Policy Perspectives

Business Council of British Columbia

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BC's High Technology Exports: A Solid Base to Grow From

Highlights

- In the context of the overall British Columbia economy, the advanced technology sector is substantial, accounting for more than 80,000 jobs and 6% of economic output (GDP).
- That said, BC's technology sector is smaller than its counterparts in the other provinces that host sizable high technology industries.
- The advanced technology sector in BC is populated by a plethora of smaller businesses and has relatively few large companies (and very few true "anchor" firms).
- Turning to exports, BC's technology industry has performed relatively well in recent years. Technology-related exports have grown more quickly than total provincial exports, and BC has outpaced Canada as a whole on this metric.
- Within Canada, BC punches somewhat below its weight in exports of technology goods, but well above its weight in exporting technology services. Exports of technology services are difficult to track and often not very visible; this contributes to the perception that BC underperforms in technology exports.
- Recent research on regionally-based high technology clusters in the United States indicates that over the long-term, technology production has significant multiplier effects, with one technology job supporting as many as five other jobs in a given metropolitan area.

British Columbia is home to an economically significant and notably diversified high technology sector. A detailed overview of the sector is presented in the most recent *British Columbia's Technology Report Card 2012*.[1] It shows that the production of advanced technology goods and services now generates 6% of the province's GDP and accounts for approximately 80,000 jobs. While this is lower than the GDP share in some other provinces, BC's technology sector continues to expand faster than the economy in general. And it has been resilient in the wake of the 2008-09 recession and the rather sluggish economic recovery that followed in its wake.

One area of particular interest to the Business Council is the high technology industry's export profile and prospects. A strong export sector is vital to BC's economic health. Exporting is also the key channel through which the local technology industry needs to grow in order to create more high-paying jobs and make a greater imprint on the province's economic landscape. In terms of merchandise or goods trade, BC's technology sector supplies a small portion of the province's exports. However, on the services side the sector has been surprisingly successful in

[1] Available at BC TIA's website: http://www.bctia.org/Resources/Industry-Info

selling technology-related services beyond the BC market. Combined, these two technology export segments – goods and services – constitute a growing and dynamic part of the province's export base.

BC's advanced technology industry has strong linkages with the United States, which is a useful reminder that despite rapid growth in China and some other emerging economies, the US remains our largest export market – and one with considerable growth potential. Today, more than two-thirds of BC technology-based merchandise exports are destined for the US. And although Asia is becoming a more important trading partner for the province, technology exports to Asia have seen only modest gains.

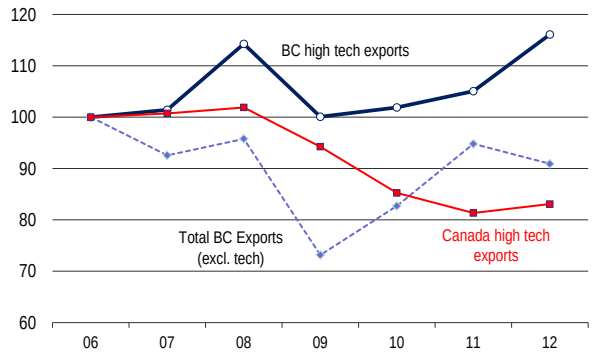
A Brief Review of Technology Exports

Using established definitions, BC's high technology merchandise exports amounted to approximately $1 billion in 2012. With overall merchandise exports reaching $32 billion, the technology sector provided a little over 3% of BC's total export sales.

Although small, the sector's exports have been quite resilient. During the recent global recession, BC's technology goods exports fell 12%, but this followed a big jump in 2008 and was also less than the simultaneous 23% slump in the province's total merchandise exports. Taking a somewhat longer-term view, over the past five years the province's technology exports have held up quite well. Thanks to an upswing in 2012 they are now above their 2006 level. BC's total merchandise exports, on the other hand, have yet to regain their pre-recession peak. And relative to Canada, BC has been able to maintain its technology-related export sales. Using the same product classification to define high technology goods, the value of Canadian technology exports declined for three consecutive years starting with the 2009 recession, and by 2012 it was still 17% below the 2006 level.

Drilling down into different product groupings, it turns out that computers and telecommunications equipment rank as BC's leading technology export segment. Aerospace is second as a source of technology goods exports, followed closely by biotech products.

Figure 1
BC Merchandise Technology Exports Compared to Canadian Technology Exports and Total BC Exports
Indexed 2006=100



Source: BC Stats, unpublished data and Industry Canada Online Trade Database.

