

JDI ROUNDTABLE **ON MANUFACTURING** **COMPETITIVENESS IN NEW** **BRUNSWICK FORUM**



**A SECTOR AT CROSSROADS: AN OVERVIEW OF
MANUFACTURING AND OPPORTUNITIES FOR
GROWTH IN NEW BRUNSWICK**

J.C. Herbert Emery and Xiaolin Guo

Executive Summary

Manufacturing exports are New Brunswick's economic engine, despite great challenges facing the sector. But with the right policies, regulations and business conditions, manufacturing has another "gear" that can drive GDP and population growth.

New Brunswick manufacturing has not followed the path of its counterparts in other advanced economies. Employment and value-added have not declined as much as in Maine, the U.S. and Ontario, and the province differs in character with its high concentration of output from five industries, its high share of exports, and its high dependence on a single foreign market.

These features suggest New Brunswick manufacturing will be strongly influenced by external factors, like changes in the value of the Canadian dollar and international trade agreements. High exposure to global competition of manufacturers in New Brunswick also indicates that policy decisions will have significant impacts. New Brunswick manufacturers don't seek local market share; they are competing for a bigger slice of the global economic pie.

New Brunswick manufacturers largely respond to exchange-rate-driven profit opportunities by adjusting employment while maintaining fixed productivity, instead of investing capital to raise productivity while reducing employment. Historically, an abundance of labour likely made this organization efficient; but with today's aging population, labour scarcity and education investments oriented away from manufacturing, labour-driven expansion has proved limiting.

New Brunswick has not followed the path of other jurisdictions with aging populations. Across countries, an aging workforce is associated with a shift toward automation technologies. The greater the demographic change, the more rapid is the development of automation technologies. Yet, to date, this has not occurred in New Brunswick.

We must ask: What is holding back the capital investment that would drive transformational change in New Brunswick manufacturing? This paper argues the answer is an eroding business climate that dampens technology investment, including rising tax burdens, onerous regulations and public policy decisions that drive up business costs.

The resilience of New Brunswick's manufacturing sector, despite the policy-driven decline in business climate, likely represents an opportunity for growth. This paper seeks to answer: What would happen if manufacturers' efforts were channeled into growing production and export sales, instead of merely

sustaining their operations? What collateral benefits would occur elsewhere in the economy, such as the service sector, with a greater focus on technology in manufacturing? And what policy changes are needed to allow manufacturers to raise GDP and employment in New Brunswick?

Introduction

“The key to expanding US exports and reaching manufacturing’s employment potential is to have companies, domestic and foreign, judge it is profitable to manufacture here”.

Martin Baily and Barry Bosworth (2014) “US manufacturing: Understanding Its Past and Its Potential Future,” *Journal of Economic Perspectives* 28(1): 2-26.

Manufacturing exports are New Brunswick’s economic engine. Among the ten provinces, by manufacturing’s share of GDP, New Brunswick has ranked no lower than fourth since 1997, and that share has declined less than in Quebec, Ontario and Manitoba. In the Atlantic region, New Brunswick’s dollar value of GDP is 10% greater than Nova Scotia, three times that of Newfoundland and Labrador and five times that of Prince Edward Island.

New Brunswick’s manufacturing sector differs from that of other provinces. It has a high concentration of output across five industries, a high share of output exported, and high dependence on the U.S. market. These features of the province’s manufacturing sector suggest the provincial economy will be strongly influenced by external factors like changes in the value of the Canadian dollar. The extremely high exposure to global competition of manufacturers in New Brunswick also indicates that policy decisions have particularly large impacts on the sector in comparison to other provinces.

Manufacturing in New Brunswick has not followed the path of the sector in other advanced economies, including neighbouring jurisdictions Maine and Nova Scotia. For one, employment and value added from manufacturing in New Brunswick have not declined as much as in these jurisdictions. This resilience could represent a risk that inevitable economic adjustment has been delayed; or, it could suggest a big opportunity for growth.

As noted in a 2019 Canadian Manufacturers and Exporters (CME) report, U.S. businesses have leveraged capital investment to drive competitiveness and output growth, while Canadian businesses have often passively relied on a low exchange rate (page 11). Prior to 2010, New Brunswick’s abundance of labour also created a competitive advantage in terms of lower wage costs for producers. That advantage appears to have now disappeared with population aging and out-migration. New Brunswick employers report frustration with labour shortages at a time when labour market indicators suggest New Brunswick looks more like a full employment economy.

According to the CME, after 1999 and up until 2010, Canadian manufacturing saw slower growth in labour productivity than the U.S. But since 2010,

manufacturing labor productivity has increased at similar rates in both countries (page 12).

Yet New Brunswick, like the other Maritime provinces, lags the rest of Canada with respect to investment and productivity growth. The province has had lower labour productivity, with lower capital intensity of production, than provinces outside of the Atlantic region. Adjustment in New Brunswick manufacturing, when the exchange rate changes, is largely accomplished through changes in employment. Historically, an abundance of labour in New Brunswick likely made this the efficient organization of the sector; but with an aging population and labour scarcity, labour driven expansion in production is proving to be a limiting factor.

Manufacturers say they cannot find the workers they need at prevailing wage rates, and raising wages to attract labour is a challenge without increases in labour productivity. If New Brunswick manufacturing follows the path of other jurisdictions with aging populations, manufacturers in New Brunswick will need to shift to investment strategies to raise labour productivity with higher capital intensity to remain competitive.

Acemoglu and Restrepo (2019) find that across countries, an aging workforce is associated with a shift in production exploiting (industrial) automation technologies. The greater the demographic change, the more rapid is the development of automation technologies. Yet to date, this shift has not happened in New Brunswick, the Atlantic province with the greatest reliance on manufacturing.

This prompts an obvious, but important question: Why has New Brunswick, a quintessential example of an economy under pressure from demographic change, defied the global trend of demography-induced capital investment in manufacturing?

Our research suggests the answer lies in public policy decisions at the provincial level, which have dissuaded Atlantic firms from investing in technology, despite the clear economic benefits in doing so.

It certainly isn't as if the opportunity to incent such investment does not exist: Holden (2019, 19), for instance, reviews tax policies which ought to create the right incentive for manufacturers, such as the federal government's 2018 decision to follow the U.S. in allowing businesses to immediately write off all qualifying capital expenditures.

While this improvement to the Accelerated Capital Cost Allowance (ACCA) should, in theory, benefit manufacturers in the region, CME consultations with

New Brunswick manufacturers found the ACCA reform has had a limited impact because it does not adequately offset the declining local business environment. This decline includes a rising tax burden, onerous regulatory requirements, and other government policy decisions that drive up business costs.

Of course, the improved ACCA will partially offset other policies that undermine manufacturer competitiveness in the province. But this policy alone does not improve the business climate to stimulate new investment; it only prevents that climate from getting even worse.

