Capital Allowance Systems for Chemical Corporations: Canada vs. United States

Odette Pinto, PhD, MBA, CGA

A report based on a research study commissioned by the Chemistry Industry Association of Canada, to compare and identify differences in capital allowances (tax depreciation) for capital expenditures incurred by chemical corporations in Canada and the United States.

October 6, 2014

About the Author

Odette Pinto is an assistant professor at MacEwan University's School of Business in Edmonton, conducting research and teaching courses in income tax, international business and research. Odette obtained her PhD (Accounting) from the University of Alberta in January, 2010, having previously obtained a MBA, with a major in International Business, from the University of Alberta in June 2002. Odette is a Certified General Accountant and has completed the In-Depth tax course offered by the Canadian Institute of Chartered Accountants. Her career has focused primarily on taxation and much of her work experience in public accounting has been as a tax consultant.

Executive Summary

The capital expenditures of corporations that manufacture chemicals (hereinafter referred to as "chemical corporations") often include substantial, long-term investments. Capital allowance systems govern the write-off of capital expenditures over a period of time and, given the substantial amounts, can have a significant impact on a corporation's cash flow and investment decisions. Differences in the capital allowance systems that favor chemical corporations in the United States can put chemical corporations located in Canada at a disadvantage.

The determination and calculation of capital allowance deductions in Canada is based on the Capital Cost Allowance (CCA) system, while the Modified Accrual Cost Recovery System (MACRS) applies in the United States. This research study identifies differences in the methods and rates used to calculate capital allowances for manufacturing equipment for chemical corporations in the two countries, which result in the faster write-off of such capital expenditures in the United States. Differences in the description of assets classified as "manufacturing equipment" are also identified, in particular the inclusion of land improvements in the classification of Class 28 manufacturing equipment in the United States, which results in a faster write-off of such costs, for example the write-off of capital expenditures incurred for roads at chemical manufacturing plants. Furthermore, there are also differences in the capital allowances and tax treatment of other assets owned by chemical corporations, for example catalysts, railcars and rail sidings. Overall, the results of this study suggest that differences in the capital allowances for manufacturing equipment, as well as other important assets, result in a faster write-off (tax deduction) of these major capital expenditures and provide an advantage to chemical corporations in the United States over their Canadian counterparts.

This research study was commissioned by the Chemistry Industry Association of Canada (CIAC), with the underlying objective being to compare and identify differences, if any, between the capital allowance systems of chemical corporations in Canada and the United States, with a focus on assets classified as "manufacturing equipment". The report is based on information obtained through a review of the literature, a review of documentation published by the tax authorities in both countries and information obtained from discussions with some representatives of chemical corporations in both countries. The report also draws on data obtained from a previous research report prepared for the Canadian Manufacturers and Exporters Association (Capital Allowance for Manufacturing Corporations in Canada and the United States, November 2013). The results of this study contribute to a better understanding of the differences between the capital allowance systems in Canada and the United States, providing useful information to CIAC and its members. However, due consideration should also be given to legislation and tax reform proposals that are currently under review in the United States that, if passed, could have a significant impact on the MACRS capital allowance system.

Table of Contents

1. Introduction

A report of the results of a research study commissioned by the Chemistry Industry Association of Canada (CIAC), to compare, and to identify differences (if any), between the capital allowance systems of corporations that manufacture chemicals (hereinafter referred to a "chemical corporations") in Canada and the United States, with a focus on assets classified as "manufacturing equipment".

Capital investment in chemical corporations is substantial and generally requires a long-term commitment by the corporations. Any differences in the tax treatment of capital expenditures and capital allowances for manufacturing equipment and other material capital assets can have a significant impact on a chemical corporation's cash flow and capital investment decisions.

The determination and calculation of capital allowances in Canada are based on the Capital Cost Allowance (CCA) system, while the Modified Accrual Cost Recovery System (MACRS) applies in the United States. This research study will compare the CCA and MACRS capital allowance systems for chemical corporations, identify and analyze differences, and draw appropriate inferences from the data obtained. The data and the information for this study is obtained through a review of the literature, a review of documentation published by the tax authorities in both countries and information obtained through discussions with some representatives from chemical corporations in Canada and the United States. The results of this study will contribute to a better understanding of the differences between the capital allowance systems and the related tax deduction(s) for capital allowances in Canada and the United States, providing useful information to CIAC and its members.

