declines in house prices even during the crisis, while western provinces suffered double-digit price losses during the crisis, partly reflecting the downward pressures on commodity prices. Ontario and British Columbia experienced rapid house price increases of around 20 percent on average since their crisis-related trough levels, ahead of the introduction of the harmonized sales tax.



2. **This chapter estimates the evolution of equilibrium real home prices in the post crisis period in key provinces.** Specifically, we look closely at fundamental determinants of

¹ Prepared by Evridiki Tsounta.

² There are numerous measures of house prices available in Canada, including new house price index provided by Statistics Canada, existing home prices provided by the Canadian Real Estate Association (CREA) and the Teranet-National Bank existing home price index. While the latter is similar to the Case-Shiller index, CREA's sales weighted index remains the most widely used given its larger sample size (all provinces, more years, all multiple listing sales by realtors). This measure exhibits the largest volatility, including large upswings, does not take into account compositional effects, and in that respect it should represent an upper limit in terms of any deviations from economic fundamentals. Our analysis is based on the CREA index unless otherwise noted.

house price developments in five large Canadian provinces (Alberta, British Columbia, Ontario, Quebec, and Saskatchewan) to come to an assessment about possible deviations from equilibrium prices. Following Tsounta (2009), we use an econometric model to estimate the equilibrium house prices, as determined by demand (derived on the basis of factors such as disposable income and demographic developments) and supply (derived from factors influencing the available housing stock). The specification of these models is a long-run (cointegration) relationship between house prices and their determinants, which is then embedded in an error-correction mechanism. We examine current valuations against economic fundamentals using quarterly regional data—such as disposable income, demographic developments (which also account for inter-provincial and international migration trends) and mortgage credit for the period 1993Q1–2010Q3.

3. Results suggest that home price developments are largely explained by fundamentals throughout Canada, with the possible exceptions of Ontario and British Columbia. While prior to the crisis the commodity boom had pushed house prices in western provinces above levels explained by economic fundamentals, the latest data suggest that house prices are above model predictions only in British Columbia and Ontario (and to a much lesser extent in Quebec and Alberta), possibly related to sharp activity prior to the introduction of the harmonized sales tax in the two provinces, which raised services costs for buying some houses (discussed in more detail later on). Specifically, we find that house prices in Ontario and British Columbia are around 9–14 percent above levels predicted by our econometric model as of the third quarter of 2010. In contrast, house prices in Quebec and Alberta are only slightly above levels predicted by the model while Saskatchewan appears to have house prices below levels dictated by fundamentals even though both of the resource-rich western provinces of Alberta and Saskatchewan had experienced significant deviations from economic fundamentals during the housing and commodity boom period. Despite the limitations of econometric estimates of house-price dynamics, the measured small degree of house price deviations from model predictions coupled with the recent cooling in the housing market suggest that, on the national level, Canadian prices are trending towards levels dictated by economic fundamentals.

4. Analyzing house-price valuations is important for various reasons:³

- *Households' behavior.* As housing represents the largest single asset for most households, changes in its valuation would have important consequences for their balance sheets and thus spending behavior.
- *Financial soundness.* Mortgages and other real-estate related assets also represent an important component of financial institutions' balance sheet (almost a third of chartered

³ Tsounta (2009) provides a more detailed discussion of the macro-financial linkages surrounding the housing sector and the vulnerabilities amid highly indebted Canadian households.

banks' assets, with mortgage credit rising by an average of 7.7 percent per year during 2000–08, then contracting by 4 percent in 2009), implying that housing market developments could have important implications for the health of the financial system, including profitability and soundness.⁴

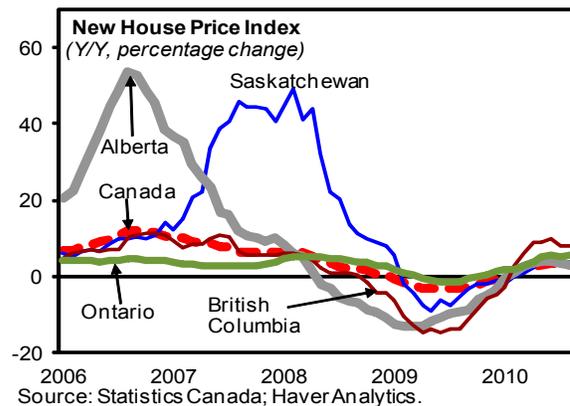
- *Policy Implications.* House prices also affect the consumer price index, and thus inflationary trends and expectations. As a result, understanding housing price dynamics has important implications for monetary policy in its role to preserve price stability as well as financial stability. Last but not least, revenues from real estate transactions (including construction-related income and excise taxes) have an important impact on a country's fiscal position. More generally, the construction sector could have important implications in the overall performance of the economy; it employed 6½ percent of the Canadian workforce (over 1 million) in 2009 and deducted over ½ percentage point from growth (versus a positive average annual contribution of 0.3 percentage points between 1997–2007).