In this paper, we argue that improving the business climate may be the first order of business to start investment in manufacturing to raise GDP and employment, and to modernize more of the sector.

Manufacturing in New Brunswick

In terms of share of GDP, New Brunswick manufacturing ranked fourth among provinces in 1997 and third in 2018. Whereas Ontario and Quebec had GDP shares that fell from just above 20% in 1997 to 12% and 14% in 2018, respectively, New Brunswick's manufacturing share of GDP fell from 13% in 1997 to just under 11% in 2018. Manitoba has had a similar GDP share to New Brunswick in 1997 (14%) and fell to 10% in 2018.

In the Atlantic region, New Brunswick's GDP from manufacturing is 10% higher than Nova Scotia, five-times higher than P.E.I. and three-times higher than Newfoundland and Labrador. In 2018, manufacturing accounted for 8% of GDP in Nova Scotia, 10.6% in P.E.I. and 4% in Newfoundland and Labrador.

Manufacturing GDP in New Brunswick is generated by relatively few industries. Table 1 shows that in 2015, almost half the province's manufacturing output was from Petroleum and Coal Production. Another 40% was from Food Products, Wood Products, Paper and Primary Metal.

Other provinces also have dominant industries but not to the same extent. Ontario's sector is dominated by Transportation Equipment, which is 31% of manufacturing. Nova Scotia has 27% of its manufacturing output from Food Products, and another combined 40% from Wood Products, Paper, Plastics and Rubber, and Transportation Equipment.

Table 1: Share of 2015 Manufacturing Output by Industry

	Canada	New Brunswick	Nova Scotia	Ontario
	%	%	%	%
Food	14	16	27	11
Beverage and Tobacco Product	2	2	3	2
Textile and Textile Product Mills	1	0	1	1
Clothing and Leather and Allied Product	0	0	1	0
Wood Product	4	7	5	1
Paper	4	11	8	2
Printing and Related Support Activities	1	0	2	1
Petroleum and Coal Product	9	49	1	5
Chemical	9	1	4	8
Plastics and Rubber Products	4	2	21	5
Non-metallic Mineral Product	2	1	2	2
Primary Metal	10	5	0	12
Fabricated Metal Product	5	2	5	5
Machinery	5	1	3	5
Computer & electronic	2	0	2	2
Electrical Equipment & Component	1	0	1	1
Transportation Equipment	20	1	14	31
Furniture and Related Product	2	1	1	2
Miscellaneous	2	1	1	2
Total Share of Largest Industry	20	49	27	31
Total Share of 2nd to 5th largest industries	42	39	48	36
Total Share of the remaining industries	38	12	25	33

For a small-population province with a large petroleum refinery, it is not surprising that manufacturing output is concentrated in a small number of NAICS sub-industries. Yet New Brunswick's manufacturing output, even without the refinery, is much more concentrated in a smaller number of industries than in Canada overall, Ontario and Nova Scotia.

The manufacturing sector in New Brunswick is also more trade exposed than manufacturing in any other province, except perhaps Ontario. Two-thirds of New Brunswick's manufacturing output was exported internationally in 2017,

compared to half in Ontario, 40% in Nova Scotia and 45% for Canada overall. And New Brunswick has high dependence on its manufacturing sector for exports. Figure 1 shows that 90% of New Brunswick exports by value in 2017 were from the manufacturing sector. This reliance on manufacturing exports is matched by Ontario, but is well above the national average.

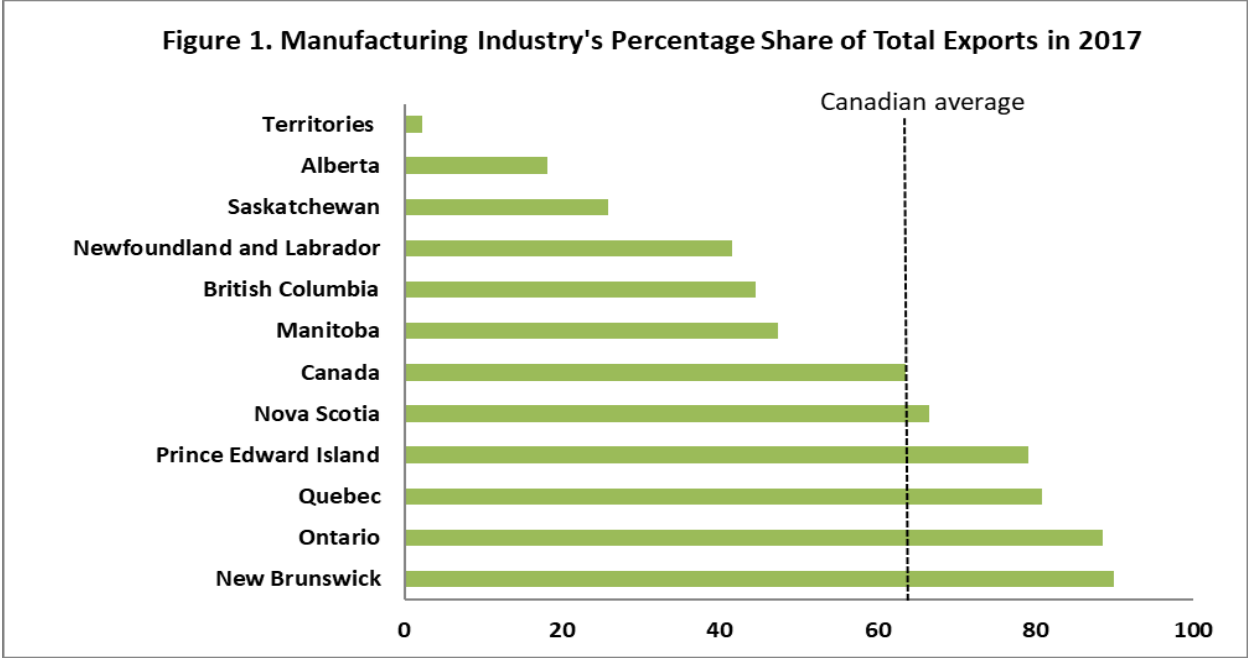


Table: null (formerly CANSIM 228-0077)

New Brunswick has high reliance on the U.S. market for its exports. More than 90% of manufacturing exports are to this country, which far exceeds the average for Canada (74%) and Ontario (77%). Nova Scotia, in contrast, sends 68% of its output to the U.S. and a higher share to China (13%). Although New Brunswick has a small proportion of exports to China and Europe, these two countries are also major trading partners of Canada (Figure 2).