The balance of the report is structured as follows. Section 2 provides background information, while Section 3 provides a brief outline of the research method. Section 4 provides a description of the research findings, with an analysis of these findings. Section 5 describes other factors that should be considered and Section 6 includes the concluding remarks.

2. Background Information

In Canada, the CCA system describes how capital allowances for capital expenditures are determined while in the United States the MACRS system applies. Both these systems determine the write-off (tax deductions) of capital expenditures incurred by businesses. CCA in Canada and Depreciation Allowance in the United States can be considered as "tax depreciation" since they are similar to the accounting concept of the depreciation (amortization) deduction per generally accepted accounting principles.

The capital cost allowance (CCA) system in Canada indicates that capital assets are allocated to appropriate "classes" (as described in Schedule II of the Income Tax Regulations) and the CCA deduction (per paragraph 20(1)(a) of the Income Tax Act (ITA)) is calculated, generally using a declining balance method and the half-year rule applicable in the year of purchase. For example, Class 43, the CCA class for manufacturing equipment, has a 30% rate applied on a declining balance basis to the Undepreciated Capital Cost (UCC) of the class, with the half-year rule applicable in the year of purchase. In the United States, the modified accrual cost recovery system (MACRS) also requires capital assets to be allocated to the appropriate "class" (as described in Publication 946) but the MACRS deduction is generally calculated using a combination of the double-declining balance and straight line methods, with the half-year convention applicable in the year of purchase. For example, Class 28, the MACRS class for assets used in the manufacture of chemicals and fertilizers is a five-year class, with the capital cost written off over 6 years because the half-year convention applies in the year of purchase. Appendix 1 of the report released by the Canadian Manufacturers and Exporters Association (November 2013) includes a

comparison of CCA for Class 43 (Canada) vs. MACRS for Class 28 (United States), and provides a useful comparison of current capital allowance deductions for these classes.

Accelerated capital cost allowance (ACCA) was introduced in Canada in 2007, to allow for a faster write-off and cost recovery for manufacturing equipment in the aftermath of the global financial crisis. Similarly, in the United States, the Economic Stimulus Act was introduced in February, 2008, with the introduction of special depreciation allowances, commonly referred to as bonus depreciation, which accelerate the write-off and cost recovery of all capital expenditures. As the financial crisis continued, both countries extended these measures, with ACCA (Canada) and bonus depreciation (USA) extended to December 31, 2013. In 2013, the Canadian government announced a further extension of ACCA up to December 31, 2015 while in the United States bonus depreciation was not extended beyond December 31, 2013. However, Bill H.R.4743, which proposes an extension of bonus depreciation to December 31, 2016, was introduced in early 2014 and was recently passed by the House Ways & Motions Committee (July 11, 2014). At the time of this report, this bill is currently before the entire House of Representatives. Although the passage of this bill and the extension of bonus depreciation are uncertain, some representatives suggest that this bill could receive approval before December 31, 2014.

The focus of this research study is a comparison of the capital allowance systems in Canada and the United States for chemical corporations. However, two additional important factors should be given due consideration. First, a comparison of the corporate taxes in the two countries should be considered as an extension to this study, as discussions with representatives from the chemical industry in both countries suggest that corporate taxes, including income taxes, property taxes and business taxes, plus any applicable tax rebates and/or tax credits are often major factors in the overall taxation of chemical corporations and are also major factors in capital investment decisions. For example, although the U.S. corporate tax rate (35%) is one of the highest in the world, the Section 199 (United States) Domestic Production Deduction effectively reduces the corporate tax rate by 3% and, despite some restrictions (for example, the deduction is limited to 50% of the W2 wages in the year), the Section 199 reduction is available to most chemical manufacturing corporations with domestic production activities. Second, tax reform proposals are being considered in the United States and several proposals have been put forth. For example, the current "Camp" tax reform proposal that is being deliberated proposes changes to simplify the MACRS system, including suggestions to use the alternative depreciation system (ADS) rather than the current general depreciation system (GDS); these changes would result in significant changes to MACRS. The proposed effective date for the Camp tax reform proposals is after December 31, 2016 and, although the future of tax reform in the United States is uncertain at the date of this report, it should be given due consideration.

