NAFTA and Markets: US Economic Impacts on Canadian Equities
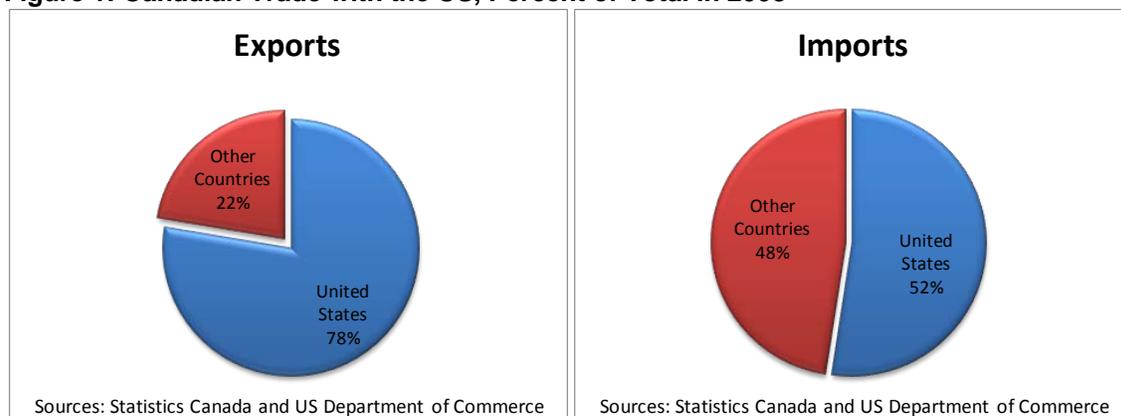
| January 2010

Introduction

The Canadian and US economies are highly integrated. The US is Canada's largest trading partner and the health and strength of the US economy has important ramifications for the Canadian economy and markets. In this Research Bulletin, we use the Barra Canada Equity Model (CNE4) to explore the relationship between the US economy and Canadian markets. We find a statistically significant relationship between new orders in the US manufacturing sector and equity returns from the Canadian energy sector, the sector most heavily impacted by US-Canadian trade. We also show that this relationship has increased over time due to the North American Free Trade Agreement (NAFTA).

Trade Between Canada and the US

The US and Canada have the world's largest bilateral trade relationship, valued at USD 565 billion in 2008. The relationship is highly asymmetric. As shown in Figure 1, 52% of all Canadian imports in 2008 originated from the US, and 78% of all Canadian exports were destined for the US. In contrast, only 16% of all US imports originated from Canada, and 20% of all US exports went to Canada. The overall impact of trade between the two countries has been much lower on the US economy, with trade at only 31% of GDP compared to 69% for Canada in 2008. Canada depends on the US for economic growth.

Figure 1: Canadian Trade with the US, Percent of Total in 2008

Exports

Other Countries 22%

United States 78%

Sources: Statistics Canada and US Department of Commerce

Imports

Other Countries 48%

United States 52%

Sources: Statistics Canada and US Department of Commerce

The breakdown of exports by sector provides a clear picture of where US economic activity has the greatest impact on Canadian economic activity. As Table 1 shows, the largest share of Canadian exports to the US in 2008 was in the category of HS2 Chapter 27: "Mineral Fuels, Mineral Oils, Bituminous Substances and Mineral Waxes."[1] This chapter contains energy products including petroleum, natural gas, and electricity. Therefore, we should see US economic conditions influencing the Canadian energy sector.

Furthermore, these statistics show a discernible trend over time. Motor vehicles and parts were the largest category of exports in 2004, but in 2005 energy overtook motor vehicles and parts. Energy continued to increase its share of exports, and by 2006 Canada had become the largest

---

[1] "HS" stands for "Harmonized System" or "Harmonized Commodity Description and Coding Systems." The HS is a system for categorization of products maintained by the World Customs Organization and used by most trading countries. For more details, see www.wcoomd.org.

energy supplier to the US.[2] By 2008, 33% of all Canadian exports to the US were energy-related, followed by motor vehicles and parts at a distant second of 13.6%. Contributing to the growing trend of Canadian energy exports to the US[3] were global demand and supply conditions, Middle Eastern politics, and agreements such as the North American Free Trade Agreement (NAFTA). Thus, we again see the increasing impact of the US economy on the Canadian energy sector.

Table 1: Exports Breakdown By Sector

	2004	2005	2006	2007	2008
27 - Mineral Fuels, Mineral Oils, Bituminous Substances and Mineral Waxes	19.1%	23.0%	23.4%	25.3%	33.0%
87 - Motor Vehicles, Trailers, Bicycles, Motorcycles and Other Similar Vehicles	22.3%	20.6%	19.6%	18.4%	13.6%
84 - Nuclear Reactors, Boilers, Machinery and Mechanical Appliances	7.5%	7.2%	7.2%	7.5%	6.9%
85 - Electrical or Electronic Machinery and Equipment	4.1%	4.1%	4.1%	4.1%	3.7%
39 - Plastics and Articles Thereof	3.5%	3.6%	3.6%	3.3%	3.1%
48 - Paper, Paperboard and Articles Made From These Materials	3.8%	3.6%	3.4%	3.0%	2.8%
76 - Aluminum and Articles Thereof	2.2%	2.3%	3.0%	2.8%	2.6%
44 - Wood and Articles of Wood (Incl. Wood Charcoal)	5.5%	4.9%	4.2%	3.1%	2.0%
72 - Iron and Steel	1.4%	1.4%	1.5%	1.5%	1.9%
73 - Articles of Iron or Steel	1.5%	1.6%	1.6%	1.6%	1.6%
Total Exports (Thousands of CAD)	348,144	365,741	359,135	355,901	375,480