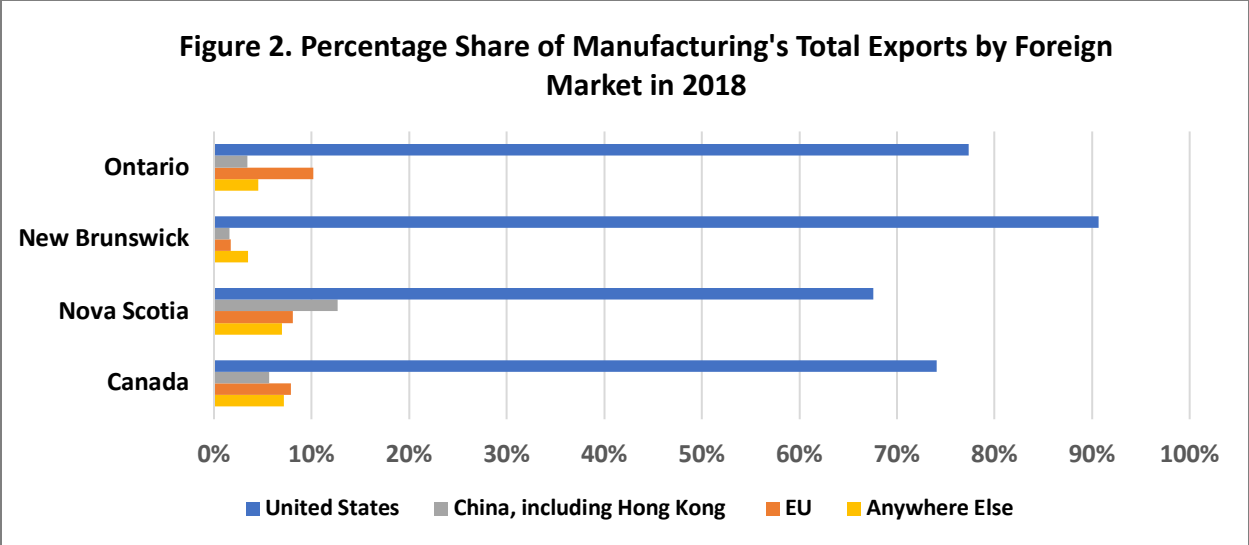


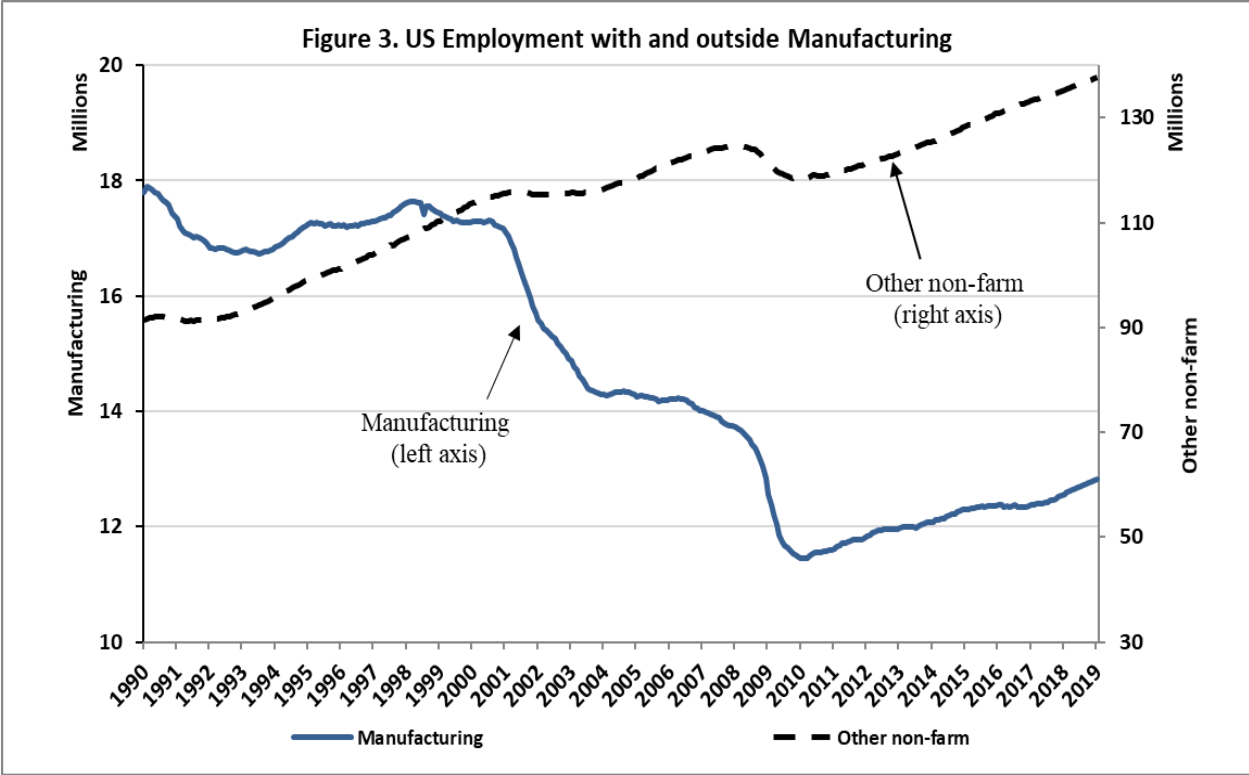
Table: null (formerly CANSIM 228-0079)

What happened to manufacturing in the U.S.?