3. Research Method

The data for this research study was obtained from a review of the literature, including the publications issued by the tax authorities in both countries, and information obtained through discussions with some representatives from chemical corporations in Canada and the United States. This study also draws on a previous study conducted by the author for the Canadian Manufacturers and Exporters Association (Capital Allowance for Manufacturing Corporations in Canada and the United States, released November 2013). This report includes analyses of the data obtained, with appropriate calculations, and inferences drawn from the analyses.

4. Research Findings and Analyses

1. Comparison of CCA (Canada) vs. MACRS (USA) rates

   With reference to Appendix 1 (excerpt from the report prepared for the Canadian Manufacturers and Exporters Association, November 2013), the current differences between the CCA and MACRS systems are listed below:

Class 43 (Canada)	Class 28 (USA)
rate = 30%, method = declining balance after 3 years: 58% of investment expensed after 6 years: 86% of investment expensed	rate = 5-year class; method = double-declining balance after 3 years: 71% of investment expensed after 6 years: 100% of investment expensed

Additional notes:

- The above summary excerpt of Appendix 1 illustrates the specific percentage differences in the cumulative write-off (expense) of capital investments at three and six years after the date of purchase; for example, after 6 years, 100% of capital expenditure are written-off in the United States as compared to 86% in Canada.
- As Appendix 1 suggests, the combination of the double-declining balance and straight line methods result in a quicker write-off of capital investments under MACRS (USA) as compared to the CCA system (Canada), which uses the declining balance method.
- In the United States there are separate classes for manufacturing equipment for different industries, for example Class 28 applies to the manufacture of chemicals and fertilizers while Class 36 applies to the manufacture of electronic components, products and systems; MACRS classes and rates can differ across manufacturing industries.

Analysis: CCA rate (Canada) vs. MACRS rate (USA)

Based on the above differences in the capital allowance rates for Class 43 (CCA, Canada) vs. Class 28 (MACRS, USA), the chart below indicates that a 45% rate for Class 43, using the declining balance method, would result in an approximate equivalent write-off of a Class 43 capital investment in Canada and a Class 28 capital investment in the United States.

Comparison of a $100 investment in manufacturing equipment (chemical industry)

	Class 43 CCA (Canada)		Class 28 MACRS (USA)
$100	IF 45% declining balance	Total	5-year double-declining; IRS Tables
Year 1 (half-year rule)	$22.50	$22.50	$20
Year 2	34.875	$57.38	$52
Year 3	19.18125	$76.56	$71
Year 4	10.5496875	$87.11	$83
Year 5	5.802328125	$92.91	$95
Year 6	3.191280469	$96.10	$100

The above comparison indicates that a CCA rate of 45% for Class 43 would result in the approximate equalization of capital allowance(s) in Canada and the United States. A 45% CCA rate applied on a declining balance basis would result in the write-off of 96% of the capital expenditures after six years, while MACRS results in the write-off of 100% of the capital expenditures after six years.

Importance of equalization of capital allowance in Canada and the United States:

- Capital allowances affect the after-tax cash flows of all corporations
- Capital allowance deductions are generally a factor in decision making models and affect the Net Present Value of potential investments, for example decision models used in the selection and location of capital investment projects
- Differences in capital allowances can be a significant factor for capital intensive industries (e.g. chemical corporations), where the investment in manufacturing equipment is substantial.

2. Classification of Manufacturing Equipment (Class 43 or Class 29 in Canada vs. Class 28 in USA)

Review of the description of Class 29 in Schedule II of the Regulations, Income Tax Act (ITA) of Canada (note: the Class 29 description also applies to Class 43):

Preamble: the preamble of the Class 29 definition refers to property other than property that would be included in Class 41 (c) or (d) and Class 47(b). However, since Class 41 refers to "field processing" and Class 47(b) refers to equipment "to liquefy natural gas" these specific exclusions can be ignored for the purposes of this research study.

Subparagraph (a)(i): "(Property) to be used directly or indirectly (by the taxpayer) in Canada primarily in the manufacturing or processing of goods for sale or lease"

In the above definition, the term "used directly or indirectly" (in manufacturing) can be interpreted quite broadly as "indirect use" is not defined in the Income Tax Act (ITA). The term "primarily" in the ITA generally refers to the 50% test, therefore Class 29 property must be used at least 50% in the manufacturing process.