5. **The paper is structured as follows.** The next section analyzes recent housing market developments in Canada. Section III describes the results of our analysis and Section IV concludes.

B. The Ups and Downs Following the Crisis

6. **Similar to most OECD countries, Canadian housing activity and prices were hit hard by the financial crisis.** In particular,

- New house prices experienced a moderate retrieval at the national level (falling by 3 percent in 2009). However, after rising impressively in the west during the commodity boom years, they have plummeted amid the financial crisis and the retrenchment in commodity prices, falling by around 6.5 percent in British Columbia and 10 percent in Alberta in 2009 alone.⁵



⁴ Chapter 5 provides a more detailed discussion of the Canadian mortgage market.

⁵ For example, in late 2006, new house prices in Alberta were 50 percent higher than a year ago (up 97 percent from end-2002 to their peak in late-2007) with more sustained increases in Saskatchewan (up over 120 percent between end-2002 and their peak in mid-2008). In contrast, prices in the rest of Canada exhibited more moderate increases, rising at most by around 13 percent (in Fall 2006) on an annual basis (up 41 percent between end-2002 and their peak in early 2008).

- Teranet-National Bank's existing home price index also shows significant declines amid the financial crisis, especially in the resource-rich western provinces and the financial hub of Toronto (the index records house prices in Canada's six metropolitan areas of Ottawa, Toronto, Calgary, Vancouver, Montreal, and Halifax).

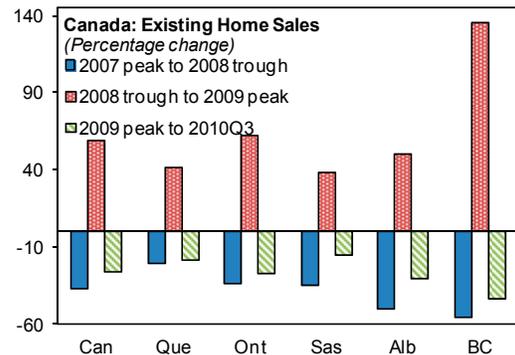
Cumulative Nominal Changes in House Prices
(Percentage change)

	Peak to trough (crisis)	Since trough to August 2010
Canada	-8.9	17.0
Calgary, AL	-15.4	8.2
Montreal, QU	-1.6	12.9
Ottawa, ON	-4.8	18.5
Toronto, ON	-11.3	23.1
Vancouver, BC	-12.0	17.2
Halifax, NS	-3.8	12.2

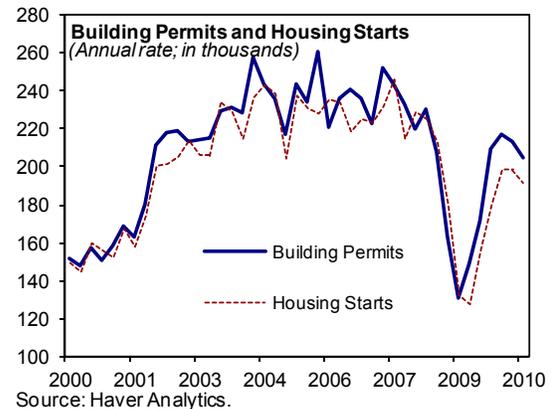
Source: Teranet-National Bank and author's calculations.

7. **The retrenchment in house prices during the financial crisis also coincided with declining construction and sales activity.** In April 2009, housing starts reached a low not seen since 1996 while building permits were 40 percent down from their all time peak (recorded in December 2005). In regional terms, the west experienced remarkable decreases in housing starts and building permits; for example, in early 2009, housing starts and building permits were around one-fifth the levels recorded in the commodity boom years, while CREA's existing home sales declined by over 35 percent peak-to-trough, with the largest declines experienced in the resource rich provinces of British Columbia and Alberta.