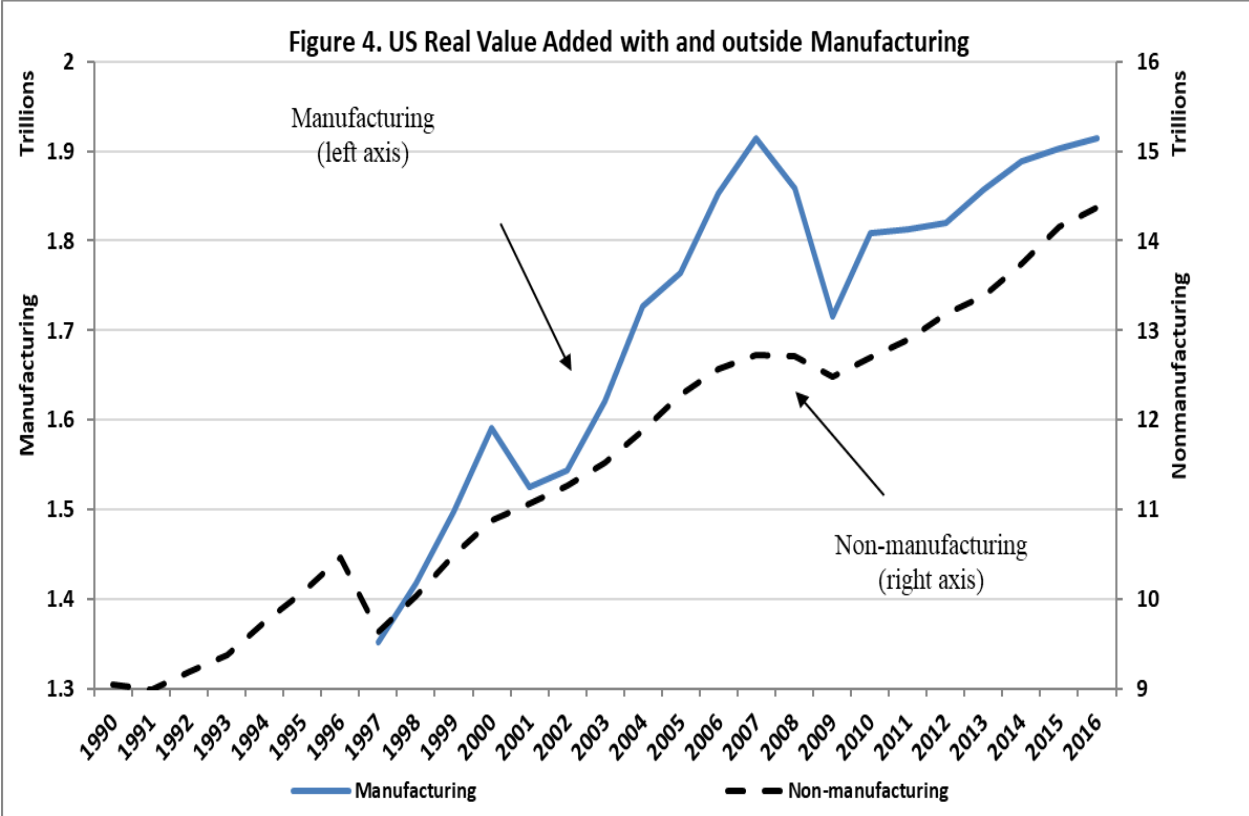
Martin Baily and Barry Bosworth (2014,10) claim that *“The decline in manufacturing employment as a share of the economy-wide total is a long-standing feature of the US data and also a trend shared by all high-income economies.”* At the same time, they show that manufacturing's share of U.S. GDP was stable from 1960 to 2012 at just above 10%. While manufacturing as generator of employment has declined, it continues to contribute to the generation of national income, as it always has.

Fort et al. (2018) show that in the U.S., employment in the manufacturing sector showed a steady decrease since the 1970s, and the rate of decrease accelerated after 2000 before stabilizing after 2010. In contrast, non-manufacturing employment has shown a long-term steady increasing trend (Figure 3). These two trends contribute to the continuous decline in the share of U.S. employment in manufacturing.

Fort et al. also show that for the U.S., the decline in employment in manufacturing has coincided with increasing labour productivity. Figure 4 shows a trend increase in manufacturing real-value-added that matched the rate of increase in non-manufacturing GDP prior to the 2008 recession. This reflects a faster rise in manufacturing labour productivity than in the overall economy. Since the 2008 recession, value-added in manufacturing has increased at the same rate as the rest of the economy.



