

Patterns of Diversification in Canadian Exports 1999-2008

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OFFICE OF THE CHIEF ECONOMIST: ANALYTICAL REPORT



Patterns of Diversification in Canadian Exports, 1999-2008

Lili Mei & Florence Jean-Jacobs
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Executive summary

Traditionally, Canadian exports have relied heavily on demand from the U.S., but this has begun to change as exports gained momentum from expansion into international markets. The process of diversification of our exports away from the U.S. is now well advanced and pervasive across most sectors. This paper assesses which sectors are leading the pack in contributing to this diversification process, and which destinations are at the forefront of it – with a particular focus on emerging markets.

The degree of diversification is important in determining the exposure of different sectors to unfavourable short-term events (like economic crises) or long-term demand stagnation. Sectors that are more internationally diversified are likely to be more resilient to shocks, and their penetration of new markets may be an indication of their flexibility and potential for future growth. Emerging markets are particularly important in that respect as they account for an increasingly large share of global demand. Last but not least, sectors with greater international exposure are likely to profit from foreign investment opportunities and other associated benefits like innovation and competitiveness.

The sectors that have diversified most in the last decade are metals and minerals, aerospace and machinery and electrical equipment. These products have seen their export share to non-U.S. destinations increase by 15 percentage points or more. In value terms, the top ranking sectors are metals and minerals, accounting for over one-third of the increase, followed by agri-food and machinery and electrical equipment (led by gas turbines, parts for construction machinery, computers, and integrated circuits). Together, they are responsible for more than two-thirds of the nominal increase in exports to non-U.S. markets over the decade.

In terms of regional patterns, other advanced countries (non-U.S.) have contributed significantly to the diversification of metals and minerals, aerospace and machinery, while Asia-Pacific is responsible for the increased diversification in many resource-based sectors, including chemicals, metals and minerals, agri-food and wood and paper, and also made an important contribution to the diversification of machinery and electrical equipment. Latin America and the Caribbean (LAC), emerging Europe, and the Middle East and North Africa (MENA) have contributed to international diversification in higher manufacturing products like aerospace and machinery, with LAC leading the diversification in automobiles.



1) Background on Diversification

Canadian merchandise exports to the world have grown significantly over the past decade, reaching \$484 billion in 2008, up 36.1% from their 1999 level. There are two forces of change behind this growth: regional diversification and change in product composition.

On one hand, Canadian exports expanded into a range of new markets around the world. Although the United States continues to be the most important and influential market for Canadian exports, its share has declined in recent years. Increasingly, Canadian exporters are searching for business opportunities elsewhere in the world, where several emerging economies are rising with new and different demands.

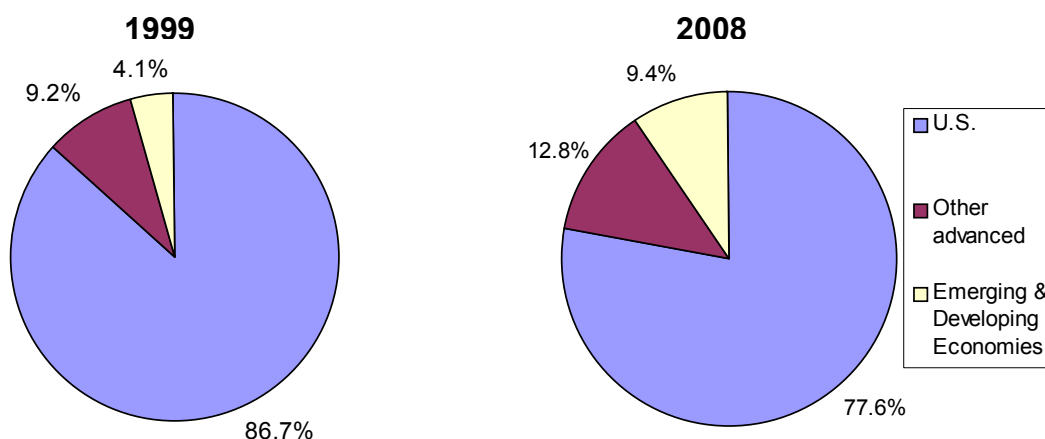
On the other hand, there were structural changes in the composition of our exports. Exports have become more concentrated in a handful of sectors compared to ten years ago. Over that period, resource and resource-based products (especially energy, metals and minerals and agri-food) have contributed more to export growth than higher value-added industrial products.

1.1) Regional Diversification

As the value of Canada's exports to the world increased over time, the share of exports to the United States shrank. Canadian exporters are expanding their shipments to markets in other advanced economies, and the emerging/developing economies.

In 1999, exports to the U.S. accounted for 86.7% of total Canadian exports. This share has decreased to 77.6% in 2008. In 1999, only 9.2% of total exports headed to other advanced economies and 4.1% to the emerging and developing economies. In 2008, their shares have grown to 12.8% and 9.4% respectively (Chart 1).

Chart 1. Comparison of Shares of Canadian Merchandise Exports



These share movements over the past decade imply much faster growth rates to non-U.S. markets. In the 1990s, Canadian exports to the U.S. generally enjoyed double digit growth rates

while the growth rate of exports to the rest of the world remained low. Since 2003, this trend was reversed. As a result, the ratio between Canadian exports to U.S. and those to the rest of the world has reduced from nearly seven in 1999 to about three in 2008 (Table 1).

Table 1. Merchandise Exports to the United States and Non-U.S. Destinations, 1999 to 2008

Year	World	United States	Non-U.S. Countries	World	United States	Non-U.S.
	C\$ millions			Annual Growth Rate (%)		
1999	355.4	308.1	47.3	11.6	14.1	-2.5
2000	413.2	359.3	53.9	16.3	16.6	13.9
2001	404.1	351.8	52.3	-2.2	-2.1	-3.0
2002	396.4	345.4	51.0	-1.9	-1.8	-2.5
2003	381.1	326.7	54.4	-3.9	-5.4	6.6
2004	412.3	348.1	64.1	8.2	6.6	18.0
2005	436.4	365.7	70.6	5.8	5.1	10.1
2006	440.4	359.1	81.2	0.9	-1.8	15.0
2007	450.7	355.9	94.8	2.3	-0.9	16.7
2008	483.6	375.5	108.1	7.3	5.5	14.0

1.2) Evolution of the Product Mix

The product mix of Canadian exports had changed over the last ten years, reflecting changes in world demand. Globally, we observe an increased concentration of exports in a handful of sectors (especially primary products) and a decline in some traditionally dominant export sectors. Furthermore, the export sector dynamics are different in the U.S. market than in other markets around the world.

In 1999, the automotive sector accounted for almost a quarter of total Canadian exports to the world (the large majority of which was destined to the U.S.). Ten years later, as U.S. automakers struggle with negative economic conditions, its share accounts for only 11.1% of total exports. Contrasting with the decline of the automotive sector is the rise of energy exports. The share of energy exports burgeoned from 8.5% in 1999 to 27.6% in 2008.

In Canadian exports to the U.S. market, there was a shift towards a greater concentration of primary products. The decline of automotive exports and the rise of energy exports are mainly reflective of changes in demand. Ten years ago, automotive exports accounted for 27.5% of total exports to the U.S., followed by exports of machinery and electrical products (15.1%). In 2008, exports of energy products account for one third of total exports south of the border, while exports of automotive products fell to 13.6%, and exports of metals and mineral products now rank third (11.0%), slightly ahead of machinery and electrical products (10.6%).

Primary products have traditionally been the key export to non-U.S. markets; however, the sectors that dominated exports to these markets have changed over the years. In 1999, exports of agriculture and wood and paper products together accounted from more than 40% of total exports to non-U.S. markets. In 2008, exports of metals and minerals, and machinery and

electrical products together accounted for 40%. Agriculture product exports fell to second place at 18.5% (compared to 20.3% in 1999). The share of the wood and paper sector contracted significantly from 20.6% to 8.4% of total exports to these markets.