8. **The Canadian housing market recovered strongly following the crisis.** Existing house prices have rebounded in 2010, with British Columbia's Teranet-National Bank existing home price index rising by over 11 percent (year on year) in August 2010 and Ontario house prices rising by around 12 percent (both quality adjusted); smaller increases were recorded in the rest of Canada. Traditional valuation measures (house price-to-income and house price-to-rent) had reached historic highs during that period (Figure 1). Similarly, housing activity was on the rise with building permits and housing starts almost doubling between February 2009 and March 2010, with particularly large increases recorded in British Columbia. CREA's existing home sales have also more than recovered their crisis-related losses, reaching an all-time high in 2009Q4, with particularly strong sales recorded in Ontario and British Columbia (up 62 and 135 percent, respectively since crisis trough).



Sources: Canadian Real Estate Association and author's calculations.



III. CANADA'S POTENTIAL GROWTH: A POST-CRISIS ASSESSMENT¹

A. Introduction

1. **This paper revises IMF staff's earlier assessment of the impact of the recent financial crisis on Canada's potential growth.** Such assessment is warranted now that economic recovery is underway and the immediate impact of the crisis has been observed; notably private investment during the financial crisis and thus capital accumulation have been impacted, while unemployment rate peaked at 8.7 percent in August, which could possibly affect equilibrium rates of unemployment—both lowering potential growth. While the impact of the financial crisis on total factor productivity (TFP) is not known a priori, it is unlikely that strong growth in TFP would lift Canada's potential growth over the medium-term, given past experience.

B. Main Findings

2. **We find that the potential GDP growth rate in Canada has declined significantly in 2009 and 2010** (by around ½ percentage point compared to 2008 and one full percentage point compared to the period 2004–08). The potential GDP level is also estimated to suffer a permanent decline of about 2 percent vis-à-vis a no-crisis scenario by 2015; a modest loss compared to previous financial crises in industrialized countries (Cerra and Saxena, 2008, and IMF, 2009).² Staff estimates suggest that the loss could be eliminated if investment grows at close to twice the growth rates assumed in the latest WEO projection over the medium term.

3. **The crisis has impacted mostly capital accumulation and to a lesser extent labor input with positive contributions to total factor productivity.**

- *Capital accumulation.* Canada has experienced a large drop in investment since mid-2008, with investment dropping by 18.5 percent during the crisis and so far only recovering by 6¾ percent since the trough, implying that it will take 4–5 years for the capital-GDP ratio to return to its historical average (as assumed in WEO projections).
- *Labor input.* Due to the crisis, the unemployment rate rose from a 30-year low of 5.9 percent in early 2008 to a high of 8.7 percent in mid-2009, now standing at

¹ Prepared by Evridiki Tsounta. This paper is a revised and streamlined version of Estevão and Tsounta (2010).

² According to Cross (2010), the current recession was milder than the ones in the 1980s and 1990s for Canada; GDP dropped by 3.3 percent over three quarters between the fall of 2008 and the summer of 2009, compared to a GDP decline of 4.9 percent over six quarters in the early 1980s, and a 3.4 percent GDP drop in the 1991–92 downturn over four quarters. Similarly, employment fell just 1.8 percent in the recent recession, compared with 3.2 percent in 1991–92 and 5 percent in 1981–82.

around 8 percent. Similar abrupt adjustments were also observed in the participation rate, which fell from a historic high of 78.6 percent in early 2008 to a trough of 77.6, now hovering at around 78.3 percent. Similarly, hours worked experienced a peak-to-trough drop of over 4 percent, though they have since recovered by over 3 percent.

- *TFP impact.* So far the crisis had surprisingly a positive impact on TFP, which is estimated to have risen by over 2 percent in 2009, after a lukewarm performance in the previous years, possibly reflecting sectoral shocks and the accompanying reallocation of resources.^{3,4} This result is rather surprising since recent research points to negative implications from financial shocks on TFP. The explanation probably lies on several cyclical and composition effects, common during severe recessions—for instance, less skilled workers tend to be fired first and less productive firms tend to be weeded out during recessions; both effects raising observed TFP growth. To avoid this large cyclicity, estimates of potential growth use smoothed TFP growth rates.
- *Output gap.* We find that the output gap reached its widest point in 2009 at 4¼ percent in mid-2009, and is expected to be halved by the end of 2010.