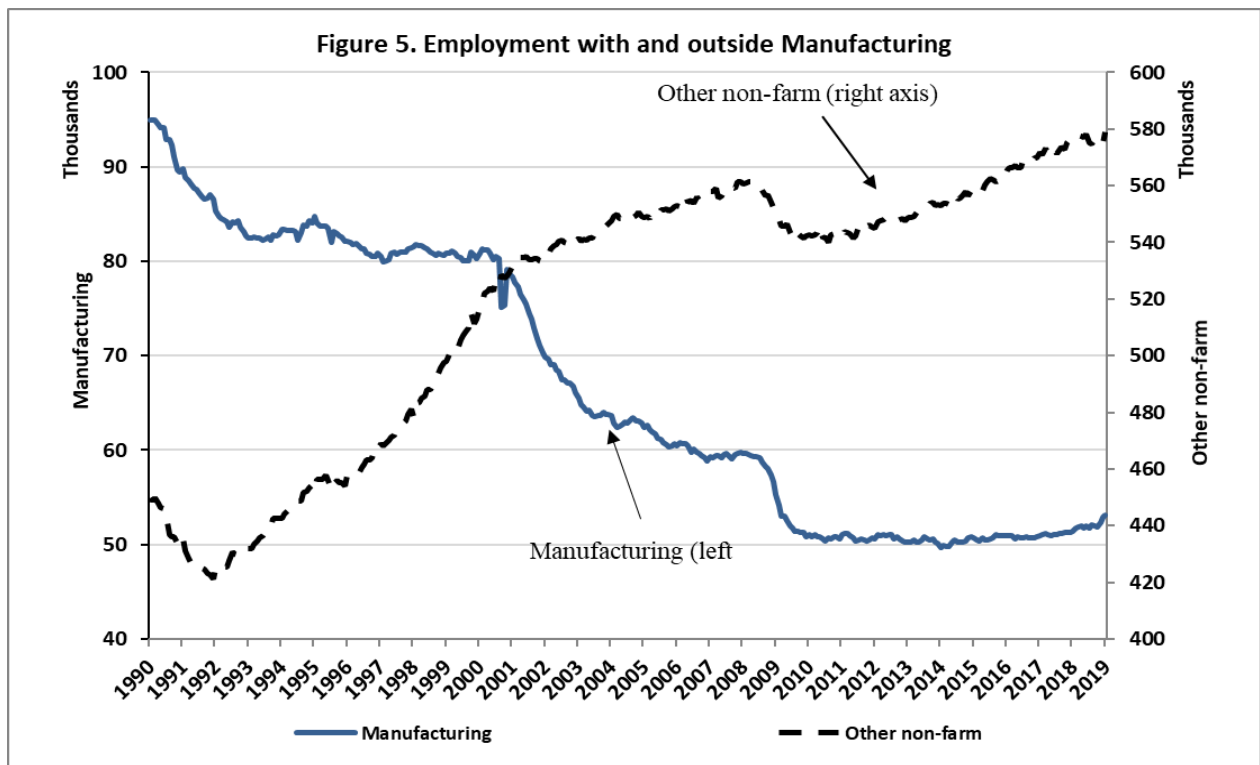
Source: U.S. Bureau of Labor Statistics



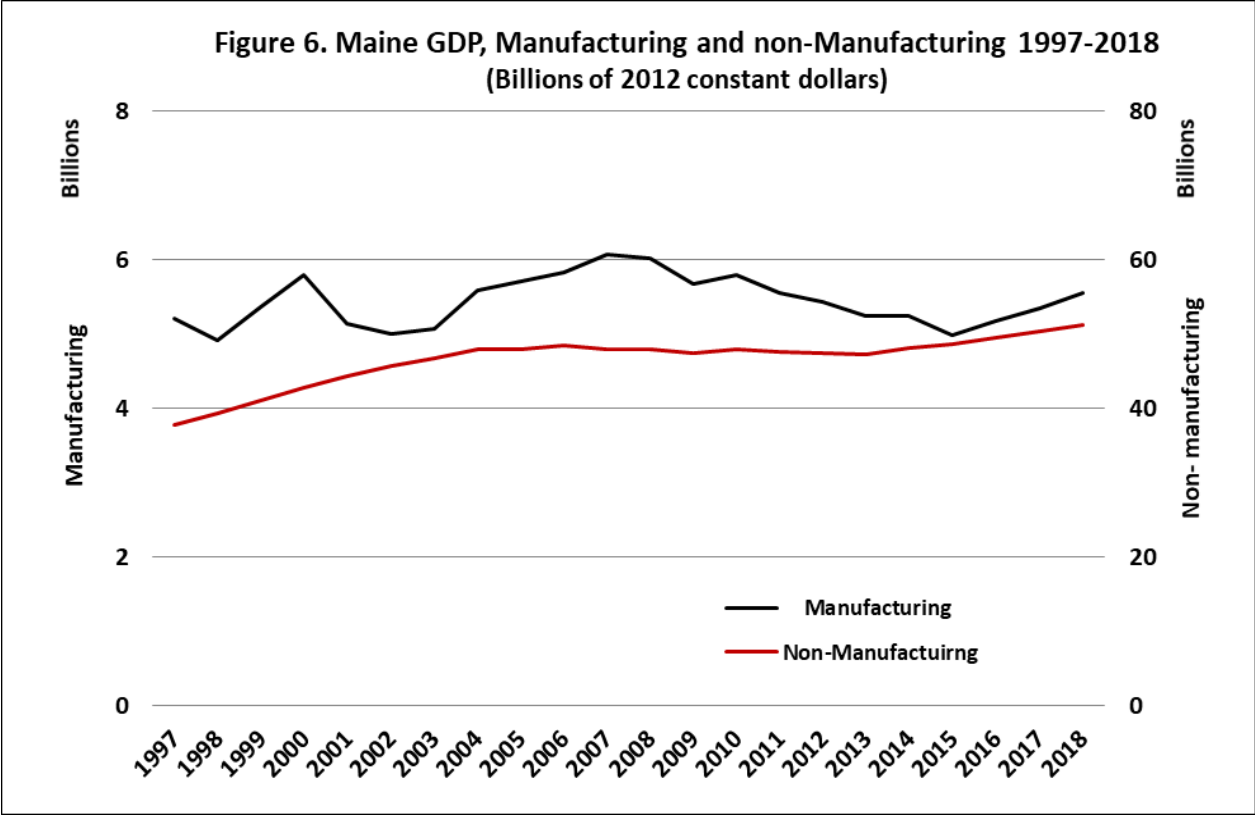
Source: U.S. Bureau of Labor Statistics

We highlight that these two trends for U.S. manufacturing are seen for the State of Maine, which like New Brunswick is a small open economy with high reliance on its external (to the State) trade activities. Like the U.S. overall, up until 2010 the relative decrease in manufacturing employment and growth of value-added in the manufacturing sector for Maine indicates that labour productivity has grown faster than other industries (Figures 5 and 6). After 2010, however, Maine shows little recovery in manufacturing employment levels and has declining value-added in manufacturing.

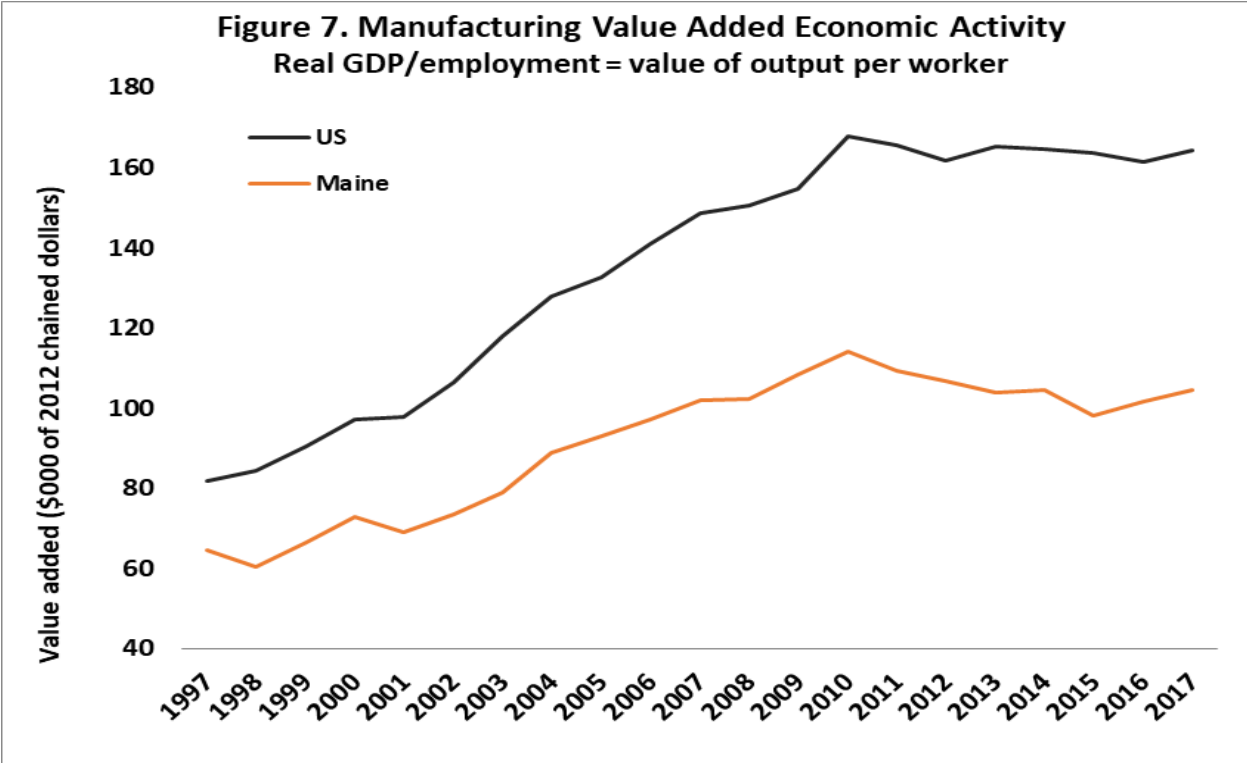
Figure 7 shows that Maine's value-added per worker in manufacturing was increasing up to 2010, albeit at a slower rate than for the U.S. overall. Since 2010, however, this measure of labour productivity remained stagnant for manufacturing in the U.S. but fell in Maine.



Source: U.S. Bureau of Labor Statistics



Source: U.S. Bureau of Labor Statistics



Source: U.S. Bureau of Labor Statistics

The lack of manufacturing recovery after 2008 in Maine was observed for the wider U.S. northeast region (TD Bank, 2015). The employment and value-added in the U.S. manufacturing sector rebounded after the recession, but manufacturing in the northeast did not. It is also of note that growth in non-manufacturing employment and value-added has been weaker in Maine than for the U.S. economy following the 2008 recession.