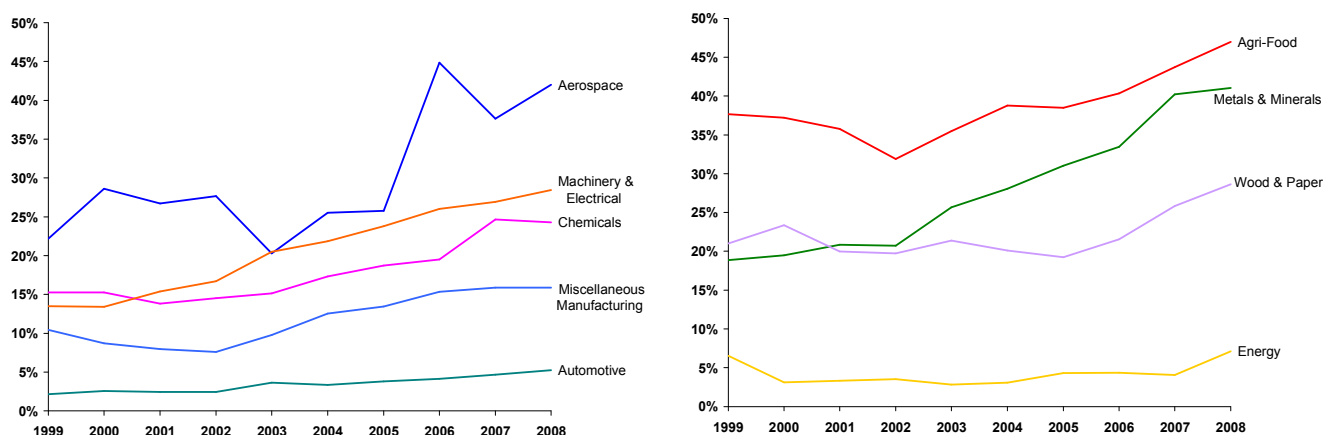
2) Sectors Leading Diversification¹

Although diversification away from the U.S. is widespread across most sectors (except energy which remains very dependent on the U.S. market), there are sectors which show more diversification than others. We will highlight these changes based on two criteria - relative and absolute changes. In doing so, we address two questions: which export sectors are the most diversified internationally and/or becoming more so? Which sectors have led the increase in exports to non-U.S. destinations over the last decade?²

2.1) Relative Diversification

A rising share of exports going to non-U.S. markets indicates increasing export diversification for a given sector. The majority of export sectors showed strong export diversification over the past ten years (Chart 2). In 1999, agri-food was the sector with the largest share of exports destined to non-U.S. markets (37.7%). This share has risen to 47.0% by 2008. Aerospace, metals and minerals, and machinery and electrical equipment sectors also saw notable diversification into non-U.S. markets. Only energy and automotive sectors remained completely dependent (>90%) on the U.S. market.

Chart 2. Share of Exports to Non-U.S. Markets in Total Exports to the World, by Sector



¹ Sector definitions are in the Appendix 3.

² A more complex quantitative measure of diversification, the Herfindahl-Hirschman index (HHI) was also used to measure Canadian export diversification, by sector. See results in the Appendix 1.

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Overall changes over this decade are summarized in Table 2, which ranks export sectors by their relative diversification away from the U.S. from highest to lowest. Metals and minerals posted the largest gain in share to non-U.S. markets, diversifying by 22.2 percentage points over the past ten years. This growth stemmed mainly from the growing demands from newly industrialized emerging economies, such as the BRIC countries. The aerospace sector ranked second, followed by machinery and electrical equipment. Although the non-U.S. market share of aerospace exports has fluctuated over time, it showed a strong overall upward trend as the Canadian aviation industry displayed its competitiveness in international markets. The increase in share in the machinery and electrical sector has been strong and steady due to increased demand from the Latin American and Asian countries.

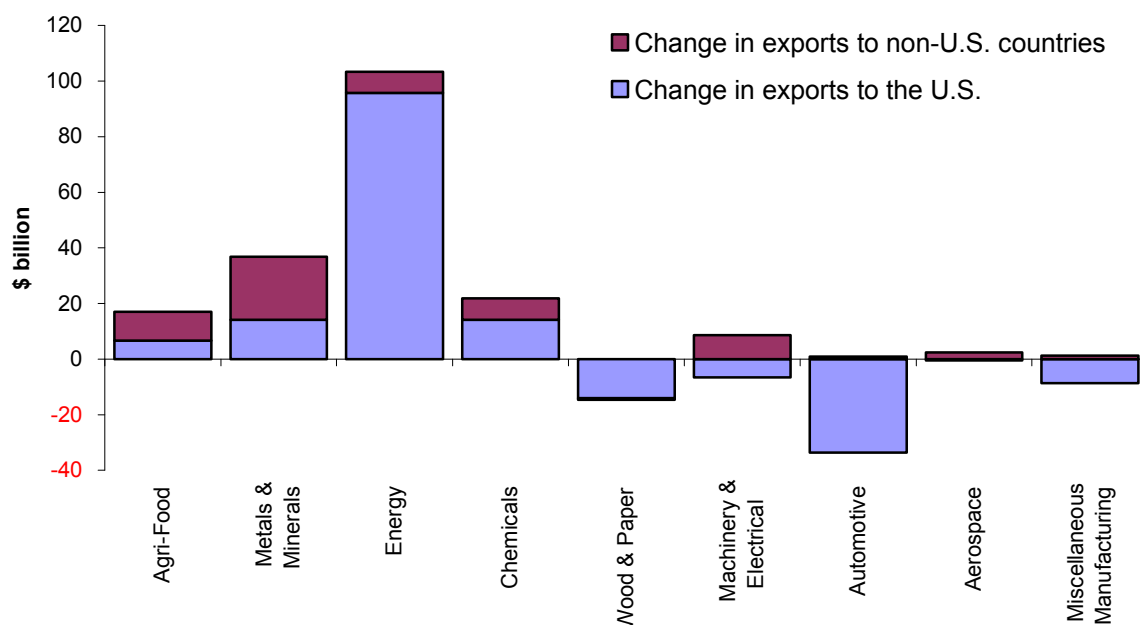
Table 2. Sector Rankings by Change in Non-U.S. Export Share, between 1999 and 2008

Ranking	Sector	Change in Share
1	Metals, minerals and their products	22.2%
2	Aerospace	19.8%
3	Machinery and electrical equipment	15.0%
4	Agriculture, food and beverage	9.3%
5	Chemicals, plastics and leather	9.0%
6	Wood and paper	7.6%
7	Miscellaneous manufactures	5.5%
8	Automotive products	3.1%
9	Energy products	0.6%

2.2) Absolute Diversification

In absolute value terms, the bulk of the increases in exports in the metals and minerals and agri-food sectors were from gains in the non-U.S. markets (Chart 3). These two sectors became more diversified as their exports expanded into new markets. In contrast, the energy sector has continued to rely heavily on the U.S. market. Automotive, wood and paper, and miscellaneous manufacturing sectors saw their export value shrink due to declining sales in the U.S. market. Exports of machinery and electrical products saw an increase in sales to non-U.S. markets, which made up for the loss in the U.S. market.



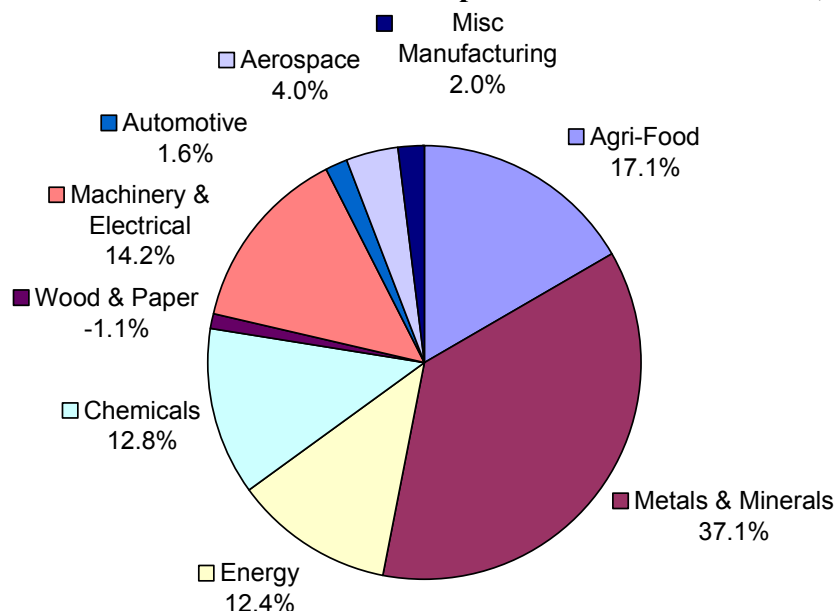
Chart 3. Nominal Change in Exports to U.S. and Non-U.S. Markets, by Sector (1999 to 2008)

The metals and minerals sector also led the absolute diversification race, having the largest value increase (\$22.5 billion) in exports to non-U.S. markets over the past ten years. The agriculture and food sector as well as the machinery and electrical equipment ranked second and third. On the other hand, wood and paper exports contracted in both U.S. and non-U.S. markets. Hence it is ranked at the bottom of the list due to the overall contraction (Table 3).