Paragraph (b) of the definition lists specific inclusions in Class 29:

i) property that is railway rolling stock or property that would be included in Class 8(j) i.e. radio communication equipment
ii) oil or water storage tank
iii) powered industrial lift truck
iv) electrical generating equipment
v) property that is included in Class 10 (b) or (f) - i.e. portable tools or computers purchased before March 23, 2004

Implications of the above definition:

- The description in Class 29 also applies to Class 43, as the preamble for Class 43 refers to Class 29. Class 43 applies for the calculation of CCA while Class 29 is the accelerated capital cost allowance (ACCA) class and is applicable for certain periods of time as enacted in the legislation; for example, Class 29 (ACCA) will apply, for purchases of manufacturing equipment up to December 31, 2015.
- Representatives from Canadian chemical corporations indicate that they interpret the terms "direct or indirect use" and "primarily" in the manufacturing process broadly and generally argue for the inclusion of assets in Class 43 (or Class 29) where an asset's use is related (directly or indirectly) to the corporation's overall manufacturing process.

Review of the description of Class 28 in Table B-2 of Publication 946 (MACRS) in the United States:

Title of Class 28: Manufacture of Chemicals and Allied Products

The definition of Class 28 refers to:

i) "assets used to manufacture basic organic and inorganic chemicals …."

ii) "chemical products to be used in further manufacture….."

iii) "assets used to further process man-made fibers ……'

iv) "includes all land improvements associated with plant site or production processes, such as effluent ponds and canals, provided such land improvements are depreciable but does not include buildings and structure components defined in section 1.48-1(e) of the regulations"

v) "does not include assets used in the manufacture of finished rubber and plastic products or in the production of natural gas products, butane, propane, and by-products of natural gas production plants"

Implications of the above definition of Class 28 (MACRS):

- Reference to "assets used to manufacture **….** chemicals" is interpreted broadly, to include assets used directly or indirectly in the manufacturing process.
- Reference to "all land improvements" is important; although the definition refers to examples "such as effluent ponds and canals" it refers to "all land improvements". It should be noted that some U.S. representatives indicate that the exclusion to "structural components" indicate that "structural landscaping" is generally excluded from Class 28.
- Land improvements listed as a separate class (Class 00.3) in Table B-1of Publication 946 describe land improvements as "improvements directly to or added to land ….. provided such improvements are depreciable" and "examples of such assets might include sidewalks, roads, canals, waterways, drainage facilities, sewers (not municipal sewers), wharves and docks, bridges, fences, landscaping shrubbery, or radio and television transmitting towers" and "does not include land improvements that are explicitly included in any other class, and buildings and structural components as defined in section 1.48-1(e) of the regulations"

Analysis: differences in the descriptions of Class 43 (CCA) vs. Class 28 (MACRS)

In both countries, the reference to the "use of assets in the manufacturing process" is interpreted broadly, with direct or indirect use of the asset considered relevant in both the CCA and MACRS descriptions and classification of assets.

As land improvements are described in Class 00.3 in Table B-1, and Class 28 in Table B-2 specifically includes "all land improvements" an assumption can be made that the land improvements described in Class 00.3 would be included in Class 28 if "associated with plant site or production processes" "to manufacture chemicals and allied products". The inclusion of all land improvements in Class 28 (MACRS) could result in important differences in capital allowance treatment. For example, the treatment of capital costs of "roads" would differ in the two countries. Based on the above analysis of MACRS Tables B-1 and B-2, the cost of roads would be included in Class 28 in the United States, which is a 5-year class and, with the application of the half-year convention, would be written-off over 6 years. In contrast, the capital costs of "roads" in Canada are included in Class 17, which has a CCA rate of 8% applied on a declining balance basis, which would result in a much slower write-off for the costs of roads at a manufacturing plant. It should be noted that, based on

discussions with U.S. representatives, if roads service a manufacturing plant as well as an administrative building the costs would be included in MACRS Class 00.3 (15 year class) not Class 28, but if the roads are solely for a manufacturing plant they are included in Class 28 (5-year class).

The cost of roads, including gravel, can be substantial and discussions with corporate representatives in Canada suggest that, for existing chemical manufacturing plants, the cost of roads can constitute up to 5% of total capital assets (for tax purposes) and for new manufacturing plants these costs can be an even higher percentage of the total assets. Thus, the differences in the tax treatment of land improvements (e.g. roads) between the two countries can result in significantly lower capital allowance tax deductions for chemical corporations located in Canada.