4. **Moving forward, we expect Canada’s potential growth to rise to 2 percent over the medium term, with capital accumulation being the main driving force.** Using a perpetual inventory method, including by accounting for a historical rate of depreciation of around 8 percent a year, we obtain the path for the growth in the capital stock shown in Figure 1 and Table 1, which returns to the pre-crisis recent historical average, bringing the capital-output ratio to its long-term average.⁵ Changes in the participation rate and hours worked due to the crisis are not expected to negatively impact potential growth over the

³ Estevão and Severo (2010) show that financial shocks affect TFP growth through their effect on factor allocation, which in turn depends on an industry’s degree of reliance on external funding and whether the financial shock affects firms differently within each industry. The model presented shows that TFP growth in an industry would decline if banks’ tightened lending standards cause higher heterogeneity in capital costs within an industry. That would force the market equilibrium further away from an optimal allocation of resources as done by, say, a social planner, thus reducing industry’s TFP growth. They show that for the period going from 1990 to 2007 and using data for 31 industries in the United States and Canada, financial shocks indeed tended to lower TFP growth.

⁴ In comparison, U.S. TFP has risen by 2.9 percent in 2009.

⁵ Statistics Canada (2007) indicates that Canada’s depreciation rate is greater than the rates observed in the United States due to higher depreciation in building and engineering construction. While both countries have similar depreciation rates for machinery and equipment asset classes (18 percent on average in the United States and 20 percent in Canada), there is a considerable difference between Canadian and U.S. depreciation rates for buildings and engineering construction (U.S. rate is 3 percent versus an 8 percent Canadian average).

medium term (given the flexibility of the Canadian labor market).⁶ Beyond the crisis, demographic forces will contribute negatively to potential growth, with average hours of work and NAIRU expected to continue their downward trend; the latter has temporarily halted during the crisis.⁷ We also expect that the recent uptick in total factor productivity is mostly a one-off, cyclical effect with minimal implications over the medium term; overall, trend TFP grew by around 0.4 percent a year in the last decade, after falling in the 1990s.⁸

C. Conclusions and Policy Implications

5. **What do our estimates imply for policymakers?** Data suggest that Canada's output gap is still considerably large, implying that the current accommodating stance for monetary and fiscal policies should stay in place. Moving forward, the crisis would have a permanent impact on Canada's potential GDP level, implying that policies to raise potential growth would be worth considering. These could include enabling private R&D investment (which is low in Canada in international comparisons), facilitating internal trade, enabling foreign direct investment and enhancing product market competition, removing obstacles that hinder elderly labor force participation, and ensuring that incentives do not hinder firms from growing larger.^{9,10} Indeed, the authorities are considering or are already implementing many of the recommendations noted above as highlighted in *Advantage Canada* (2006)—the authorities' economic plan to increase Canada's competitiveness, including lowering corporate income taxation (at the provincial and federal level) and eliminating capital taxes,

⁶ Balakrishnan (2008) finds that Canada's labor market is as efficient as the one in the United States, though the data used in the analysis are up to 2004, thus excluding the increasing strains on the Canadian labor market amid the commodity boom, intensified by internal barriers to trade (such as interprovincial mobility barriers). Labor market flexibility is reflected in the significant and immediate impact of the Canadian downturn on the unemployment rate, which increased from 6.2 percent in October 2008 to 8.7 percent in August 2009, now standing at around 8 percent.

⁷ Stats Canada's baseline projections indicate that between 2006 and 2011, working-age population will rise by a cumulative 4.4 percent versus over 13 percent increase in the elderly population. This discrepancy increases over time; by 2031, the elderly population more than doubles (compared to 2006) while the size of the working-age population only increases by 8 percent.

⁸ For a discussion of trend TFP for industrial countries during financial crises, refer to Haugh et al. (2009).

⁹ Pilat (2005) finds that Canada lags many OECD countries in innovative performance and may have some scope for further catch-up. However, it notes that Canadian investment in R&D is unlikely to catch up with the R&D intensity recorded in some OECD countries, as it is limited by the structural composition of the economy—i.e., without a large high-tech industry—and by a relatively small average firm size.

¹⁰ For a more extensive discussion of possible structural reforms that could raise productivity in Canada, the reader is referred to OECD (2004 and 2006) and Bishop and Burleton (2009).

while in the latest Budget they committed to move forward with the recommendations of the *Competition Policy Review Panel* (2008) to enhance competition and productivity.