Table 3. Sector Rankings by Nominal Change in Exports to Non-US markets, from 1999 to 2008

Rank	Sector	Nominal Value Change (\$billion)
1	Metals, minerals and their products	22.5
2	Agriculture, food and beverage	10.4
3	Machinery and electrical equipment	8.6
4	Chemicals, plastics and leather	7.8
5	Energy	7.5
6	Aerospace	2.4
7	Miscellaneous manufactures	1.2
8	Automotive	0.9
9	Wood and paper	-0.7

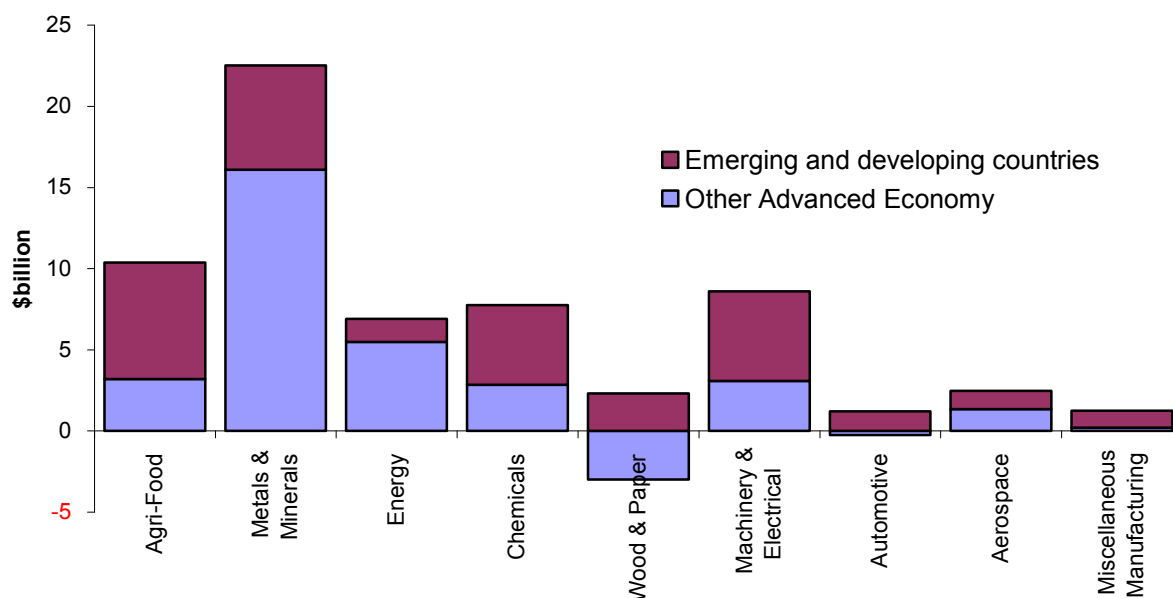
Chart 4 shows sector shares in the overall diversification away from the U.S. market. The metal and mineral sector is responsible for 37.1% of the total increase in exports to non-U.S. markets. Together, the primary product sectors (metals and mineral, agriculture and food, energy and chemicals) accounted for more than three quarters of the total increase in exports to non-U.S. markets.

Chart 4. Share of the Overall Increase in Exports to Non-U.S. markets, by Sector

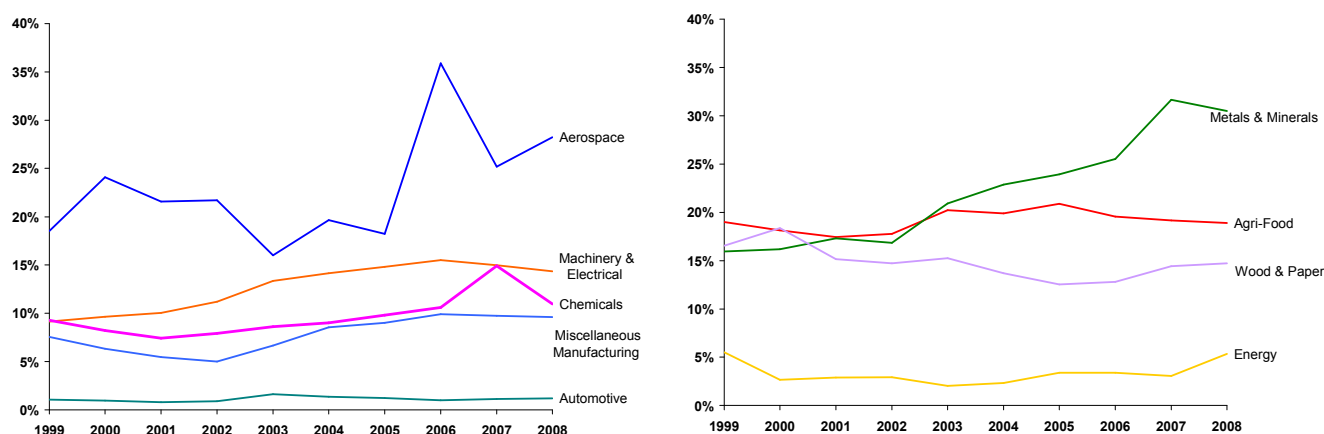
3) Other Advanced Economies

Canada's second largest export destination group after the U.S. consists of other advanced economies, which includes countries such as Japan, the United Kingdom, Germany and South Korea. Over the last decade, the share of total exports to this group has been increasing steadily. Its share of total exports rose from 9.2% to 12.8% in 2008.

This group of markets has been particularly important for the diversification of the metal and mineral sector, as well as exports in the aerospace sector. Demand for metals and minerals mainly came from various European countries such as the United Kingdom, Norway, and Belgium. Advanced Asian economies such as Japan and South Korea were also important export destinations of metals and minerals, such as mineral ores, aluminium and nickel. The demand for Canadian aerospace products mainly stemmed from Europe.

Chart 5. Nominal Change in Exports to the Rest of the World (Non-U.S.), by Sector (1999 to 2008)

As Chart 6 illustrates, the export diversification path for most sectors was relatively smooth during the past decade. The most significant increase occurred in the metals and minerals sector. The other sectors that showed increases were machinery and electrical equipment and chemicals. Agri-food, miscellaneous manufacturing, energy and automotive sector exhibited little change in diversification within this market over the past decade. These observations agree with the fact that the economies included in this group have relatively more mature markets with established relationship with Canadian exporters.

Chart 6. Share of Exports to Other Advanced Economies (Non-U.S.) in Total Exports, by Sector

Exports of metals and mineral products to other advanced countries had the highest export value among all sectors in 2008, accounting for 34.8% of total exports to these markets. The share of exports destined to other advanced economies in this sector also increased significantly, by 14.6

percentage points since 1999 (\$16.1 billion nominal increase) (Tables 4 and 5). The aerospace sector ranked second, increasing its export share by 9.7 percentage points. Demand for Canadian aerospace products mainly came from European countries, such as the United Kingdom and Germany. On the downside, the wood and paper sector saw its share shrink by 1.8 percentage points, mainly due to a decline in the demand from Japan, which used to be the second largest buyer of Canadian wood and paper products. The energy sector saw a slight share decline but its export value actually increased by \$5.5 billion. The demand for energy products came from both advanced Asian countries and Europe. Japan and South Korea's demands for coal has been consistent over the years (and spiked in 2008), while the Netherlands has recently showed pronounced interest in Canadian oil.

Table 4. Sector Rankings by Changes in Export Share of Other Advanced Economies, between 1999 and 2008

Rank	Sector	Change in Share
1	Metals and minerals	14.6%
2	Aerospace	9.7%
3	Machinery and electrical equipment	5.2%
4	Miscellaneous Manufacturing	2.0%
5	Chemicals	1.7%
6	Automotive	0.1%
7	Agriculture, food and beverage	-0.1%
8	Energy	-0.2%
9	Wood and paper	-1.8%

Table 5. Sector Rankings by Nominal Change in Exports to Other Advanced Economies, between 1999 and 2008

Rank	Sector	Nominal Value Change (\$billion)
1	Metals and minerals	16.1
2	Energy	5.5
3	Agriculture, food and beverage	3.2
4	Machinery and electrical equipment	3.1
5	Chemicals	2.8
6	Aerospace	1.4
7	Miscellaneous manufacturing	0.2
8	Automotive	-0.3
9	Wood and paper	-3.0

4) Emerging and Developing Economies

As Canadian exporters explore new business opportunities around the globe, we see more diversification in all the emerging and developing regions. However, the degree of export

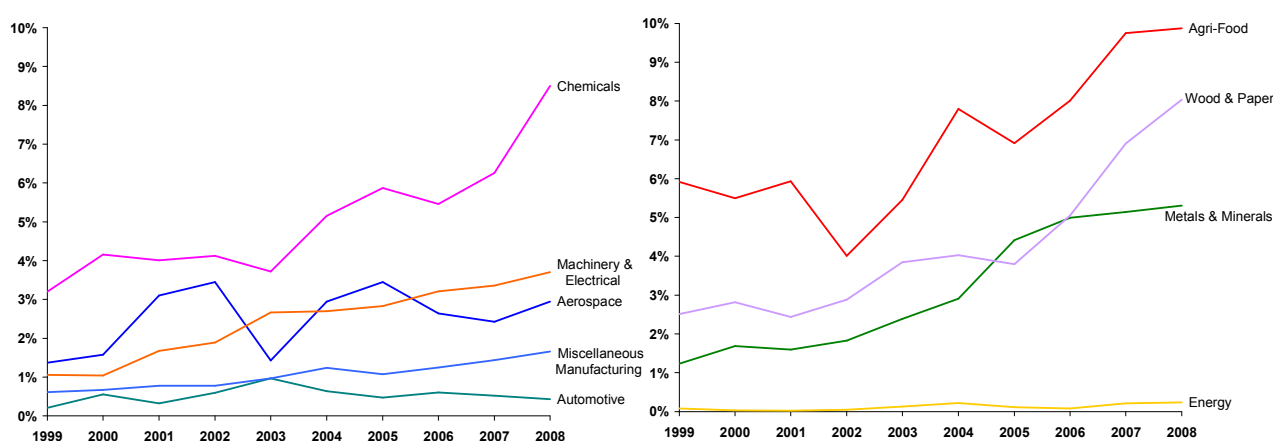
diversification varies across these new markets. Two main geographical regions became the major source of the diversification of Canadian exports: Asia-Pacific and Latin America. Exports to these regions have increased sharply over the past ten years. The following sections analyse which sectors have led the increase in exports to the various emerging/developing world destinations over the past decade.