3. Differences in the classification and capital allowances for other assets: Catalysts

In Canada, catalysts are capitalized and classified as property in Class 26 (Schedule II of the Regulations). In the United States, there is no specific class for "catalysts" in the MACRS system, and therefore the tax deduction is equivalent to a reasonable amortization calculated per generally accepted accounting principles (GAAP). Thus, in the United States, the cost of catalysts would be amortized (written-off) over its estimated useful life, determined by a chemical corporation.

Analysis:

In Canada, the initial capital costs incurred on the purchase of catalysts are capitalized in Class 26, while recurring replacement costs for catalysts are expensed, based on usage, with a caveat that such costs do not result in an upgraded catalyst. As Class 26 has a CCA rate of 5% applied on a declining balance basis, the write-off of catalyst costs in Canada likely extends beyond the "useful life" of the underlying catalysts. Discussions with the Canadian representatives suggest that, although the useful life varies across types of catalysts, on average the useful life for most catalysts do not extend beyond a few years.

Discussions with representatives from chemical corporations in the United States indicate that the costs of catalysts are generally amortized over their useful lives, and the costs of catalysts with a relatively short life are expensed at the date of purchase while the costs of more precious catalysts are amortized over their estimated useful life. The useful life of catalysts appears to vary across chemical corporations but, similar to Canada, the average life of many catalysts is estimated to be a few years.

Based on the above analysis, the tax treatment of catalysts in the United States generally allows for a faster write-off of catalyst costs. The total amounts expended on catalysts for a chemical manufacturing corporation are difficult to approximate because of the difference in chemical treatments used in the manufacturing processes of various chemical corporations. However, based on the information obtained from representatives in Canada, Class 26 catalysts constitute 0 to 12% of total assets. In summary, the difference in the tax treatment of catalysts could be significant for chemical corporations in Canada that use catalysts in their manufacturing processes.

4. Differences in the classification and capital allowances of other assets: railcars and rail sidings

The report to the Canadian Manufacturers and Exporters Association (November 2013) indicated that the capital costs of rail cars are written-off over a shorter period of time in the United States. In Canada, railcars are generally included in CCA Class 7 with a 15% rate applied on a declining balance basis, although a corporation can elect to use Class 35, with special allowances resulting in an effective CCA rate of approximately 13%. On the other hand, in the United States

railcars are included in MACRS Class 00.25, which is a 7-year class. The table below summarizes the impact of the differences in capital allowance treatment between Class 7 (CCA) and Class 00.25 (MACRS):

Class 7 (CCA, Canada)	Class 00.25 (MACRS, USA)
rate = 15%, method = declining balance after 3 years: 33% of investment expensed after 8 years: 70% of investment expensed	rate =7-year class; method = double-declining balance after 3 years: 56% of investment expensed after 8 years: 100% of investment expensed

Rail sidings are also subject to different capital allowance treatment in the two countries. In Canada, rail sidings are included in Class 1 (4% rate, declining balance method) while in the United States, rail sidings are considered to be "land improvements" related to the manufacturing plant and are therefore included in Class 28 (5-year class, double declining and straight line method). This difference results in a much faster write-off of costs for rail sidings in the United States. Furthermore, discussions with the representatives suggest that the total costs of rail sidings can be in excess of 5% of total assets for some chemical corporations in Canada.

Analysis:

The above table indicates the faster write-off of the capital costs of railcars in the United States. Although several corporate representatives indicate that railcars are often leased by corporations, with lease costs being written-off as expenses when incurred, the above disparity in CCA deductions (Canada) vs. MACRS deductions USA) could impact chemical corporations that own railcars, and could also affect corporate financing decisions related to the purchase vs. lease of railcars. As the capital costs of rail sidings can be material for some chemical corporations, the disparity in the capital allowance treatment between the two countries is another significant factor and provides an advantage for chemical corporations located in the United States.

5. <u>Differences in the classification of other assets: computer (hardware) systems</u>

In Canada, computers that are used directly or indirectly in the manufacturing process are included in Class 43 (or Class 29). On the other hand, if the computer or computer system is not used in the manufacturing process, computers are included in Class 50 (with a 55% CCA rate, applied on a declining balance basis, with the half-year rule applicable in the year of purchase).

In the United States, if a computer is used in the manufacturing process it is included in Class 28 (MACRS). However, if a computer is not used in the manufacturing process it would be included in Class 00.12, which is also a 5-year class.