Table 1. Path for Potential Output Growth Components 1/

	2005-2008	2008	2009	2010	2011	2012	2013	2014	2015
Potential Growth , percentage change	2.4	2.1	1.5	1.6	1.8	1.9	1.9	1.9	2.0
Capital Services, percentage change	3.6	5.2	1.8	2.1	2.5	3.0	3.2	3.4	3.6
Labor Services, percentage change	1.2	0.9	0.8	0.7	0.8	0.8	0.7	0.7	0.7
NAIRU, percentage points 3/	6.9	6.7	6.7	6.7	6.5	6.3	6.1	6.1	6.1
Labor force participation rate, percentage points 4/	77.9	78.1	78.1	78.1	78.1	78.1	78.0	77.9	77.9
Total Factor Productivity, percentage change	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2
Contributions to Potential Output Growth 1/ (Percentage points)									
	2005-2008	2008	2009	2010	2011	2012	2013	2014	2015
Potential Growth	2.4	2.1	1.5	1.6	1.8	1.9	1.9	1.9	2.0
Capital Services 2/	1.4	2.0	0.7	0.8	0.9	1.2	1.2	1.3	1.4
Labor Services	0.7	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.4
NAIRU 3/	0.1	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0
Labor force participation rate 4/	0.1	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0
Annual hours worked per employee 5/	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	0.0	0.0
Working age population 6/	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.5
Total Factor Productivity	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2

Sources: Haver Analytics, WEO, OECD, and staff estimates.

1/ Output-labor elasticity assumed to be 0.6 and output-capital elasticity assumed to be 0.4, see Sharpe, Arsenault and Harrison (2008).

2/ Trend capacity utilization is calculated using data from Stats Canada (detrended by HP-filter).

3/ Non-accelerating inflation rate of unemployment. HP filter of civilian unemployment rate, 15-64 years (seasonally adjusted).

4/ Trend labor force participation rate calculated by applying the HP filter of the ratio between labor force and working age population.

5/ Trend changes in annual hours work per employee is calculated by applying the HP filter of annual hours worked per employee in the total economy.

6/ Working-age population refers to Canadian population 16-65 years of age. Projections as published by Stats Canada.

IV. THE BUMPY ROAD AHEAD FOR NORTH AMERICAN AUTOMAKERS¹

This chapter examines the development of the Canadian automotive sector vis-à-vis NAFTA partners during the crisis, and reviews the policy support to the sector. Simulating a model of sales of light vehicles in North America estimated on historical data going back to 1960, we find only modest spillovers from an eventual double dip recession in the United States onto Canadian jobs and growth. Yet, even in the absence of a retrenchment in U.S. growth, North American Original Equipment Manufacturers (OEMs) face hard long-term challenges from foreign competitors and risk a permanent loss of market share in the region.

A. Background

1. **The large swings in motor vehicle production have had significant effects on North America's real GDP growth in the past** (Figure 1). Both the production and sales of autos trended up over the 1990s, peaking in the early to mid-2000s, thanks to buoyant consumer spending and the elimination of residual trade barriers across the region following the implementation of NAFTA.² However, taking the United States as a benchmark, the contributions to growth have been small, on average, during the past two decades and drops in the sector's output have shaved up to ½ percentage point from GDP growth rates in bad years.

2. **During the 2000s, the industry has undergone two of the largest shocks in the history of the sector.**

- *Energy crisis.* Between 2003 and 2008, the prices of automotive fuels surged to unprecedented levels, discouraging purchases of sport utility vehicles (SUVs) and pickup trucks which have low fuel economy. This has affected sales, especially of the “Big Three” automakers (General Motors, Ford, and Chrysler. See Box 1), who had focused on these vehicles as a result of their popularity and relatively high profit margins.³
- *Financial crisis.* The financial crisis further slashed the demand for and production of automotive products, as consumer credit tightened and home equity loans used to finance car

¹ Prepared by Nicoletta Batini, Thomas Dowling and Grace Bin Li (all WHD). We are thankful to Dennis DesRosiers for providing us with data and a useful conversation.

² The introduction of NAFTA is estimated to have contributed until 2000 to an increase in North American motor vehicle production and sales of around 25 percent, although it is associated with a fall in employment in the United States and Canada (with corresponding gains in Mexico). Within the first ten years of NAFTA's ratification, the value of NAFTA auto trade almost doubled. Since NAFTA was introduced, both Mexico and Canada have attracted substantial FDI in the auto sector from the United States and from outside the region.

