

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	3.2	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	1.2	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 shrank⁴ 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).

⁴ 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	
	Percent of Total Domestic Production	Percent of Total Domestic Production	Percent of Total Domestic Production	Percent of Total Domestic Production	Percent of Total Domestic Production	Percent of Total Domestic Production
Chrysler	21.4	10.5	8.7			
Ford	16.2	15.7	24.5			
General Motors	22.1	23.8	21.8			
Total	59.7	50.1	55.0			

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 CAD2.9 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 USD1.5 billion to the United States and CAD1.5 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. As of 2009, Fiat, the United Auto Workers (UAW), and the U.S., Canadian, and Ontario

"Big Three" Light Vehicle Sales, by Country

	Canada		Mexico		United States	
	2009	Aug. 2010	2009	Aug. 2010	2009	Aug. 2010
	Mkt. Share	Mkt. Share	Mkt. Share	Mkt. Share	Mkt. Share	Mkt. Share
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.

governments are shareholders of Chrysler Group LLC. 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

Direct Economic Stimulus Targeting the Auto Industry

	Canada		United States	
	Debt Obligation (Billions of CAD)	Equity Transfer (Percent)	Debt Obligation (Billions of USD)	Equity Transfer (Percent)
Chrysler <i>a/</i>	2.9	2.0	12.8	9.9
Chrysler Financial Company	none		1.5	
General Motors	10.8	11.7 <i>b/</i>	50.7	60.8 <i>c/</i>
GMAC	none		16.3	56.3 <i>d/</i>
Total stimulus (Debt obligations and equity shares)				
Federal Government	9.7 bil. CAD		76 bil. USD <i>e/</i>	
Ontario Government	4.9 bil. CAD			

Sources: Canada Economic Action Plan Budget 2009, Canada Economic Action Plan First Report 2009, Canada Economic Action Plan Second Report 2009, Canada Economic Action Plan Third Report 2009, Canada Economic Action Plan Fourth Report 2009, Canada Leading the Way on Jobs and Growth: Budget 2010, FinancialStability.gov.

a/ 3.7 bil CAD committed, 2.9 bil CAD disbursed for Canada.

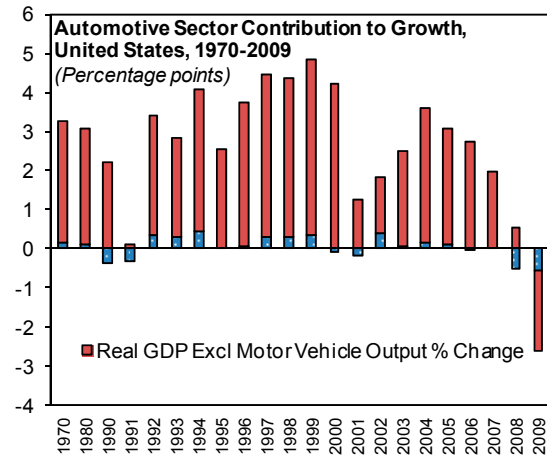
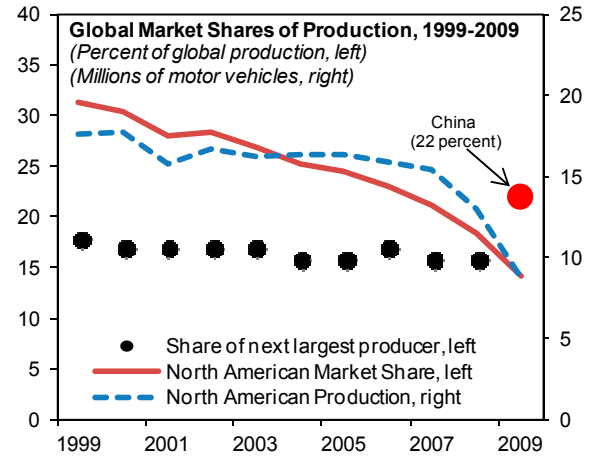
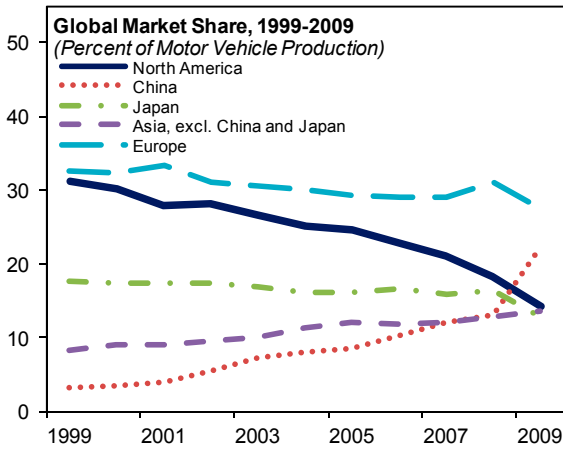
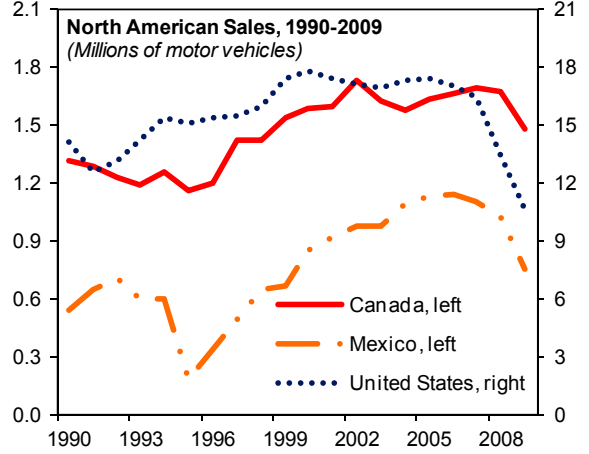
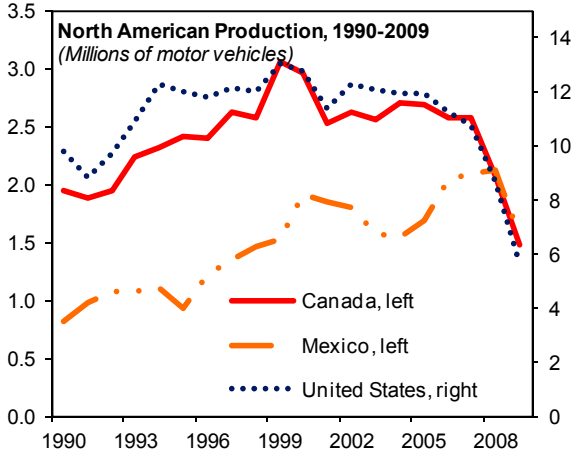
b/ In addition, 403 mil. USD of preferred shares were transferred to the Canadian and Ontario governments.

c/ In addition, 2.1 bil USD preferred stock were transferred to the U.S. government.

d/ In addition, 10.1 bil. USD preferred stock were transferred to the U.S. government.

e/ Total is net amount of stimulus.

Figure 1. State of the Auto Industry



Sources: U.S. Bureau of Economic Analysis, DesRosiers Automotive Yearbook 2010, OICA, and Fund staff calculations.