Analysis:

The treatment of computers (or computer systems) used in the manufacturing process is similar in Canada and the United States, with the computers included in Class 43 or 29 (CCA) or in Class 28 (MACRS). However, for computers not used in the manufacturing process, Class 50 (CCA) has a 55% rate while Class 00.12 is a 5-year class, resulting in a write-off over 6 years; therefore there is a small advantage in the write-off of computer costs in Canada.

6. ACCA (Canada) vs. Bonus Depreciation (USA)

With reference to Appendix 2 (excerpt from the report prepared for the Canadian Manufacturers and Exporters Association, November 2013), the impact of differences between ACCA and bonus depreciation (up to December 31, 2013) are listed below:

Class 29 (ACCA, Canada)	Class 28 (with Bonus Depreciation, USA)
rate = 50%, method = straight-line	rate = 50% straight line + 5-yr class MACRS double-declining method
half-year rule applies	no half-year rule for bonus depreciation, but applies to MACRS
Year 1: 25% of investment expensed	Year 1: 60% of investment expensed
Year 2: 75% of investment expensed	Year 2: 76% of investment expensed
Year 3: 100% of investment expensed	Year 3: 86% of investment expensed

Important notes:

- Bonus depreciation (United States) provided a significant advantage for capital investment for the manufacturing industry (and other industries) in the United States. Bonus depreciation applied to all classes of assets (i.e. not only manufacturing equipment) while ACCA (in Canada) only applies to Class 29 (assets classified as manufacturing equipment). Furthermore, in contrast to ACCA in Canada, the bonus depreciation deduction is permitted in addition to the usual MACRS deduction (which is calculated on the "balance" in the class after bonus depreciation).
- The bonus depreciation rate was increased from 50% to 100% for the period from September 2010 to December 31, 2011). Essentially, this resulted in the ability of U.S. corporations to get a tax deduction (write-off) for the full cost of capital investments at the date of purchase. Anecdotal evidence suggests that this significant difference between the write-off of capital investments in Canada and the United States had a significant effect on capital investment decisions during this period.
- In Canada, ACCA was extended (beyond December 31, 2013) to December 31, 2015. ACCA is accomplished through inclusion of manufacturing equipment in Class 29, which has a CCA rate of 50% and allows for a write-off over three years (25% in the year of purchase, 50% in the second year and the remaining 50% in the third year).
- In the United States, bonus depreciation (50%) has not been extended beyond December 31, 2013. However, a bill (Bill H.R.4743) to extend bonus depreciation up to December 31, 2016, was passed by the House Ways and Means Committee on July 11, 2014, and is currently before the entire House of Representatives. Further progress and the enactment of this bill into legislation is uncertain at the time of this report, with some representatives suggesting that bonus depreciation could be extended to December 31, 2016 while other representatives reiterate the current uncertainty of Bill H.R. 4743.

Analysis:

Bonus depreciation was a significant factor for all corporations in the United States, especially in the period between September 2010 and December 2011, when the bonus depreciation rate was 100%, resulting in a significant difference between bonus depreciation (United States) and ACCA (Canada) during this period (see Appendix 2). In addition, bonus

depreciation (both the 50% and 100% bonus depreciation rates) was applicable to all classes (i.e. not limited to manufacturing equipment only), which is in contrast to ACCA that only applies to manufacturing equipment in Class 29.

The extension of ACCA to December 31, 2015 currently provides an advantage to chemical corporations located in Canada. However, if Bill H.R. 4743 is passed and bonus depreciation (50%) in the United States is extended to December 31, 2016, there will again be a disparity in the capital allowances applicable to capital investments in manufacturing equipment in the 2016 year. Appendix 2 (an excerpt from the report to the Canadian Manufacturers and Exporters Association, November 2013) illustrates the differences that would be applicable in this situation.

5. Other Important Factors for Consideration

1. Corporate tax rates

The corporate income tax rate in Canada is lower than the United States, which has one of the highest corporate tax rates in the world. However, several specific deductions and credits can reduce the effective U.S. tax rate significantly. For example, the Section 199 deduction for "domestic production activities" applies to most U.S. manufacturing corporations and would thus result in an effective tax reduction of approximately 3% of taxable income. Other credits and rebates, for example state property or business tax rebates, can also affect a corporation's overall taxes paid in the United States.

A detailed comparison and analysis of the corporate income tax rates and other relevant taxes (Canada vs. United States) is outside the scope of this paper; further work is needed for an effective comparison of corporate tax rates in the two countries. Furthermore, as tax credits and rebates vary across the states in the United States, further detailed work is required and the author recommends future research to address these issues.