Teresa C. Fort, Justin R. Pierce, and Peter K. Schott (2018) make some additional observations about U.S. manufacturing industries, which informs us about how the U.S. manufacturing sector was adjusting over time:

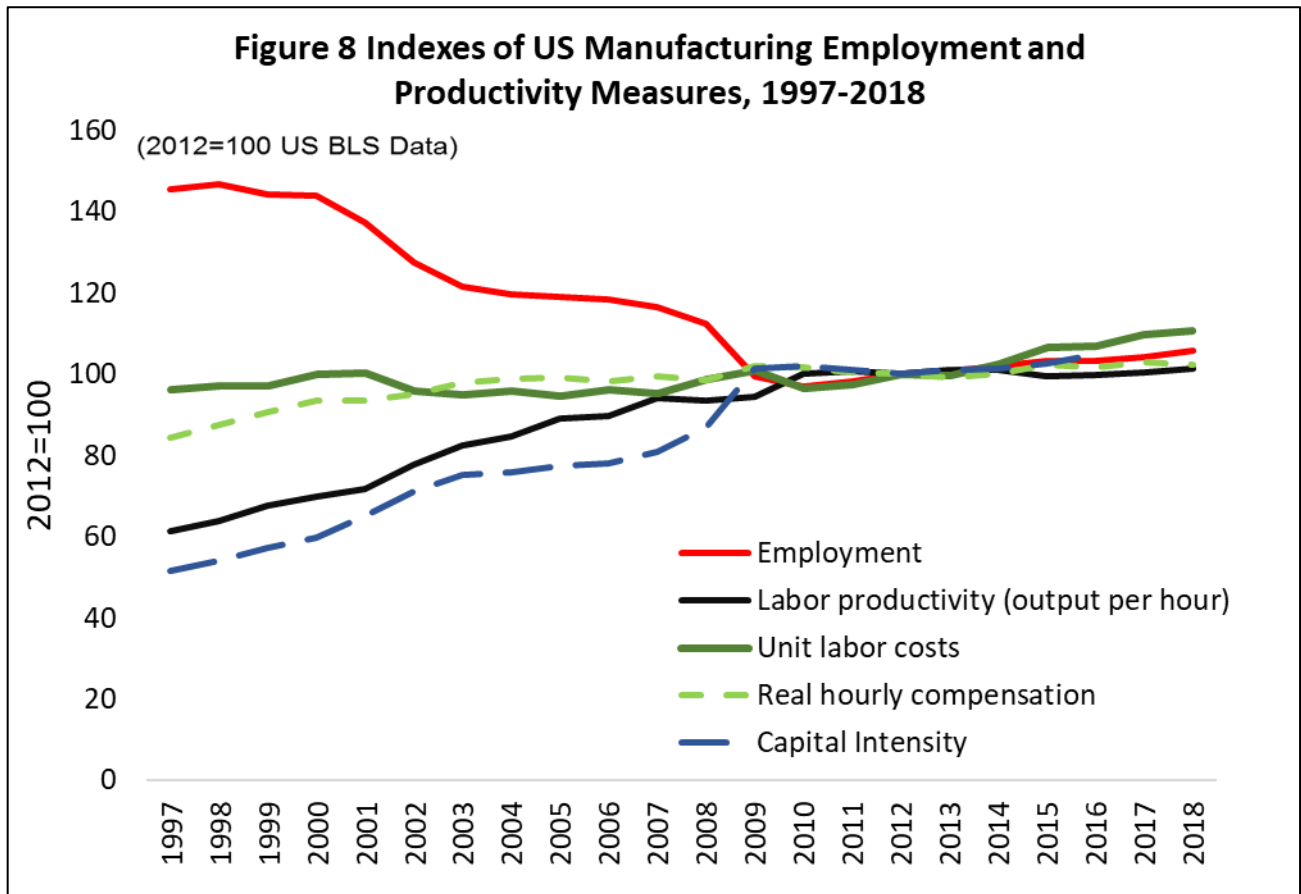
- 1. The overall growth trends in the manufacturing industry vary by sector. Apparel, which was negatively impacted by import penetration, had falling employment and value added. In contrast, other sub-sectors, such as transportation equipment, show declining employment but rising value-added. After 2000, the set of manufacturing sectors with declines in both employment and output increases.*
- 2. Most employment losses were from continuing firms closing plants and establishments. The net firm deaths/exits accounts for just 25% of the employment decline. The shuttering of outmoded plants and opening of new facilities has allowed for new investment and technology upgrades in US manufacturing.*
- 3. In addition to manufacturing employment decline, there has been substantial reallocation of employment across regions of the US. Before 2000, employment in the manufacturing sector had moved from the north and east to the south and west. After 2000, employment started falling in all regions as foreign competition intensified.*

Figure 8 depicts trend changes in employment and productivity in U.S. manufacturing. The figure shows indexes (2012=100) from the U.S. Bureau of Labor Statistics for employment, labour productivity (constant dollar value of output per hour), hourly compensation (constant dollar), capital intensity of production and "unit labour costs" (the ratio of hourly compensation to labour productivity). Unit labour costs are a measure of cost competitiveness as it represents the share of producer revenue remaining after payroll expenditures.

Prior to 2008, falling manufacturing employment coincided with rising capital intensity of production, which can be interpreted as the impact of new production technology and automation. The substitution of capital for labour increased labour productivity, which resulted in strong growth for manufacturing value-added (Figure 4). Labour compensation per hour of work showed less

remarkable change over the time period and unit labour costs remained steady.

After 2007, none of the indexes show much change, with the exception of unit labour costs after 2013. That change suggests a deteriorating competitiveness of U.S. manufacturing as labour costs began to represent a larger share of the firm's revenue. With no further increase in capital intensity of production, there is no further increase in labour productivity. While payroll costs have not risen since 2015, labour productivity has declined, thus reducing the competitiveness of U.S. manufacturing.



What happened in New Brunswick and Canada?

Employment decline later than the U.S.

The decline in manufacturing employment in Canada happened later than in the U.S., around 2004 following a decade of increase (Figure 9). It is only after 2008 that manufacturing employment falls below previous lows. And unlike

before 2008, it shows no recovery.¹ Where U.S. manufacturing fell by 12% from 1979 to 2000, Canada showed no trend decrease at all. And from 2000 to 2012 U.S. manufacturing fell a further 25%, whereas in Canada's decrease was 21% over the same period. Unlike in the U.S., however, Canada's manufacturing employment after 2010 has not rebounded.