4.1) Asia-Pacific

In recent years, the rise of emerging economies in the Asia-Pacific region has attracted a great deal of attention. With new economic powers such as China and India, the region is playing an increasingly important role in the diversification of Canadian exports.

Though most of the sectors have seen an increase in the share of exports going to Asia-Pacific (Chart 7), this region is particularly important for agriculture and food, chemicals, metals and minerals, as well as wood and paper. Within this region, China is definitely leading the new growth of exports in most of the primary product sectors; it recently became the world's second largest buyer of Canadian wood and paper products. Demand for Canadian metals and mineral products such as nickel, sulphur and iron and copper ores from China drove up the region's share of exports in that sector. The bulk of demand for Canadian cereals came from Indonesia, while demand for oil seeds (including canola) came from China. Canadian fertilizers are also in high demand in these two countries, and China is a major destination for our organic chemicals. As a result of China's growing appetite for raw materials, over 60% of our chemical sector exports and half of the metals and mineral sector exports to emerging/developing markets ended up in emerging Asia-Pacific region.

Chart 7. Share of Exports to Asia-Pacific Countries in Total Exports, by Sector



The wood and paper sector gained the most in this region, its share of total exports increasing by 5.5 percent between 1999 and 2008. Recently, China has started to show an increased interest in Canadian forestry products. In 2007 it has replaced Japan as the second largest export destination for Canadian forestry products. The chemical sector, as well as metals and minerals exports, also saw their share of exports improve over the past ten years. Exports of energy to this region improved the least; however, even in that sector traditionally dominated by exports of petroleum

and gas to the U.S., burgeoning demand for coal from China is indicative of potential diversification.

Table 6. Sector Rankings by Change in Share of Exports to Asia-Pacific Countries, between 1999 and 2008

Rank	Sector	Changes in Share
1	Wood and paper	5.5%
2	Chemicals	5.3%
3	Metals and minerals	4.1%
4	Agriculture, food and beverage	4.0%
5	Machinery and electrical equipment	2.6%
6	Aerospace	1.6%
7	Miscellaneous manufacturing	1.0%
8	Automotive	0.2%
9	Energy	0.1%

In value terms, both the metals and minerals and chemical sectors gained roughly \$3.3 billion in exports between 1999 and 2008 (Table 7). The automotive and aerospace sectors showed little growth in value terms. Exports in these two sectors have fluctuated greatly from year to year as demand has been less stable.

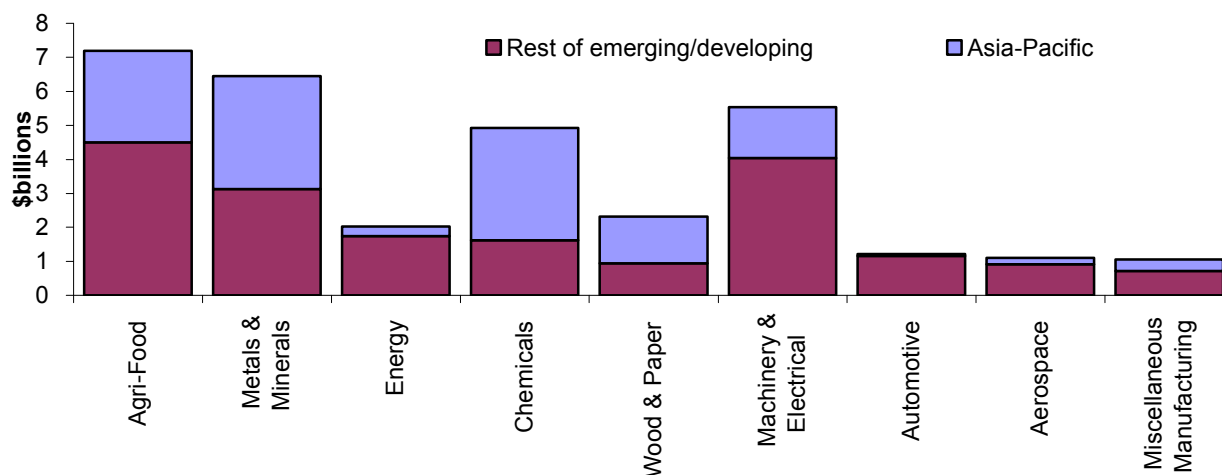
Table 7. Sector Rankings by Nominal Change in Exports to Asia-Pacific, between 1999 and 2008

Rank	Sector	Nominal Value Change (\$billion)
1	Metals and minerals	3.3
2	Chemicals	3.3
3	Agriculture, food and beverage	2.7
4	Machinery and electrical	1.5
5	Wood and paper	1.4
6	Miscellaneous manufacturing	0.3
7	Energy	0.3
8	Aerospace	0.2
9	Automotive	0.1

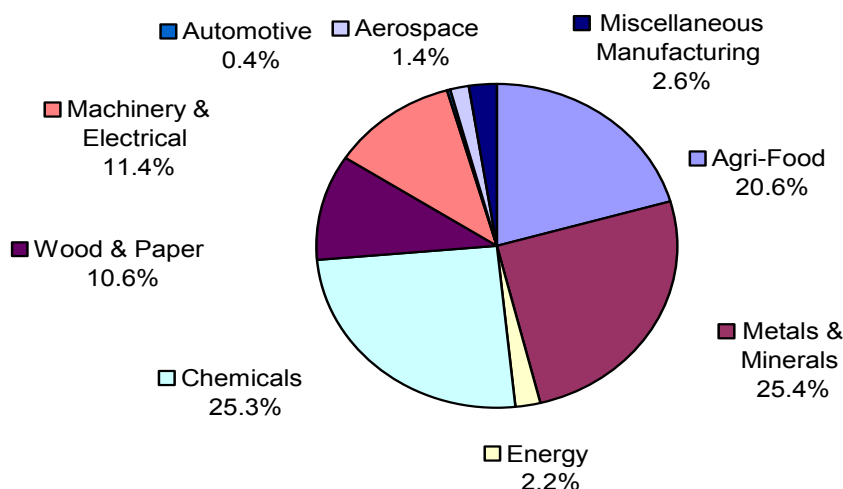
Overall, a large chunk of the increase in exports of metals and minerals and chemicals to the emerging/developing countries can be attributed to the increased demand from the Asia-Pacific region. More than half of the increase in exports of metals and minerals to the emerging markets is due to growth in exports to this region. China's thirst for more nickel, sulphur, and copper and iron ores, combined with India's demand for gold and precious stone drove up these increases. About 67.3% of the increase in chemical exports to the emerging markets also stemmed from this region. China and India have generated strong demand for fertilizers as they increased food production to meet the growing domestic demand. Asia-Pacific markets also generated increased

demand for Canadian agriculture and food exports as China became the largest buyer of oil seeds in the region while India demanded more food staples such as dried peas (Chart 8).

Chart 8. Growth in Value of Exports to Asia-Pacific and the Rest of Emerging/Developing Countries, by Sector (1999 to 2008)



The Asia-Pacific region is the leader in the growth of exports to the emerging/developing markets. We can see this market is particularly important for exports of primary products, especially for metals and minerals, and chemicals. Exports in the agriculture and food sectors have also seen substantial growth (Chart 9). The composition of demand from Asia-Pacific economies is a reflection of the economic growth within this region. Several new market powers rose from this region, with a growing appetite for primary resources to feed their industrialization and economic growth. It is reasonable to expect that the Asia-Pacific region will continue to lead the diversification of Canadian exports away from the U.S. for many years to come.

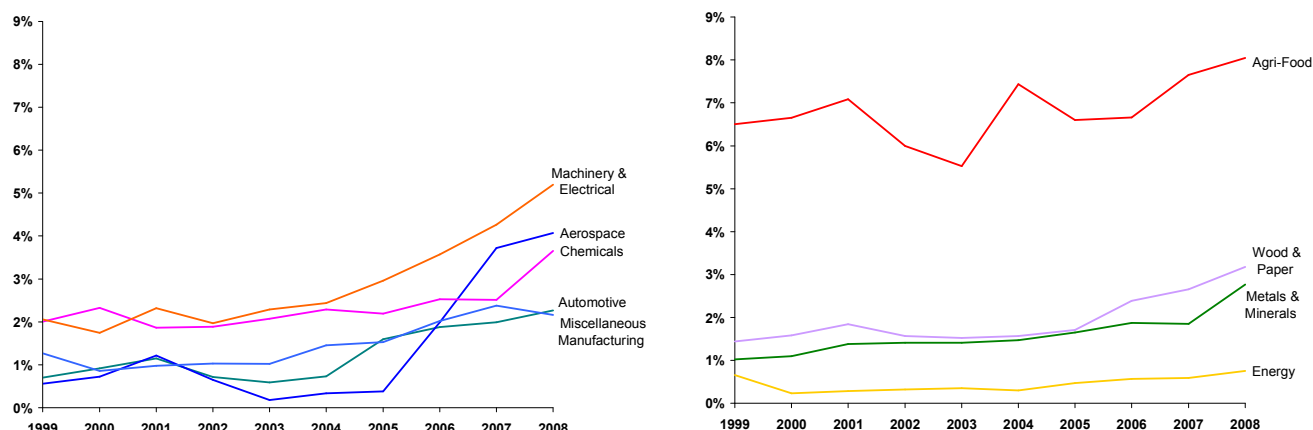
Chart 9. Share of the Overall Increase in Exports to Asia-Pacific Countries, by sector between 1999 and 2008

4.2) Latin America and the Caribbean (LAC)

Over the past decade, exports to Latin American and Caribbean countries continued to grow. Being home to Mexico, Canada's second largest export destination in the developing world, and Brazil, a new market power, the Latin America and Caribbean region continues to be the second largest export destination zone within the emerging/developing world. This market led the growth in demand for Canadian automotive and aerospace products in the emerging/developing world.