2. Tax Reform Proposals (USA)

Tax reform proposals in the United States include significant changes proposed to the capital allowance system (MACRS). Furthermore, changes to the corporate tax rates are also included in the tax reform proposals. Currently, there are 3 different proposals being examined, with the Camp proposal, introduced in early 2014, being the most recent.

If enacted, the Camp tax reform proposals would significantly affect the capital allowance(s) for manufacturing equipment, but the detailed changes for manufacturing equipment by industry (e.g. manufacturing of chemicals) is currently unknown. The effective date proposed for tax reform is January 1, 2017. The tax reform proposals suggest that MACRS move to the alternate depreciation system (ADS) rather that the current GDS system. In particular, the tax reform proposals suggest that manufacturing equipment (for all industries) should be included in a single 10-year class (rather than separate classes for different industries). Overall, tax reform proposes a simplification of the capital allowance system and an overall reduction in the number of the MACRS classes. The Camp tax reform also proposes a reduction in corporate tax rates and an annual consumer price index adjustment to capital allowance.

3. Other factors affecting capital investment decisions by chemical corporations

Representatives from chemical corporations indicate that although capital allowances and corporate tax rates are factors included in the financial models used in making capital investment decisions (e.g. location of a manufacturing plant in Canada or the United States), these are not necessarily deciding factors and other factors could be more significant. Examples of other, and possibly more significant factors, include source of raw materials, access and the price of resources and raw materials (e.g. a low price for natural gas) and the market for the manufactured chemical product.

6. Concluding Remarks

This research study focuses on a critical examination of the tax deductions for capital allowances for chemical corporations in Canada and the United States and, in particular, identifies differences in the capital allowance method and rates, and differences in the classification of assets included in the class for manufacturing equipment in the two countries.

Manufacturing equipment is included in Class 43 in Canada's Capital Cost Allowance (CCA) system, while assets used in the manufacture of chemicals and fertilizers are included in Class 28 in the Modified Accrual Cost Recovery System (MACRS) in the United States. The difference in methods used (declining balance method in Canada vs. a combination of the double-declining and straight line methods in the United States) and the difference in rates (Class 43 CCA rate of 30% vs. Class 28 MACRS 5-year class) results in a faster write-off of capital investments in manufacturing equipment in the United States. The results of this study suggest that in order to achieve a similar write-off of such costs in Canada, over a similar period of time (i.e. Class 28, full write-off of capital costs in six years in the United States), a Class 43 CCA rate of 45% applied on a declining balance basis would be required.

Differences in the description and classification of assets in CCA Class 43 vs. MACRS Class 28 are also important. In particular, the description for Class 28 includes "all land improvements", which is a broad classification and, although subject to interpretation, suggests that land improvements like roads, canals and waterways would be included in MACRS Class 28 with a full write-off over six years. On the other hand, Class 43 does not include such land improvements and instead these assets are generally allocated to other classes, which often results in a slower write-off of such costs. For example, in Canada, roads are classified as CCA Class 17 with a rate of 8% applied using the declining balance method, which results in a significantly slower write-off than roads included in MACRS Class 28 in the United States, which is a five-year class; this could be a significant factor for investments in new (greenfield) chemical manufacturing plants. In addition to roads, rail sidings are also considered land improvements for a manufacturing plant and are included in MACRS Class 28 (USA). In contrast, rail sidings are included in CCA Class 1 in Canada, with a 4% rate applied on a declining balance basis. This difference in the tax treatment, resulting in a significantly lower capital allowance deduction in Canada, is important as the capital investment in rail sidings can be significant for some chemical corporations. This research study also examined differences in the capital allowance treatment of other assets. For some assets the capital allowance treatment is similar across the two countries, for example computer systems (hardware) while for other assets there are significant difference, for example railcars and catalysts. The results of this report suggest that the difference in the

capital allowance treatment (method(s) and rates) for catalysts and railcars can also be material and significant factors for some chemical corporations, providing a further advantage to chemical corporations located in the United States.