Sources: Statistics Canada and US Department of Commerce

US Economic Activity and Canadian Factor Returns

The trade statistics indicate certain types of relationships between US economic activity and the Canadian equity markets. First, greater US economic activity should positively impact the Canadian energy sector. Second, the relationship should strengthen over time. We test both these hypotheses using factor returns from the Barra Canada Equity Model (CNE4).

First, we need a measure of US economic activity. The measure we use is the Manufacturing New Orders Index from the Institute of Supply Management (ISM).[4] The New Orders Index is a component of the famous and long-running Purchasing Managers' Index (PMI). The PMI and its components are calculated from a survey of purchasers from over 400 industrial companies.[5] The purchasers are asked to indicate for each component if conditions during the past month have improved, stayed the same, or worsened. Although the PMI, as well as its component indices, indicate change over the past month, they are nevertheless considered important forward looking indicators for manufacturing activity in the US.[6]

Next, we need a measure of Canadian energy market returns; we use the Energy sector factor returns from CNE4. These are the model's estimated factor returns from individual equity stocks in the universe belonging to the Global Industry Classification Standard (GICS®) Energy sector.

We estimate a relationship between the New Orders Index and the Energy factor returns for the period January 1981 to November 2009. However, we also need to control for general Canadian market returns. A natural way to estimate the relationship might be to run a regression of Energy factor returns on the New Orders Index and Canadian market returns.[7] But Energy factor returns and market returns are likely to be "jointly endogenous"; that is, they are determined at the same time, and causality may run either way between the two variables. Therefore, we use the New Orders Index as an instrument, or an exogenous determinant.

---

[2] Fergusson, Ian F., "United States-Canada Trade and Economic Relationship: Prospects and Challenges," CRS Report for Congress, January 29, 2008, p. 6.
[3] For example, rising oil prices have made profitable the extraction of oil from the Albertan oil sands. See Fergusson, p. 6.
[4] See www.ism.ws for more details.
[5] The other components are Backlog of Orders, New Export Orders, Imports, Production, Supplier Deliveries, Inventories, Employment, and Prices.
[6] We use the Manufacturing New Orders Index instead of measures like the GDP due to its forward looking nature and the higher frequency; GDP is only available quarterly.
[7] We use the MSCI Canada Index returns for Canadian market returns.

We use a well-known econometric method called "two-stage least squares" to estimate a model for the following order of causality: (1) New orders from the US cause Canadian market returns, and (2) Canadian market returns cause Canadian Energy factor returns.[8] Using this method, we find a statistically significant positive relationship between the Manufacturing New Orders Index in the US and Energy factor returns in the Canada Equity Model (see Table 2).[9]

Table 2: Two-Stage Least Squares Regression Results

Dependent Variable: ENERGY
Method: Two-Stage Least Squares
Sample (adjusted): 1981M01 2009M09
Included observations: 345 after adjustments
Instrument list: NEWORDERS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.002625	0.004188	-0.626646	0.5313
MARKET	1.304074	0.483498	2.697167	0.0073

To investigate whether the relationship has strengthened over time, we use a Chow stability test. In the Chow test, we split the regression into two periods and run the regression separately for each period. The test then tells us whether the estimated coefficient, which measures the strength of the relationship between New Orders and Energy returns, is different from one period to the other. If they are different, then we would know that the relationship has changed over time.

One critical step is choosing a breaking point for the two periods. In our case, the choice is relatively straightforward due to NAFTA; NAFTA's provisions provided for tariff free trade in energy by 1998. Using January 1998 as the break point between the two periods, the results of the Chow test and the separate regressions show that the relationship between New Orders and Energy factor returns increased over time.

Table 3: Chow Test Results

Chow Breakpoint Test: 1998M01
Null Hypothesis: No breaks at specified breakpoints
Equation Sample: 1981M01 2009M11

F-statistic	4.037728	Prob. F(2,343)	0.0185
Log likelihood ratio	8.074943	Prob. Chi-Square(2)	0.0176
Wald Statistic	8.075456	Prob. Chi-Square(2)	0.0176

---

[8] For details, see Greene, William H., *Econometric Analysis*, Fifth Edition, Prentice Hall, pp. 379-80.
[9] We use contemporaneous data points although an inherent lag structure is built into the data. More precisely, the ISM PMI data are released on the first business day of the month while the Barra factor returns and MSCI index data are end-of-month figures.