Exports to Latin America and Caribbean countries as a share of total exports have grown for most export sectors during the past ten years (Chart 10). The agriculture and food sector had the highest share, while the machinery and electrical sector, seeing a smooth increase in its total exports, ranked second. In value terms, these two sectors also ranked as the most valuable exports to this region, followed by metals and minerals exports.

In general, the products demanded in Latin American and Caribbean countries are different from those in the Asia-Pacific region; we observe a more diverse product mix which spans both the primary products and higher-value added goods. Brazil showed strong demand for chemicals, metals and minerals, and machinery and electronic equipment. Mexico continued to be an important export market for agriculture and food products, machinery and electrical equipment, and automobiles.

Chart 10. Share of Exports to LAC Countries in Total Exports, by Sector

Latin American markets have not only shown interest in primary products, but also in higher value-added merchandise such as automobiles and machinery. In relative terms, all export sectors gained ground in this region and increased their share. The aerospace sector saw the greatest increase in its share of total exports, gaining 3.5% between 1999 and 2008. Mexico was the driving force behind this export sector's growth, with Brazil and Uruguay (in 2008) also contributing. Machinery and electrical equipment exports were also strong, gaining 3.1% during the same period (Table 8). In absolute value terms, demands for primary products were strong from this region, posting continuous growth (Table 9). In the higher-value added sectors, machinery and electrical equipment reported the largest gain in export value among all sectors during the past ten years.

Table 8. Sector Rankings by Change in Share of Export to LAC Countries in Total Exports, between 1999 and 2008

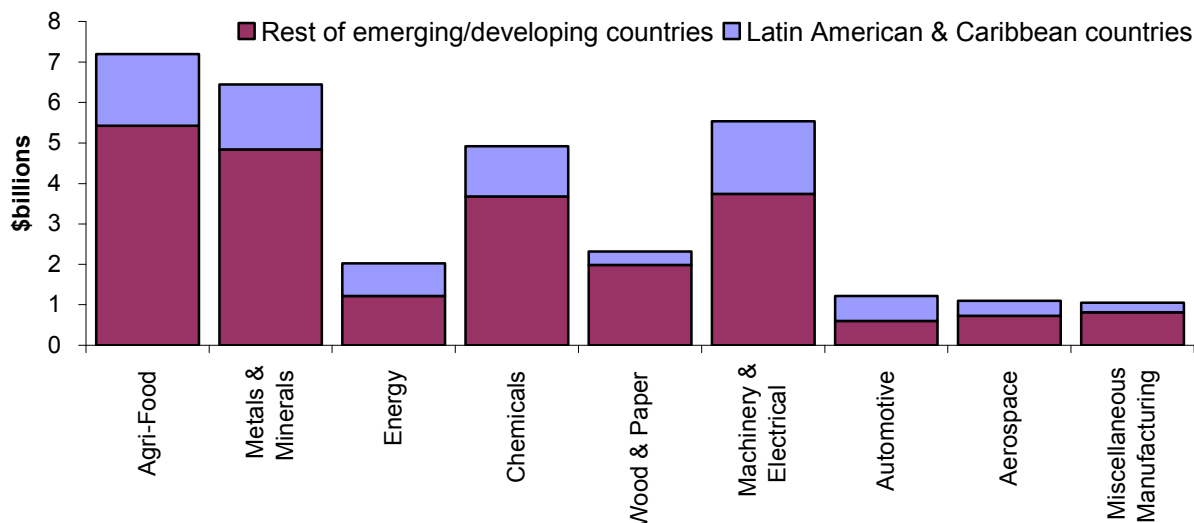
Rank	Sector	Change in Share
1	Aerospace	3.5%
2	Machinery and electrical equipment	3.1%
3	Metals and minerals	1.7%
4	Wood and paper	1.7%
5	Chemicals	1.6%
6	Automotive	1.6%
7	Agriculture, food and beverage	1.5%
8	Miscellaneous manufacturing	0.9%
9	Energy	0.1%

Table 9. Sector Rankings by Nominal Change in Exports to LAC Countries, between 1999 and 2008

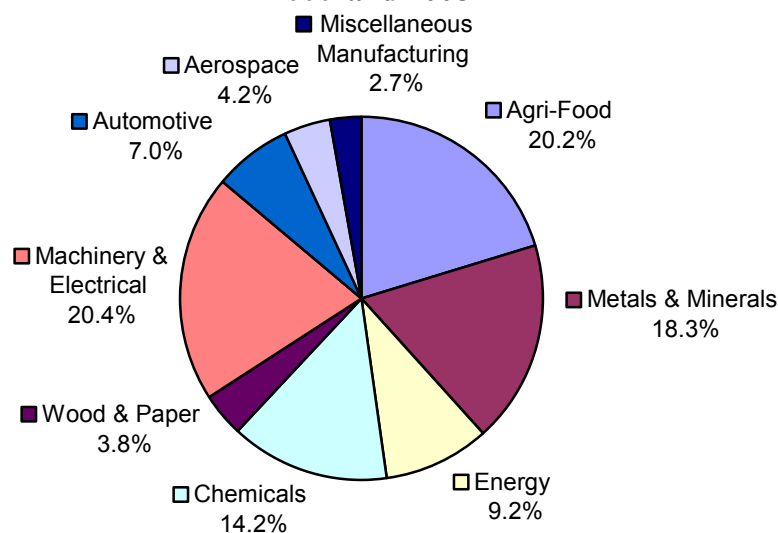
Rank	Sector	Nominal Value Change (\$billion)
1	Machinery and electrical equipment	1.8
2	Agriculture, food and beverage	1.8
3	Metals and minerals	1.6
4	Chemicals	1.2
5	Energy	0.8
6	Automotive	0.6
7	Aerospace	0.4
8	Wood and paper	0.3
9	Miscellaneous manufacturing	0.2

To put this region in the context of the emerging world, we looked at its share in the exports to the emerging world in 2008. Demand from this region led to gains in value of exports of the primary product sectors such as agriculture and food, energy and chemicals sectors. More than a quarter of agriculture exports to the emerging and developing world went to Latin America. Demand for cereals and oil seeds from Mexico and Venezuela were behind the growth of agriculture and food exports. About 57.7% of total energy exports to emerging/developing markets stemmed from the demand in this region. Brazil is the main export destination in the region for primary products such as mineral fuels and oils and fertilizers.

This region is also important in terms of the diversification of manufactured products. About 56.6% of automotive exports to the emerging/developing countries went to Latin American countries in 2008. And Chart 11 shows, over the last decade more than half of the increase in automotive exports to the emerging countries is attributable to this region. Mexico is the second largest export destination for Canadian automotive exports. Altogether, 37.0% of all machinery and electrical equipment exports to the emerging/developing world went to Latin America (Chart 11).

Chart 11. Growth in Exports to LAC and the Rest of Emerging/Developing Countries, between 1999 and 2008

Overall, the demand for both primary and high value-added products fuelled the overall growth in exports to this region. Altogether, machinery and electrical equipment with automotive and aerospace exports accounted for 31.6% of export growth to this region (Chart 12). The demand for primary products such as agriculture and food products, energy products as well as industrial materials will drive the new demand from Latin American and Caribbean countries in the near future.

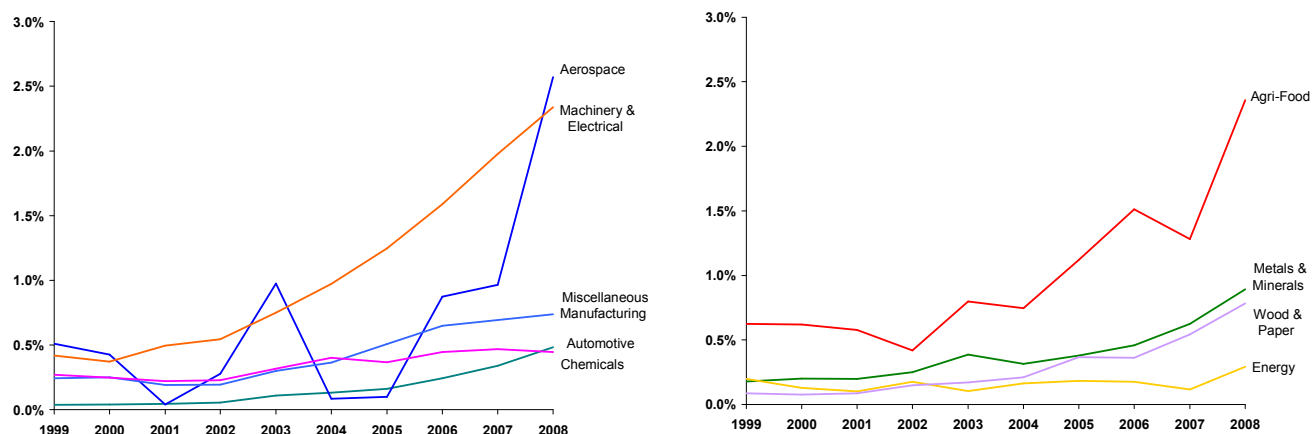
Chart 12. Share of the Overall Increase in Exports to LAC Countries, by sector between 1999 and 2008

4.3) Emerging Europe

Canadian businesses have made noticeable progress in exploring demands in the emerging European markets in the past ten years. The share of exports to emerging European countries as a share of total exports has been on the rise in all sectors. Emerging European countries as a whole have been an important source of diversification of higher value-added manufacturing sectors, especially in aerospace and machinery and electrical equipment.