³ In Canada 61 percent of total automotive production is attributable to Ford, GM and Chrysler. In the United States and Mexico the corresponding share is 53 percent and 49 percent, respectively

purchases in the 2000s dried up. Between 2007 and 2009, production, sales, and employment in the sector fell dramatically in the United States, Canada and Mexico (Table 1). By 2009, North America comprised around 14 percent of world production as China emerged as the world's largest manufacturer of motor vehicles (22 percent) as the crisis accelerated North America's downward and China's upward trends in global market shares. While the contraction of the sector was widespread across the region, some automakers were hit harder than others. In particular, the cyclical downturn exacerbated GM's and Chrysler's structural problems, as consumer credit shrank¹ and confidence tanked, pushing them to the verge of bankruptcy.

Table 1. Auto Industry Performance During the Crisis
(Percent change 2007-2009)

	North America	Canada	Mexico	United States
Automotive Product Production	-43.4	-42.3	-25.7	-47.2
Motor Vehicle Sales	-33.2	-12.3	-31.2	-35.5
Direct Employment in Auto Sector	-25.5	-28.5	-23.3	-32.9

Sources: DesRosiers Automotive Yearbook 2010, Haver Analytics, and Fund staff calculations.

3. **The rapid policy response in Canada and the United States softened the sector's hard landing.** Rescuing GM and Chrysler was unanimously seen as necessary to prevent the failure of dozens of regional part suppliers, which could have dried up the supply of parts, affecting solvent automakers and bringing the sector to a halt. The two rounds of bailouts by the Canadian federal, Ontario, and United States governments, helped both Chrysler and GM file for Chapter 11 in the United States in 2009, averting an outright failure under Chapter 7. (Box 1 provides details of the U.S.–Canada stimulus to the “Big Three”). Additional indirect measures targeting the sector included tax deductions for manufacturers, short-term lending, and the U.S. USD 3 billion federal scrappage program Car Allowance Rebate System (CARS, colloquially known as “Cash-for-Clunkers”).

4. **The global recession left the automotive industry downsized and partly restructured but still standing.** By the end of 2009, the industry still employed a considerable number of workers, contributing to a substantial share of merchandise shipments (Table 2).

¹ During 2007 nearly 2 million new U.S. cars were purchased with funds from home equity loans. Such funding was considerably less available in 2008.

Table 2. Automotive Industry in 2009

	Direct Employment	Indirect Employment 3/	Percent of Total Employment	Percent of Manufacturing	Percent of Retail Trade	Percent of Merchandise Exports
Canada	109,117	545,585	4.5	9.2	21.3	11.9
United States	666,700	2,713,054	2.6	6.8 1/	16.7	7.7

Sources: Center for Automotive Research, Haver Analytics, Industry Canada, and Fund staff calculations.

1/ Value added by industry.

2/ Mexican data not available at this level of sectoral disaggregation.

3/ Computed by applying a ratio of 1:5 for Canada and 1:4.06 for the U.S.

B. Spillover Analysis: How Would the Canadian Auto sector Weather a U.S. Double-Dip Recession?

5. **The North American automotive industry is very integrated, thanks to the North American Free Trade Agreement** (see Box 1). For example, over $\frac{3}{4}$ of the total Canadian production of light vehicles is sold to the United States every year, and cars produced in Canada contain a maximum of 35 percent of parts produced in Canada, the rest originating in the United States. The U.S. market is the largest in the region absorbing around 85 percent of total North American sales. As a result, shocks to the U.S. economy, like during the recent crisis, have immediate implications for the Canadian and Mexican automotive industries.

6. **We examine the likely cyclical performance of the North American automotive sector under two scenarios for the United States' recovery.** To this end, we estimate a yearly model for North American total vehicle sales, regressing de-trended sales on: the lags of de-trended sales, lags of de-trended U.S. real GDP growth, and the Federal Funds rate to proxy credit conditions in the market for auto loans in the United States.⁵ The estimation sample is 1960–2009, while model simulations end in 2012.

7. **The estimated model fits well historical data, explaining around 85 percent of the variation in North American sales of light vehicles over the sample.**⁶ In-sample forecasts obtained using the model show that around $\frac{3}{4}$ of the drop in sales in the region during the crisis can be justified by the collapse in U.S. output over this period, while the rest of the drop likely reflects a continuation of the downward adjustment to sales that began in 2006. By contrast, easing credit conditions (through the cuts of the Fed Funds rate to near zero) have mildly supported sales.

⁵ The average effective rate on auto loans was not statistically significant when used instead of the Fed Funds rate. We use the Hodrick-Prescott filter to perform the trend-cycle decomposition.