In New Brunswick, Figure 10 shows that the trend decline in manufacturing employment emerged after 2007. From 2008 to 2012, manufacturing employment fell by close to 20%, less than in the U.S. but similar to Canada and Ontario. Employment levels have not recovered to pre-2008 levels. It is notable that after 2008, non-manufacturing employment in Canada showed sustained growth, but there was no non-manufacturing employment growth in New Brunswick.

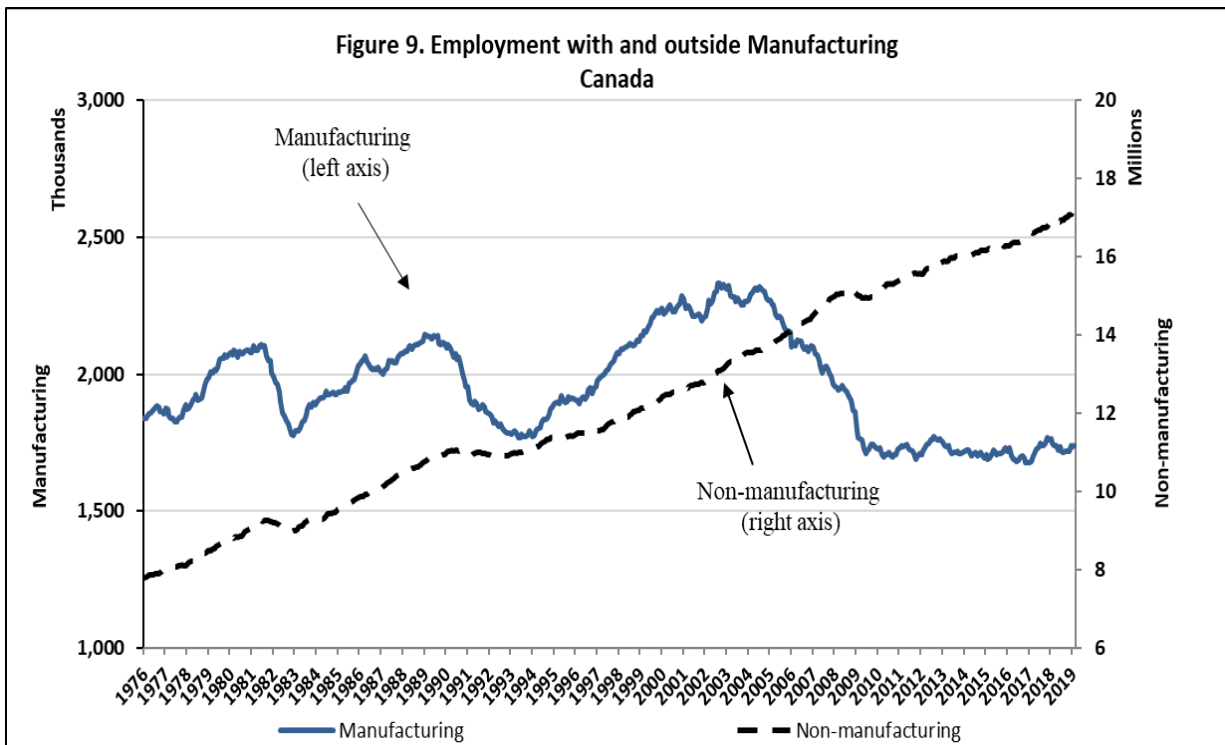


Table: 14-10-0355-01 (formerly CANSIM 282-0088)

¹ CME/CSTEC (2017, 11) claims that “a notable portion” of the decline in Figure 9 is attributed to manufacturers outsourcing (external provision of services previously provided in-house) specific skills such as human resources, information technology and engineering.

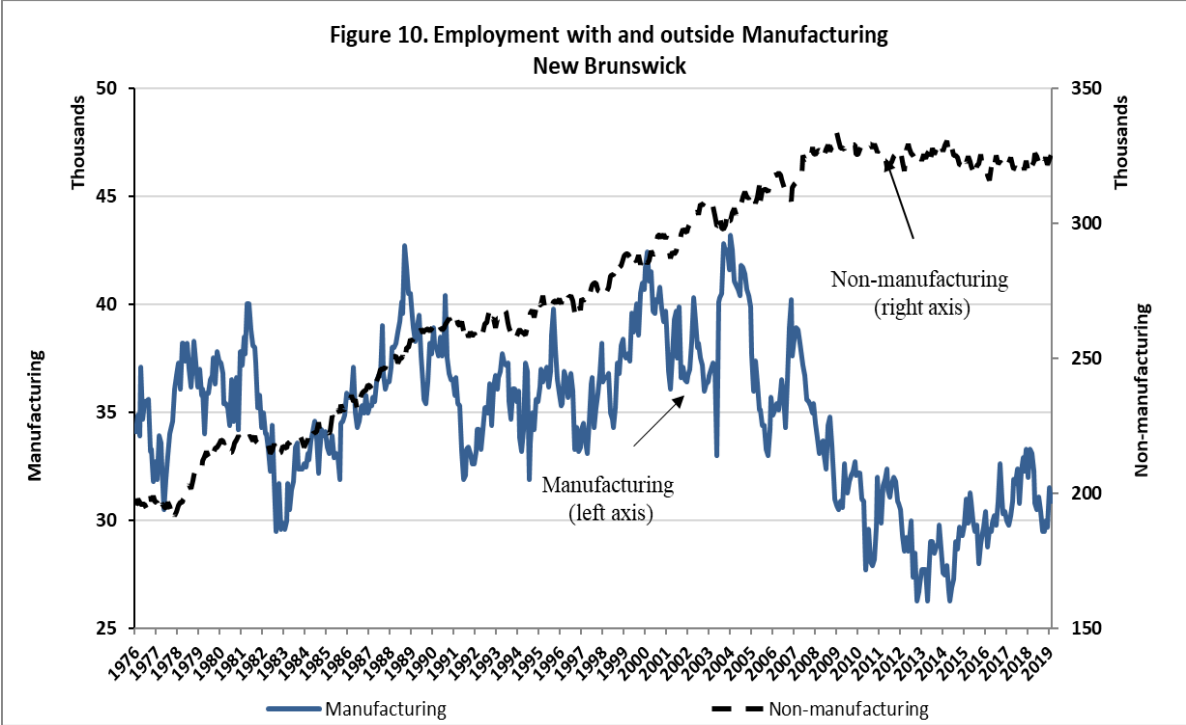


Table: 14-10-0355-01 (formerly CANSIM 282-0088)

Canada shared the same GDP downturn timing from manufacturing after 2007 and has experienced the same recovery to pre-recession levels (Figure 11). New Brunswick GDP from manufacturing declined earlier after 2004 than in the U.S. overall and the U.S. Northeast. And like the Northeast U.S., New Brunswick has experienced a permanent decrease in manufacturing GDP of around 18% from the 2004 peak, but consistent with GDP levels from 2000 and earlier (Figure 12). Nova Scotia's manufacturing sector produces less GDP than New Brunswick's, but shows the same timing of decline after 2004 and stagnation since 2008.