Although this study focuses on a comparison of the capital allowance system for chemical manufacturing corporations in Canada and the United States, other factors should be borne in mind. The corporate income tax rates for chemical corporations in the two countries should be examined in more detail, as capital allowances are part of the overall income tax system in both countries. Furthermore, a corporation's overall taxes include other taxes, for example business and property taxes, which can also be significant. Lastly, due consideration should also be given to future events that, although uncertain at the time of this report, could impact the capital allowance system(s) in the future. For example, two current uncertain events in the United States are the potential extension of bonus depreciation to December 31, 2016, and the tax reform proposals that are currently under review.

APPENDIX 1

CCA Class 43 (Canada) vs. MACRS Class 28 (United States/US): Assets used in the Manufacture of Chemicals & Fertilizers

Year (date) of Purchase	Write-off (expense)	Class 43 (Canada) 30% Declining basis		Class 28 US) 5 year class	
CCA	Year 1	15,000		20,000	
Prior to the introduction of	Year 2	25,500		32,000	
ACCA in Canada, in March 2007	Year 3	17,850	58,350	19,200	71,200
MACRS	Year 4	12,495		11,520	
Prior to the enactment of the	Year 5	8,747		11,520	
bonus depreciation, Jan 1, 2008	Year 6	6,122	85,714	5,760	100,000
	Year 7	4,286			
	Year 8	3,000			
	Year 9	2,100			
	Year 10	1,470			
	Year 11	1,329			
	Year 12	630			
	Year 13	441			
	Year 14	309			
	Year 15	216			
	Year 16	152			
	Year 17	106			
	Year 18	74			
	Year 19	52			
	Year 20	36			
	thereafter	85			
		0		0	
		100,000		100,000	

NOTES:

1. Class 43 (Canada): assets used to manufacture goods for resale or lease.
2. Class 43 (Canada): 58% of the capital expenditure is written-off in 3 years and 86% in 6 years
3. Class 28 includes assets used in the manufacture of chemicals and allied products, which includes fertilizers
4. Class 28 (USA): 71% of the capital expenditure is written-off in 3 years and 100% in 6 years
5. Half-year rule or convention applies in the year of purchase, in both countries.

APPENDIX 2

ACCA Class 29 (Canada) and Bonus Depreciation Class 28 (USA)

Year (date) of Purchase	Write-off	Class 29 Canada	Class 28 USA (5 year)	Calculation and comments
Jan 1, 2008 to Sept 8, 2010	Year 1	25,000	60,000	Bonus = 50,000 + MACRS = 10, 000
(ACCA/Canada: Mar 19, 2007)	Year 2	50,000	16,000	MACRS = 16,000
	Year 3	25,000	9,600	MACRS = 9,600
	Year 4	0	5,760	MACRS = 5,760
	Year 5	0	5,760	MACRS = 5,760
	Year 6	0	2,880	MACRS = 2,880
	Year 7	0	0	
	Year 8	0	0	
		100,000	100,000	
Sept 9, 2010 to Dec 31, 2011	Year 1	25,000	100,000	Bonus dep. = 100,000 (full amt.)
(up to Dec 31, 2012, for LPPP,	Year 2	50,000	0	MACRS
Long-Production-Period-Prop.)	Year 3	25,000	0	MACRS
	Year 4	0	0	MACRS
	Year 5	0	0	MACRS
	Year 6	0	0	MACRS
	Year 7	0	0	MACRS
	Year 8	0	0	MACRS
		100,000	100,000	
Jan 1, 2012 to Dec 31, 2013	Year 1	25000	60,000	Bonus = 50,000 + MACRS = 10,000
(or Jan 1, 2013 to Dec 31, 2013	Year 2	50000	16,000	MACRS = 16,000
for LPPP)	Year 3	25000	9,600	MACRS = 9,600
	Year 4	0	5,760	MACRS = 5,760
	Year 5	0	5,760	MACRS = 5,760
	Year 6	0	2,880	MACRS = 2,880
	Year 7	0	0	
	Year 8	0	0	
		100000	100,000	

Notes:

1. Class 28 = Chemicals and allied products (e.g. includes manufacture of chemicals and fertilizers)
2. ACCA has been extended to Dec 31, 2015; same calculations (per above) apply to 2014 and 2015.
   ACCA applies to CCA Class 29 Manufacturing equipment, and a limited number of other classes.
3. Bonus depreciation (50%) (USA) is effective until Dec 31, 2013.
   Bonus depreciation applies to most MACRS classes
4. 100% bonus depreciation, applicable for the period September 9, 2010, to December 31, 2011.
   100% bonus depreciation was extended to Dec 31, 2012 for long-period-production-property (LPPP).