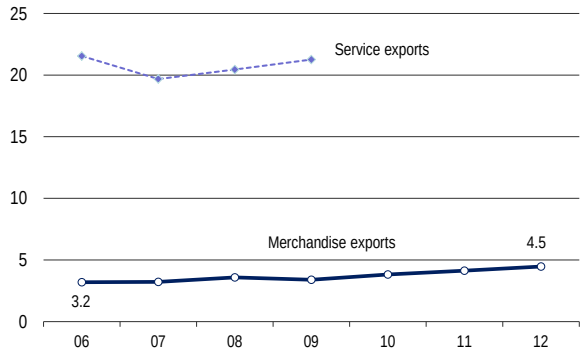
The 2012 *Technology Report Card* observes that BC's technology-related "merchandise export gap" is significant, in that the province's export shipments represent a noticeably smaller proportion of the national total than might be expected given BC's 13.1% share of Canada's population. However, it is important to recognize that BC has a comparatively small goods export sector in general, supplying about 7% of

Canadian merchandise exports in 2012. Seen this way, the BC technology sector's 4.5% contribution to Canadian technology goods exports doesn't look so bad.

Technology Services

A striking feature of British Columbia's broadly-defined high technology sector is its orientation towards services rather than goods production. In 2009, technology-based service exports reached $3.2 billion, more than three times the value of BC's exports of technology goods in that year. Data on services exports are difficult to obtain and are published with a lag, so the most recent statistics are for 2009. It can be assumed that BC's exports of technology services are now appreciably higher than the 2009 figure of $3.2 billion.

Figure 2
BC's Share of Canada's Merchandise and Service Technology Exports
Per cent



Source: BC Stats unpublished data and Profile of BC's High Technology Sector. Note: 2009 latest available data for services.

This orientation towards technology services is underscored when BC is considered against the national backdrop. Canada's technology service exports totaled $15.2 billion in 2009, which was less than the value of the country's technology merchandise exports in that year. While BC accounted for just 4.5% of Canada's technology merchandise exports, more than one-fifth of the country's technology service exports originated here. So by any measure, BC punches above its weight in exporting high technology services.[2]

The existence of a notable cluster of software development companies shows up clearly in the BC export data. Software makes up one-third of BC's technology service exports. (The value of BC's software exports amounts to more than one-third of the national total.) The second largest category of technology services exports is computer and related services (about one-quarter of BC's technology service exports), followed by engineering services at 20%.

An examination of the composition of technology firms in the province also highlights the disproportionate role of services. More than 8,000 BC businesses[3] are counted as high technology service companies, whereas just 750 firms are found in the technology manufacturing and production space.

The above figures relate to the total number of technology firms. In the services segment the majority of local technology companies are not engaged in exporting but rather sell services in the domestic market

[2] For a broader discussion of trade in services and the role of services exports generally in the context of the BC economy, see the paper on tradable services prepared by Dr. Michael Goldberg for the Business Council's Outlook 2020 project in 2009. Available on the Business Council's website at: http://www.bcbc.com/content/555/2020_200910_Goldberg.pdf

[3] With one or more paid employees.

only. Partly reflecting this domestic sales focus, 70% of BC technology service establishments are "micro businesses" with just 1-4 employees. Only 3.5% of BC technology service firms have more than 50 staff. On the manufacturing side, 45% of local technology companies have 1-4 employees and fewer than one in ten has at least 50 workers on the payroll.

Technology Sector Generates Significant Economic Spin-offs

A substantial majority of BC high technology firms are located in the Metro Vancouver region. This is not surprising, as most of the province's population and the core of the broader tradable services sector[4] are also found in the lower mainland. There are smaller clusters of firms in the Okanagan and on Vancouver Island, but the lower mainland stands out as having by far the most prominent grouping of high technology companies (including those that export).

While most observers have an intuitive sense that technology generates positive economic spin-offs, recent research by US economist Enrico Moretti has quantified the picture. His work begins by recognizing that the prosperity of a regional economy depends critically on the competitiveness of its "traded" industries – industries whose output can be sold outside of the local market. There are several "traded" industries, including manufacturing, tourism, professional-scientific-technical services, resource-based industries, parts of education, and the high technology sector.

Professor Moretti documents the sizable economic impacts that large technology clusters can have in metropolitan regions.[5] After looking at 320 US metropolitan areas, he estimates that each new technology-related job in a US urban region creates upwards of five additional local jobs beyond the technology sector itself. Two of these "extra" jobs are in professional occupations such as accounting and law, with three others in sectors such as hospitality, construction, and retail trade.

While an employment multiplier of five seems surprisingly large, Professor Moretti identifies several reasons for the outsized positive spin-offs. One is that the average high technology employee is paid well, with most in the top fifth of the earned income distribution. Data on average incomes in BC confirm this point, with average weekly earnings for an advanced technology industry worker being at least 50% higher than the economy-wide benchmark.[6] In general, better paid/higher-income workers tend to spend more on housing, restaurants, and a variety of other personal and local services; they are also more likely than most to hire others to perform household services such as landscaping,

[4] Tradable services are services that can be sold to out-of-province customers. Examples are professional services, financial services and scientific and technical services, along with education, design and consulting services.