In 2008, the largest share of exports to the emerging European market was in the aerospace sector (2.6%). Close behind were the agri-food (2.4%) and the machinery and electrical equipment sectors (2.3%). In value terms, machinery and electrical equipment and agriculture and food account for half of total exports to this region. In particular, the growth of machinery and electrical equipment exports has experienced a steady upward trend.

Chart 13. Share of Exports to Emerging European Countries in Total Exports to the World, by sector



Exports in the machinery and electrical sector have always dominated the exports to this region. Increased exports of machinery and electrical products to this region accounted for 19.5% of the increase in this sector's total exports to the emerging markets. Rising demand from Russia was the predominant factor behind the increase. Aerospace exports to the region saw the biggest gain in share of exports to the world, once again boosted by demand from Russia (Table 10). Agriculture and food exports grew significantly in this region and are the second largest sector in terms of value. Russia's demand for meat and Turkey's imports of dried lentils kept this sector's exports strong.

Table 10. Sector Rankings by Change in Share of Export to Emerging European countries in Total Exports, between 1999 and 2008

Rank	Sector	Change in Share
1	Aerospace	2.1%
2	Machinery and electrical equipment	1.9%
3	Agriculture, food and beverage	1.7%
4	Metals and minerals	0.7%
5	Wood and paper	0.7%
6	Miscellaneous manufacturing	0.5%
7	Automotive	0.4%
8	Chemicals	0.2%
9	Energy	0.1%

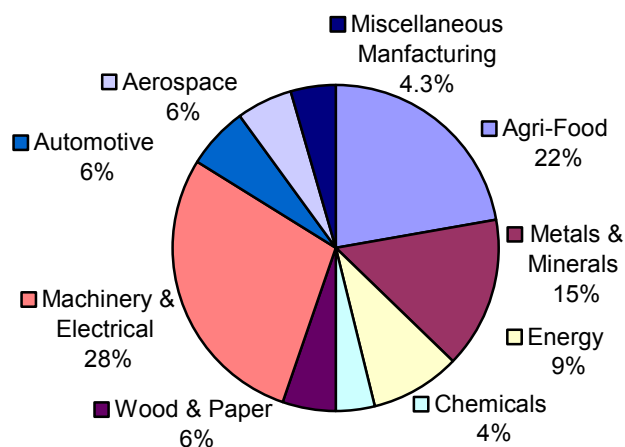
When comparing the value of exports between 1999 and 2008, the machinery and electrical sector experienced the largest value gain, followed by the agriculture and food sector. The metals and minerals sector experienced the most significant growth in exports to this region, with the value of its exports in 2008 being more than ten times its value in 1999. Turkey's demand for iron and steel led the growth in this sector's exports to the region in recent years.

Table 11. Sector Rankings by Nominal Change in Exports to the Emerging European Countries, between 1999 and 2008

Rank	Sector	Nominal Value Change (\$billion)
1	Machinery and electrical equipment	1.1
2	Agriculture, food and beverage	0.8
3	Metals and minerals	0.6
4	Energy	0.3
5	Automotive	0.2
6	Aerospace	0.2
7	Wood and paper	0.2
8	Miscellaneous manufacturing	0.2
9	Chemicals	0.1

Among the different sectors, machinery and electrical equipment led the increase in exports to this region, accounting for 28.5% of the gain (Chart 14). Altogether, the higher value-added sectors (automotive, aerospace and machinery and electronic equipment) accounted for about 40% of the total increase while primary products accounted for the rest. With Russia and Turkey emerging as regional economic powers, emerging European countries are becoming a promising new market for Canadian exports, especially for the higher-value added sectors.

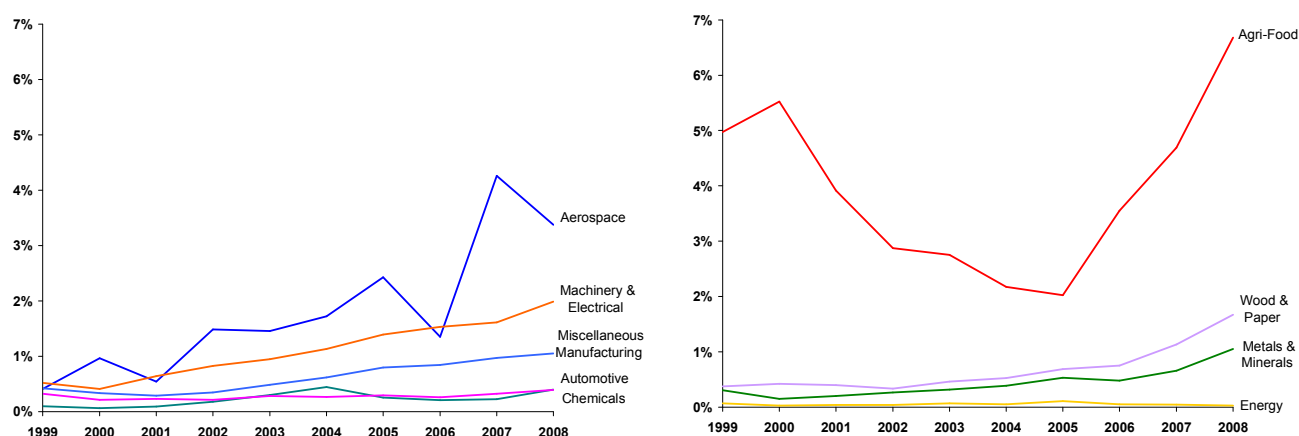
Chart 14. Share of the Overall Increase in Exports to the Emerging European Countries, by sector between 1999 and 2008



4.4) Middle East and North Africa (MENA)

Agri-food and machinery and electrical equipment sectors dominated exports to the Middle East and North Africa. Together, the exports of these two sectors accounted for more than sixty percent of total exports to this region in 2008. In terms of the share of exports to this region, agriculture and food exports to Middle Eastern and North African countries ranked the highest in 2008. This sector's share rose sharply after taking a dip over 2000-2005 (Chart 15). The share of machinery and electrical exports to this region has been mildly trending upwards. The main export destinations within this region included the United Arab Emirates, Saudi Arabia and Algeria.

Chart 15. Share of Exports to MENA Countries in Total Exports, by sector



The Middle Eastern and North African countries have made important contributions to the diversification of the aerospace sector. The share of aerospace exports to this region in total sectoral exports to the world has grown by 3.0 percent over the past ten years, much higher than

the other export sectors (Table 12). During the same period, both primary and industrial product exports gained ground in this region. Agriculture and food exports expanded the most to this region in value terms. Machinery and electrical products were ranked second in terms of gains, followed by exports of metals and minerals (Table 13).

Table 12. Sector Rankings by Change in Share of Export to MENA in Total Exports, between 1999 and 2008

Rank	Sector	Change in Share
1	Aerospace	3.0%
2	Agriculture, food and beverage	1.7%
3	Machinery and electrical equipment	1.5%
4	Wood and paper	1.3%
5	Metals and minerals	0.7%
6	Miscellaneous manufacturing	0.6%
7	Automotive	0.3%
8	Chemicals	0.1%
9	Energy	0.0%

Table 13. Sector Rankings by Nominal Change in Exports to the MENA, between 1999 and 2008

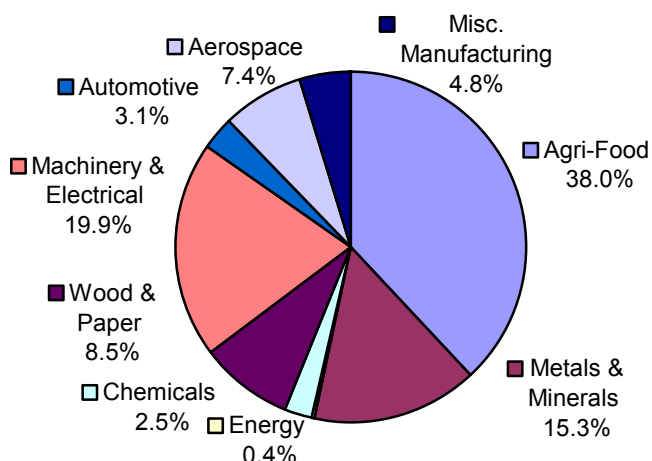
Rank	Section	Nominal Value Change (\$billion)
1	Agriculture, food and beverage	1.6
2	Machinery and electrical equipment	0.8
3	Metals and minerals	0.6
4	Wood and paper	0.4
5	Aerospace	0.3
6	Miscellaneous manufacturing	0.2
7	Automotive	0.1
8	Chemicals	0.1
9	Energy	0.0

The increase in aerospace exports to this region accounted for 27.4% of the total increase in aerospace exports to the emerging/developing world. The United Arab Emirates was the 8th largest buyer of Canadian aerospace products in 2008. This region also played an important role in the diversification of the agriculture and food exports. Increase in exports to this region accounted for 22.0% of growth in the total agriculture and food exports to the emerging markets. The bulk of the gain was from cereal exports to Algeria and Saudi Arabia. There was also increasing demand for machinery and electrical products, mainly from the UAE and Saudi Arabia.