⁶ The estimated coefficient on U.S. output is 7.3 with a t-statistic of 8.1.

8. **We simulate the model deterministically under two scenarios (Figure 2):**
1. *Baseline scenario*: U.S. real GDP growth follows the projection in the October WEO (that implies a sluggish but gradual recovery in 2011 and 2012).
 2. *U.S. “double-dip” scenario*: U.S. real GDP growth is assumed negative for two consecutive quarters in 2010Q4 and 2011Q1, depressing yearly growth in 2010 and continuing path of low growth in 2011 and 2012 (0.5 percentage points lower than the October WEO forecast each year).

Table 3. Impact of U.S. Growth on Canadian Automotive Industry Under Alternative Growth Scenarios

		2009	2010	2011	2012
		(Level)	(Annual Change)		
Scenario 1: Baseline	Auto Production (thousand)	1490	233.5	306.4	240.4
	Employment in Auto Sector (thousand)	442	13.2	13.8	10.8
	Exports in Auto Sector (bil. C\$)	44	-1.2	12.4	9.8
Scenario 2: Double-dip	Auto Production (thousand)	1490	208.2	50.0	349.8
	Employment in Auto Sector (thousand)	442	12.1	2.3	15.8
	Exports in Auto Sector (bil. C\$)	44	-2.2	2.0	14.2
Difference (Scenario 1-Scenario 2)	Auto Production (thousand)	...	25.2	256.4	-109.4
	Employment in Auto Sector (thousand)	...	1.1	11.6	-4.9
	Exports in Auto Sector (bil. C\$)	...	1.0	10.4	-4.4

Sources: Desrosiers Automotive Yearbook 2010, Haver Analytics, and Fund staff calculation.

Note: Employment figures differ from Table 2 because of a sectoral aggregation difference. In addition to those directly employed, this figure reflects associated sectors which can be attributed to the automotive industry in their entirety.

9. **Overall results rule out a return to the blockbuster level of North American sales seen in the mid-2000s.** In part, this is in line with the view that sales in the United States in the mid-2000s, which comprises the majority of North American sales, have been abnormally high, and well above their long-run growth of about 0.9 percent per year.⁷ However, under both scenarios, sales in 2011–12 undershoot the long-run trend. In particular, under the baseline, total sales of vehicles in the region would only return to the 1996 level by 2012. Worse still, under the double-dip scenario, sales in North America would still be at their 1994 level in 2012.

⁷ Our baseline forecast is slightly more pessimistic than earlier-in-the-year forecasts by some other analysts like TD Economics and Scotiabank for 2010 (whose projections range between 13.7 and 13.9 millions of units sold for the region, respectively). At 13.8 million units for 2011 our baseline forecasts are also considerable more gloomy than TD Economics, for example, that expects sales to pass the 15 million mark in two years. However, they are much rosier than J.D. Power and Associates that puts sales in the region at below 13 million units following Q3 revisions to the U.S. outlook.

10. **A double-dip scenario in the United States would have very small repercussions for Canada's jobs and growth through the effects on the Canadian auto sector.** Using as guidance the contemporaneous correlations between North American sales and (i) Canada's jobs in the automotive sector;⁸ and (ii) Canada's real GDP growth, we compute the macroeconomic impact of the two scenarios for Canada. We find that job creation would be modestly slower in the case of a U.S. double-dip, with a cumulative difference in jobs created of a mere 10,000 net over 2010–2011.⁹ Auto exports would fare several billions below a baseline scenario in the case of a double-dip recession in the United States (Table 3).

C. Long-Term Challenges

11. **Looking forward, the North American automotive industry faces several additional key challenges and risks.** These include:

- *Changes in the environmental regulation.* Concerns regarding carbon emissions have heightened sensitivity to gas mileage standards. Measures taken in the United States to improve fuel economy may prove problematic to meet for a number of OEMs.¹⁰
- *Consumer preferences.* Consumer sentiment has gradually shifted away from fuel-inefficient vehicles towards smaller-sized cars and hybrids. One question is whether the North America automotive industry, structurally geared to produce larger vehicles with low fuel efficiency, can retool before losing market share to other automakers that already produce smaller and more fuel-efficient cars.
- *Productivity and international competition.* North American auto production has been less productive than many competitors and faces strong competition from other world regions. Significant variation in wages and non-wage costs within the region and relative to abroad makes North American markets individually and collectively highly contestable. It is possible that North America, and Canada within that, sees more of their global market share erode unless it undergoes further restructuring—without which, leaves concerns about the ultimate viability of North America's automotive production.