[5] Among his recent studies, we have relied primarily on the following: The New Geography of Jobs, Houghton Mifflin Harcourt, 2012; Enrico Moretti and Per Thulin, "Local multipliers and human capital in the United States and Sweden," Industrial and Corporate Change, volume 22, number 1, 2013; and Moretti, "Local Labor Markets," in O. Ashenfelter and D.E. Card, eds., Handbook of Labor Economics, Elsevier, 2011.

[6] BC Stats, Profile of the British Columbia High Technology Sector, 2010 Edition.

cleaning, the provision of child care, etc. Because the high technology sector generates above average incomes, it has a bigger economic multiplier than many other industries where compensation is lower.

Another factor contributing to high technology's substantial employment multiplier is that companies in the sector typically purchase many professional and business services in the local market – e.g., legal and accounting services, communication services, recruitment and human resource services, and specialized consulting services. Professor Moretti finds that US high-technology firms tend to purchase more of these "producer services" than manufacturing companies or many domestically-oriented service industries.

Another factor that boosts the advanced technology sector's multiplier is the clustering that is common in the industry. Once a technology cluster is established, it tends to attract more highly skilled workers and other technology companies to locate in the same region. Importantly, Professor Moretti focuses on the **long-term impacts** of industrial clustering, measured over a 10-year time horizon. In this respect, his work differs from traditional economic impact analyses which seek to estimate short-run multipliers resulting from the opening of a new manufacturing facility or other business in a region.

Over the long-term, the clustering of technology companies in urban areas promotes further clustering and spurs additional growth in the technology space. Highly skilled employees prefer to be in a labor market where there are numerous local employers interested in people with their skill sets – a collection of technology companies doing similar work is a powerful attractor for human capital. At the same time, other companies can benefit from locating in regions where there are deep pools of skilled workers and sophisticated suppliers of services and other inputs needed to run their own operations.

Similarly, suppliers and vendors of inputs to technology-producing companies can gain advantages from proximity to groups of customers to whom they sell their services and products. Companies making use of specialized legal and financial services, lab services, shipping services, and recruiting services benefit from locating near suppliers who themselves develop progressively greater expertise in providing the kinds of services that the high technology community requires. All of this helps to explain why it is difficult to build and sustain significant advanced technology clusters outside of significant urban centres.

A final factor that emerges from Professor Moretti's research on the "agglomeration" effects that stem from the co-location of technology companies and their suppliers is the role of learning and the exchange of ideas that occurs among colleagues. This can involve attending community or industry events, random encounters in coffee shops or other social settings, or the pursuit of additional education/training at local institutions. Information about job openings, new technology ideas, research and development projects, or financing and investment opportunities can easily be exchanged within particular technology clusters, thus serving as a further catalyst for R&D, business innovation, and new company formation in the sector.

Conclusion

Overall, BC's high technology industry is smaller than its counterparts in some other provinces and many American states. But the sector's exports have held up well, with the growth of export shipments outpacing the Canadian average over the past few years. BC's technology merchandise exports are slowly gaining ground, but it is in technology services where the province really shines. Adding goods and services, BC's export base in the technology sector is sizable and by some measures proportionally larger than Canada's.

The province's high technology industry has only a handful of large firms and suffers from too few "anchor" companies around which successful clusters are often built. A lack of anchor firms makes it hard for high technology clusters to become fully established to the point where growth becomes self-reinforcing, as Professor Moretti's studies of regional development patterns in the US technology sector confirm.

From the perspective of provincial economic policy, we believe that BC's advanced technology sector warrants greater attention from policy-makers. Not only does it have substantial upside potential, but its future growth would give the province a sturdier and more diversified economic base. To this end, government should adequately fund the advanced education programs – including graduate programs – that are critical in expanding pools of highly skilled individuals needed by technology companies. The province should continue to support research and innovation – and expand its support as fiscal circumstances improve. In this regard, the government's extension of the Scientific Research and Development Tax credit in the February 2014 budget was a welcome step.

British Columbia should also be doing everything possible to optimally leverage federal government funding and programs aimed at stimulating innovation, technology development, commercialization, and relevant post-secondary research. Technology companies operating in BC would also benefit from modifications to public sector procurement policies and practices that enable improved market access for competitive, locally-developed advanced technology products and services.[7]

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[7] The final report of the BC Jobs and Investment Board offers a number of policy recommendations to strengthen the province's technology sector. See Global 360: Attracting Investment in an Increasingly Competitive World, 2014, pp. 30-33; available from the web site of the British Columbia Jobs and Investment Board at http://www.bcjib.ca/.