The gain in agriculture and food exports led the growth in exports to the Middle East and North Africa (Table 16). Nevertheless, the demand for machinery and electrical products has been

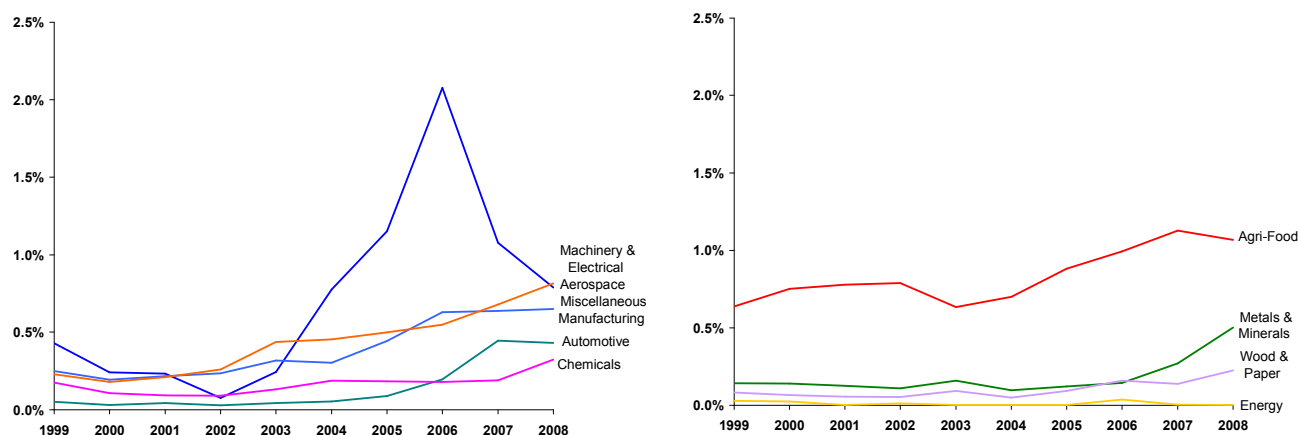
strong throughout the past decade, and remains critical to the future growth of exports to this region.

Chart 16. Share of the Overall Increase in Exports to MENA, by sector between 1999 and 2008



4.5) Sub-Saharan Africa

Exports to Sub-Saharan Africa constitute a relatively small share of total exports to the world when compared to other developing/emerging regions. However, there has been growing interest for Canadian products in this region. Agriculture and food exports have generally been the most valuable export group to this region. In recent years, there have also been signs of growing demand for machinery and electrical products, which grew to be almost as valuable as agri-food exports. The major export destination for Canadian exports was South Africa.

Chart 17. Share of Exports to Sub-Saharan Africa in Total Exports, by sector

Between 1999 and 2008, the sectors that experienced the largest increase in export share to the region were machinery and electrical equipment, agriculture and food, as well as miscellaneous manufacturing (Table 14). Demand for automotive products was particularly strong in South Africa, as well as demand for miscellaneous manufacturing products (scientific and precision instruments). In terms of an increase in export value, machinery and electrical exports top the list due to demand from South Africa, Gabon and Ghana. Metals and minerals exports to this region have been particularly strong in recent years, due to higher demand for sulphur from South Africa.

Table 14. Sector Rankings by Change in Share of Export to Sub-Saharan Africa in Total Exports, between 1999 and 2008

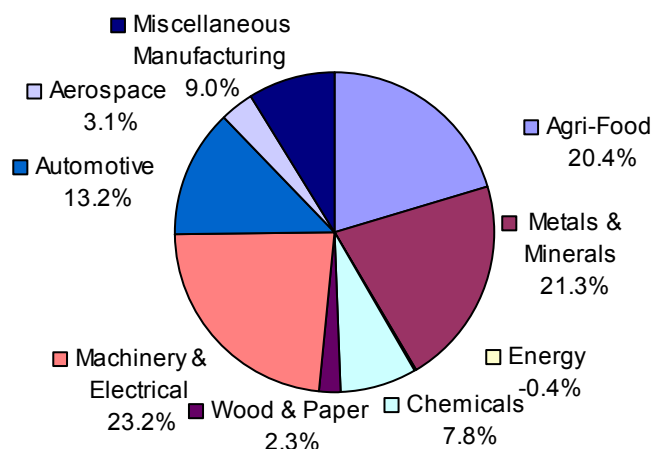
Rank	Sector	Change in Share
1	Machinery and electrical equipment	0.6%
2	Agriculture, food and beverage	0.4%
3	Miscellaneous manufacturing	0.4%
4	Automotive	0.4%
5	Aerospace	0.4%
6	Metals and minerals	0.4%
7	Chemicals	0.1%
8	Wood and paper	0.1%
9	Energy	0.0%

Table 15. Sector Rankings by Nominal Change in Exports to Sub-Saharan Africa, between 1999 and 2008

Rank	Section	Nominal Value Change (\$billion)
1	Machinery and electrical equipment	0.3
2	Metals and minerals	0.3
3	Agriculture, food and beverage	0.3
4	Automotive	0.2
5	Miscellaneous manufacturing	0.1
6	Chemicals	0.1
7	Aerospace	0.0
8	Wood and paper	0.0
9	Energy	0.0

Overall, even compared with exports to other emerging regions, exports to Sub-Saharan Africa grew at a healthy rate over the decade. The region contributed to the positive growth in machinery, metals and minerals, agriculture and food, as well as automotive exports. In particular, automotive exports to this region accounted for 15.6% of the total increase in exports by this sector to the emerging countries between 1999 and 2008. Exports of automotive products to South Africa contributed the most to this growth.

Among all the export sectors, machinery and electrical equipment led the overall diversification into this market, accounting for 23.2% of the gain, followed by metals and minerals and agriculture and food (Chart 18). In general, although the demand for agriculture and food products dominated exports to Sub-Saharan Africa, demand for higher value-added products such as machinery and automotive products could play an important role in boosting future export growth to this region.

Chart 18. Share of the Overall Increase in Exports to Sub-Saharan Africa, by sector between 1999 and 2008

5) Appendix

Appendix 1: Measuring Diversification (Herfindahl-Hirschman Index)

Methodology and Results

The Herfindahl-Hirschman index (HHI) is one of the most common measures of concentration in a shared market setting. It is one of the recommended measurements of export diversification/concentration in the statistical documentations on international trade data of the UN and the World Bank³. Developed originally in industrial organization theory to estimate the degree of market power, HHI is also used in the international economic theory to measure the extent to which a country's exports depend on certain products or markets. HHI or its normalised format (used here) is used in several studies for evaluating export diversification (e.g. Cadot et al. (2007), Gutierrez de Pineres and Ferrantino (1997)).

Methodology

Consider the market for Canadian exports in which demand is driven by seven destinations (U.S. and six major regions, as defined in Appendix 2). Applying HHI logic to this market, we can estimate the degree of market concentration – and hence relative importance of top destinations – by sector (sectors defined in Appendix 3).

For each sector, the index of export diversification will then be calculated as:

$$H = \sum_{i=1}^n \left(\frac{x_i}{\sum_{i=1}^n x_i} \right)^2 = \sum_{i=1}^n s_i^2$$

where s_i is the share of exports to a destination i (x_i) in total exports to the world ($X = \sum_{i=1}^n x_i$) for a given year, and n is the number of export destinations⁴.

The normalized HHI used in this analysis is calculated as:

$$H^* = \frac{\sum_i s_i^2 - 1/n}{1 - 1/n}$$

The normalized HHI has a value ranging between zero and one, where zero indicates perfect diversification, and one means that all exports are going to only one destination. The lower the HHI for a sector, the more diversified it is, thus less dependent on the economic conditions in a particular destination.

³ See for example: ARTNeT Capacity Building Workshop on Trade Research 22-25 March 2005, Introduction to trade research II: Trade data and statistics, Commonly used trade indicators. Mia Mikic, UNESCAP.

⁴ Here, $n=7$ for the following seven export destination groups: the U.S., Other Advanced Economies, Emerging Europe, Asia-Pacific, Latin America and the Caribbean, Sub-Saharan Africa, and Middle East and North Africa.

Results

Overall, Canadian exports went through a period of increasing diversification during the past ten years, largely as a result of slower growth in exports to the United States and rapid advance in exports to other destinations. An early trend towards concentration/stability has been reversed and all sectors underwent diversification after 2003. However, the degree of export diversification varies greatly among the sectors. Those with the highest diversification scores in 2008 were agri-food, aerospace and metals and minerals. Those were the same sectors where the share of exports destined to non-U.S. markets in 2008 was the largest (see chart 2, p.6).

The runaway leader in diversification according to the HHI is the agri-food sector (HHI = 0.23 in 2008). This sector was the most diversified throughout the decade, as demand for Canadian agriculture products has been traditionally strong in many regions. An early drop in diversification was offset by a rise starting in 2003 and accelerating in recent years.