Conclusions

We have examined the relationship between US economic activity and Canadian market returns through the lens of trade between the two countries. Since the Canadian economy is dependent on energy exports to the US, we analyzed the relationship between US manufacturing activity and Canadian energy market returns as represented by Energy factor returns from CNE4. We found a positive relationship between new orders in the US and Energy factor returns in Canada. Furthermore, we found that the positive relationship strengthened over time, as expected from the trade data and NAFTA.

Contact Information

clientservice@mscibarra.com

Americas

Americas	1.888.588.4567 (toll free)
Atlanta	+ 1.404.551.3212
Boston	+ 1.617.532.0920
Chicago	+ 1.312.675.0545
Montreal	+ 1.514.847.7506
Monterrey	+ 52.81.1253.4020
New York	+ 1.212.804.3901
San Francisco	+ 1.415.836.8800
Sao Paulo	+ 55.11.3706.1360
Stamford	+1.203.325.5630
Toronto	+ 1.416.628.1007

Europe, Middle East & Africa

Amsterdam	+ 31.20.462.1382
Cape Town	+ 27.21.673.0110
Frankfurt	+ 49.69.133.859.00
Geneva	+ 41.22.817.9777
London	+ 44.20.7618.2222
Madrid	+ 34.91.700.7275
Milan	+ 39.02.5849.0415
Paris	0800.91.59.17 (toll free)
Zurich	+ 41.44.220.9300

Asia Pacific

China North	10800.852.1032 (toll free)
China South	10800.152.1032 (toll free)
Hong Kong	+ 852.2844.9333
Seoul	+ 822.2054.8538
Singapore	800.852.3749 (toll free)
Sydney	+ 61.2.9033.9333
Tokyo	+ 81.3.5226.8222

www.mscibarra.com

RV0110

Notice and Disclaimer

- This document and all of the information contained in it, including without limitation all text, data, graphs, charts (collectively, the "Information") is the property of MSCI Inc. ("MSCI"), Barra, Inc. ("Barra"), or their affiliates (including without limitation Financial Engineering Associates, Inc.) (alone or with one or more of them, "MSCI Barra"), or their direct or indirect suppliers or any third party involved in the making or compiling of the Information (collectively, the "MSCI Barra Parties"), as applicable, and is provided for informational purposes only. The Information may not be reproduced or redisseminated in whole or in part without prior written permission from MSCI or Barra, as applicable.

- The Information may not be used to verify or correct other data, to create indices, risk models or analytics, or in connection with issuing, offering, sponsoring, managing or marketing any securities, portfolios, financial products or other investment vehicles based on, linked to, tracking or otherwise derived from any MSCI or Barra product or data.

- Historical data and analysis should not be taken as an indication or guarantee of any future performance, analysis, forecast or prediction.

- None of the Information constitutes an offer to sell (or a solicitation of an offer to buy), or a promotion or recommendation of, any security, financial product or other investment vehicle or any trading strategy, and none of the MSCI Barra Parties endorses, approves or otherwise expresses any opinion regarding any issuer, securities, financial products or instruments or trading strategies. None of the Information, MSCI Barra indices, models or other products or services is intended to constitute investment advice or a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such.

- The user of the Information assumes the entire risk of any use it may make or permit to be made of the Information.

- NONE OF THE MSCI BARRA PARTIES MAKES ANY EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE INFORMATION (OR THE RESULTS TO BE OBTAINED BY THE USE THEREOF), AND TO THE MAXIMUM EXTENT PERMITTED BY LAW, MSCI AND BARRA, EACH ON THEIR BEHALF AND ON THE BEHALF OF EACH MSCI BARRA PARTY, HEREBY EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES (INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF ORIGINALITY, ACCURACY, TIMELINESS, NON-INFRINGEMENT, COMPLETENESS, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY OF THE INFORMATION.

- Without limiting any of the foregoing and to the maximum extent permitted by law, in no event shall any of the MSCI Barra Parties have any liability regarding any of the Information for any direct, indirect, special, punitive, consequential (including lost profits) or any other damages even if notified of the possibility of such damages. The foregoing shall not exclude or limit any liability that may not by applicable law be excluded or limited, including without limitation (as applicable), any liability for death or personal injury to the extent that such injury results from the negligence or wilful default of itself, its servants, agents or sub-contractors.

- Any use of or access to products, services or information of MSCI or Barra or their subsidiaries requires a license from MSCI or Barra, or their subsidiaries, as applicable. MSCI, Barra, MSCI Barra, EAFE, Aegis, Cosmos, BarraOne, and all other MSCI and Barra product names are the trademarks, registered trademarks, or service marks of MSCI, Barra or their affiliates, in the United States and other jurisdictions. The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and Standard & Poor's. "Global Industry Classification Standard (GICS)" is a service mark of MSCI and Standard & Poor's.

About MSCI Barra

MSCI Barra is a leading provider of investment decision support tools to investment institutions worldwide. MSCI Barra products include indices and portfolio risk and performance analytics for use in managing equity, fixed income and multi-asset class portfolios.

The company's flagship products are the MSCI International Equity Indices, which include over 120,000 indices calculated daily across more than 70 countries, and the Barra risk models and portfolio analytics, which cover 59 equity and 48 fixed income markets. MSCI Barra is headquartered in New York, with research and commercial offices around the world.