⁸ Measured by a sectoral employment aggregate that comprises about two thirds of all direct and indirect jobs.

⁹ The simple regression model that we employ predicts a large bounce back of sales from the double dip recession scenario in 2012 which compensates for the loss of sales in 2011.

¹⁰ Canada has historically aligned its Company Average Fuel Consumption (CAFC) with the United States' CAFE standard and so new U.S. standards affect Canada as well. Currently, the CAFE standard is 27.5 miles per U.S. gallon (8.6 L/100 km) and has been set to increase to 30.2 miles per U.S. gallon (7.8 L/100 km) in 2011, and to 35 miles per U.S. gallon (6.7 L/100 km) by 2016.

12. **Failure to address these challenges could result in further erosion of the market share of North American automakers**, particularly of the Big Three, whose market share in the region has fallen for fifteen consecutive years due to: (1) a cost structure that is improved but still higher than the new domestic and (2) a loss of consumer confidence in their products.

13. **However, this need not have an impact on the region's automotive jobs and output as long as import nameplate brands continue to build a substantial supply base inside NAFTA.** The production-to-sales ratio has been consistently in the 80 percent range since 2000. Thus the import leakage has been steady around 20 percent this decade. Importantly, distribution and retail generate significantly more jobs than manufacturing (the ratio of jobs in manufacturing to other sector's jobs being estimated at 1:5–1:7 for the countries in this region), and jobs in these other areas of the value chain would not be put in jeopardy by a change in the composition of OEMs in the region in future years.

Box 1. Canada's Auto Industry and the "Big Three"

The "Big Three" automakers (Chrysler, Ford, and General Motors) have dominated the auto industry in North America for more

than 50 years. Chrysler, Ford, and GM make up around 50 percent of production in Canada, Mexico, and the United States and 45 percent of sales in Canada and the United States. In the United States and Mexico, GM and Chrysler account for about 1/3 of all domestic production. In Canada, however, they combine to account for 43.5 of all vehicle manufacturing.

"Big Three" Light Vehicle Production by Country, 2009

	Canada		Mexico		United States	
	2009	Aug. 2010	2009	Aug. 2010	2009	Aug. 2010
Chrysler	21.4	10.6	10.5	9.0	8.7	7.4
Ford	16.2	16.4	15.7	15.2	24.5	14.4
General Motors	22.1	17.0	23.8	17.2	21.8	19.4
Total	59.7	44.0	50.1	41.4	55.0	41.2

Sources: OICA, TD, and Fund staff calculations.

Given the importance of the "Big Three" to the North American auto industry, a cross-border bailout package was given to Chrysler and GM to stabilize the sector and prevent further job losses in 2008–09. Under the Canadian and U.S. auto bailout packages, Chrysler received CA\$2.9 billion from the Canadian and Ontario governments and USD12.8 billion from the United States government. GM's packages included CAD10.8 billion and USD50.7 billion, respectively. In exchange, both firms completed equity transfers and agreed to undergo restructuring. Ford leveraged assets to raise cash to deal with its debts and did not require government assistance. The first two quarters of 2010 were profitable for both Ford and GM. GM had repaid USD 1.5 billion to the United States and CAD 1.5 billion to Canada as of September 2010.

The crisis led to a top down reorganization of the Big Three. Chrysler Canada's parent, Chrysler LLC was

reorganized into Chrysler Group LLC and partnered with Fiat. Chrysler Group LLC, as of 2009, is owned by Fiat, the United Auto Workers (UAW) and the U.S., Canadian,

"Big Three" Light Vehicle Sales, by Country

	Canada		Mexico		United States	
	2009	Aug. 2010	2009	Aug. 2010	2009	Aug. 2010
Chrysler	11.2	10.6	10.9	9.0	8.8	7.4
Ford	15.4	16.4	11.7	15.2	15.3	14.4
General Motors	17.2	17.0	18.3	17.2	19.6	19.4
Total	43.8	44.0	41.0	41.4	43.7	41.2

Sources: DesRosiers, Haver Analytics, Motor Intelligence, Ward's Automotive, and Fund staff calculations.

and Ontario governments. General Motors of Canada is wholly owned by General Motors Company which, after restructuring, is now majority-owned by the U.S. government with stakes also held by the UAW, Canadian and Ontario governments, and creditors. Looking forward, Chrysler and GM expect to hold initial public offerings in late 2010–2011.

Continued