Other sectors (non-agriculture) were highly concentrated in the U.S. before 2000 (HHI scores of 0.6 and above). However, since 2000, most of them have greatly diversified, led by metals and minerals, machinery and electrical equipment, and aerospace. As chart A3 shows, these sectors have come a long way in finding new markets for their exports during the last decade. During the same period, exports of miscellaneous manufacturing, wood and paper and chemical products demonstrated moderate increases in their market diversification.

The least diversified export sectors are the energy and automotive sectors. With more than 90% of energy exports going to the U.S., Canada remains dependent on market demand from south of the border. A similar situation applies to the automotive sector. However, this sector has recently seen some new demand from Latin America.

These results concord with our earlier analysis of relative diversification – based on the share of exports destined to non-U.S. markets – as exemplified by the similar pattern showed in charts 2 and A3. The HHI analysis thus provides further evidence of the export diversification trends exposed in this study and confirms the robustness of the results.

Chart A3. Change in market concentration (measured in HHI), by sector (1999 to 2008)

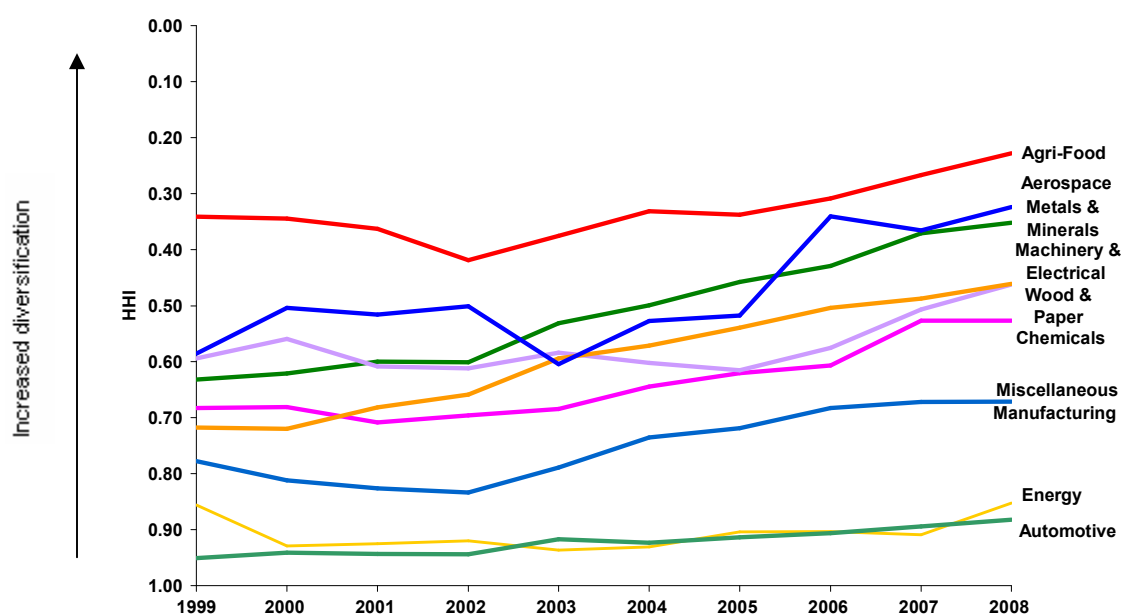


Table A3. HHI by sector (1999 to 2008)

Sectors	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Change (1999- 2008)
Agri-Food	0.34	0.34	0.36	0.42	0.38	0.33	0.34	0.31	0.27	0.23	-0.12
Metals & Minerals	0.63	0.62	0.60	0.60	0.53	0.50	0.46	0.43	0.37	0.35	-0.27
Energy	0.86	0.93	0.92	0.92	0.94	0.93	0.90	0.90	0.91	0.85	-0.08
Chemicals	0.68	0.68	0.71	0.70	0.68	0.64	0.62	0.61	0.53	0.53	-0.15
Wood & Paper	0.59	0.56	0.61	0.61	0.58	0.60	0.62	0.58	0.51	0.46	-0.10
Machinery & Electrical	0.72	0.72	0.68	0.66	0.59	0.57	0.54	0.50	0.49	0.46	-0.26
Automotive	0.95	0.94	0.94	0.94	0.92	0.92	0.91	0.91	0.89	0.88	-0.06
Aerospace	0.59	0.50	0.52	0.50	0.60	0.53	0.52	0.34	0.37	0.32	-0.18
Misc Manufacturing	0.78	0.81	0.83	0.83	0.79	0.74	0.72	0.68	0.67	0.67	-0.14

* A small HHI value indicates higher diversification. A negative change indicates increasing diversification over the period.

Appendix 2: Country Groups

Advanced Economies (33)	Emerging/Developing Economies (166)				
	Emerging Europe (27)	Asia Pacific (33)	Latin America & the Caribbean (40)	Sub-Saharan Africa (47)	Middle East and North Africa (19)
1 Andorra	1 Albania	1 Afghanistan	1 Anguilla	1 Angola	1 Algeria
2 Australia	2 Armenia	2 American Samoa	2 Antigua & Barbuda	2 Benin	2 Bahrain
3 Austria	3 Azerbaijan	3 Bangladesh	3 Argentina	3 Botswana	3 Egypt
4 Belgium	4 Belarus	4 Bhutan	4 Aruba	4 Burkina Faso	4 Iran
5 Cyprus	5 Bosnia	5 Brunei	5 Bahamas	5 Burundi	5 Iraq
6 Czech Republic	6 Bulgaria	6 Cambodia	6 Barbados	6 Cameroon	6 Jordan
7 Denmark	7 Croatia	7 China	7 Belize	7 Cape Verde	7 Kuwait
8 Finland	8 Estonia	8 East Timor	8 Bermuda	8 Central African Republic	8 Lebanon
9 France	9 Georgia	9 Fiji	9 Bolivia	9 Chad	9 Libya
10 Germany	10 Hungary	10 Guam	10 Brazil	10 Comoros	10 Mauritania
11 Greece	11 Kazakhstan	11 India	11 Cayman Islands	11 Congo Republic	11 Morocco
12 Hong Kong	12 Kosovo	12 Indonesia	12 Chile	12 Cote d'Ivoire	12 Oman
13 Iceland	13 Kyrgyzstan	13 Kiribati	13 Colombia	13 Democratic Republic of Congo	13 Qatar
14 Ireland	14 Latvia	14 Laos	14 Costa Rica	14 Djibouti	14 Saudi Arabia
15 Israel	15 Lithuania	15 Macau	15 Cuba	15 Equatorial Guinea	15 Sudan
16 Italy	16 Macedonia	16 Malaysia	16 Dominica	16 Eritrea	16 Syria
17 Japan	17 Moldova	17 Maldives	17 Dominican Republic	17 Ethiopia	17 Tunisia
18 Korea	18 Montenegro	18 Micronesia	18 Ecuador	18 Gabon	18 United Arab Emirates
19 Luxembourg	19 Poland	19 Mongolia	19 El Salvador	19 Gambia	19 Yemen
20 Malta	20 Romania	20 Myanmar (Burma)	20 French Guiana	20 Ghana	
21 Netherlands	21 Russia	21 Nepal	21 Grenada	21 Guinea	
22 New Zealand	22 Serbia	22 North Korea	22 Guatemala	22 Guinea-Bissau	
23 Norway	23 Tajikistan	23 Pakistan	23 Guyana	23 Kenya	
24 Portugal	24 Turkey	24 Papua New Guinea	24 Haiti	24 Lesotho	
25 Singapore	25 Turkmenistan	25 Philippines	25 Honduras	25 Liberia	
26 Slovakia	26 Ukraine	26 Samoa	26 Jamaica	26 Madagascar	
27 Slovenia	27 Uzbekistan	27 Solomon Islands	27 Martinique	27 Malawi	
28 Spain		28 Sri Lanka	28 Mexico	28 Mali	
29 Sweden		29 Thailand	29 Netherlands Antilles	29 Mauritius	
30 Switzerland		30 Tonga	30 Nicaragua	30 Mozambique	
31 Taiwan		31 Tuvalu	31 Panama	31 Namibia	
32 United Kingdom		32 Vanuatu	32 Paraguay	32 Niger	
33 United States		33 Vietnam	33 Peru	33 Nigeria	
			34 St. Kitts & Nevis	34 Reunion	
			35 St. Lucia	35 Rwanda	
			36 St. Vincent & the Grenadines	36 Sao Tome & Principe	
			37 Suriname	37 Senegal	
			38 Trinidad & Tobago	38 Seychelles	
			39 Uruguay	39 Sierra Leone	
			40 Venezuela	40 Somalia	
				41 South Africa	
				42 Swaziland	
				43 Tanzania	
				44 Togo	
				45 Uganda	
				46 Zambia	
				47 Zimbabwe	

Appendix 3: Sector Definition

Sector	HS chapters
Agri-food	01-24
Metals and minerals	25-26, 68-83 (excl. 77)
Energy	27
Chemicals	28-43
Wood and paper	44-49
Machinery and electrical equipment	84-85
Automotive	87
Aerospace	88
Miscellaneous manufacturing	50-67, 86, 89-99

6) References and Source of Data

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