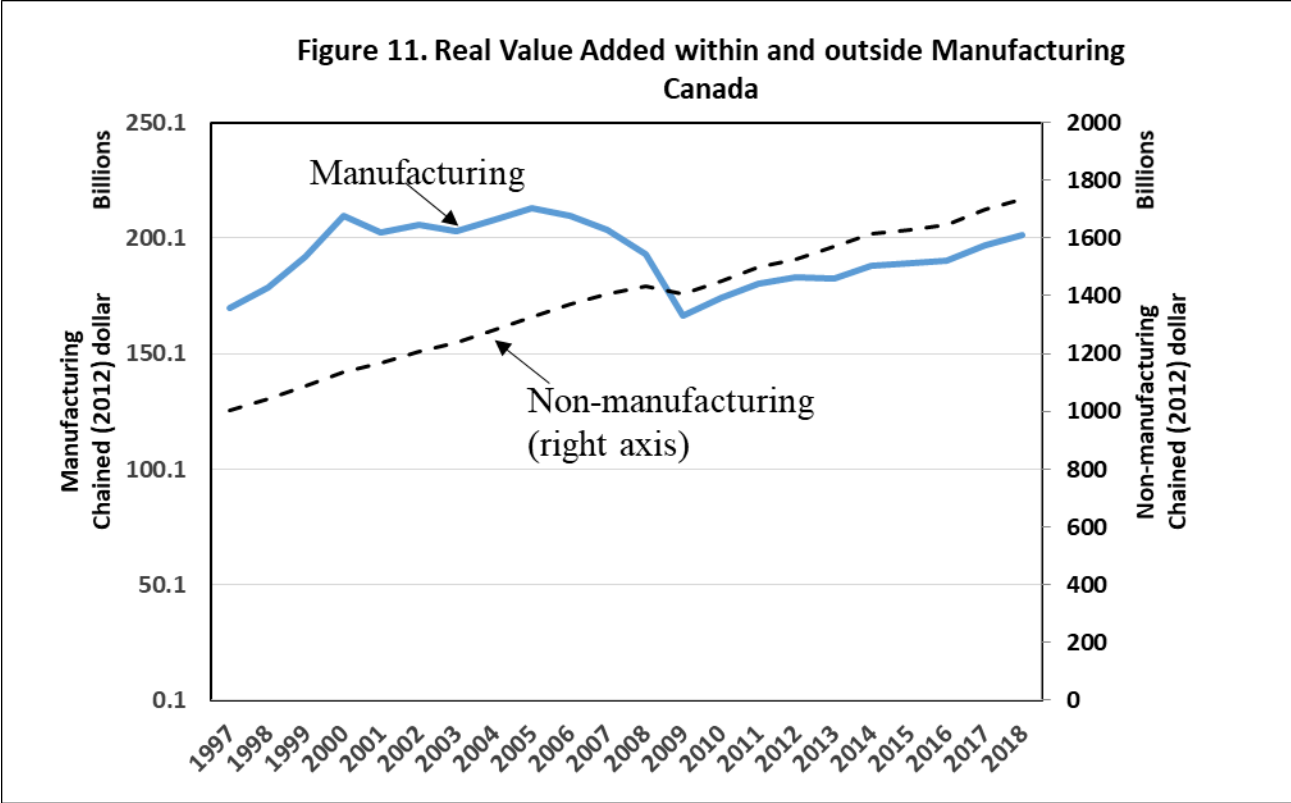


Table: 36-10-0402-01 (formerly CANSIM 379-0030)

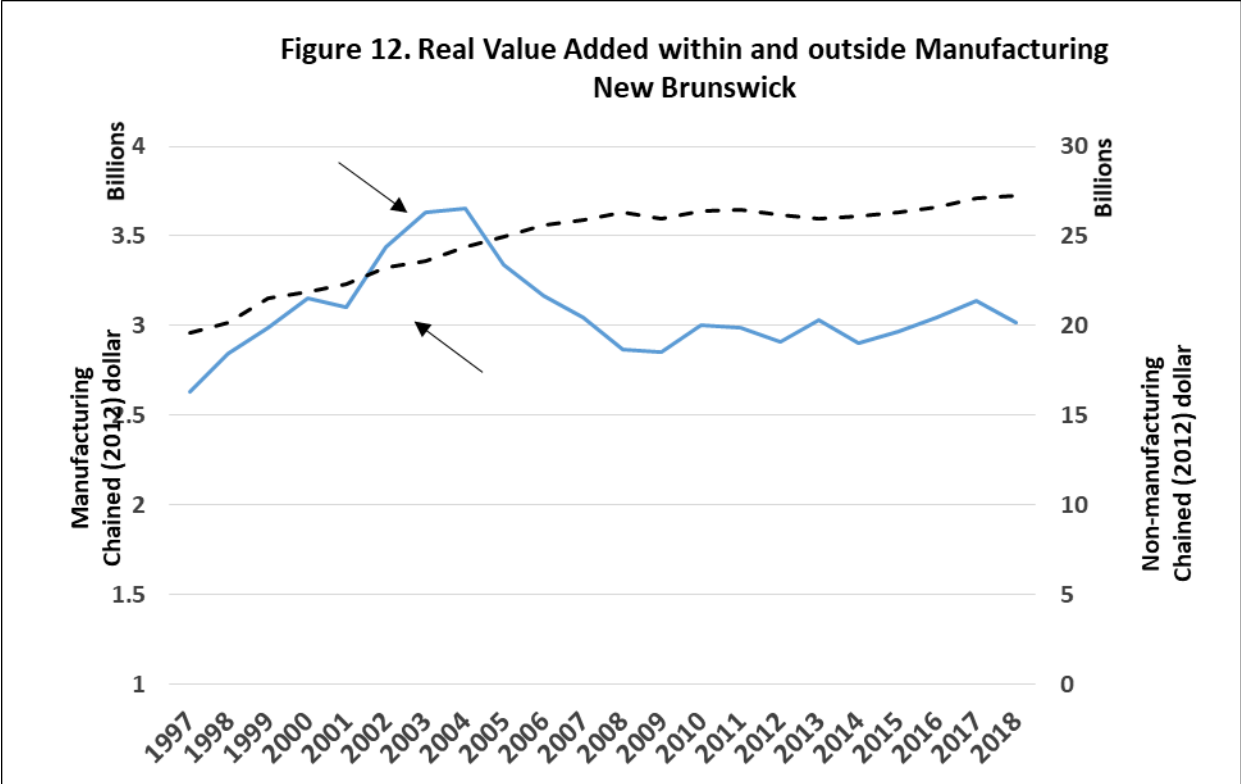
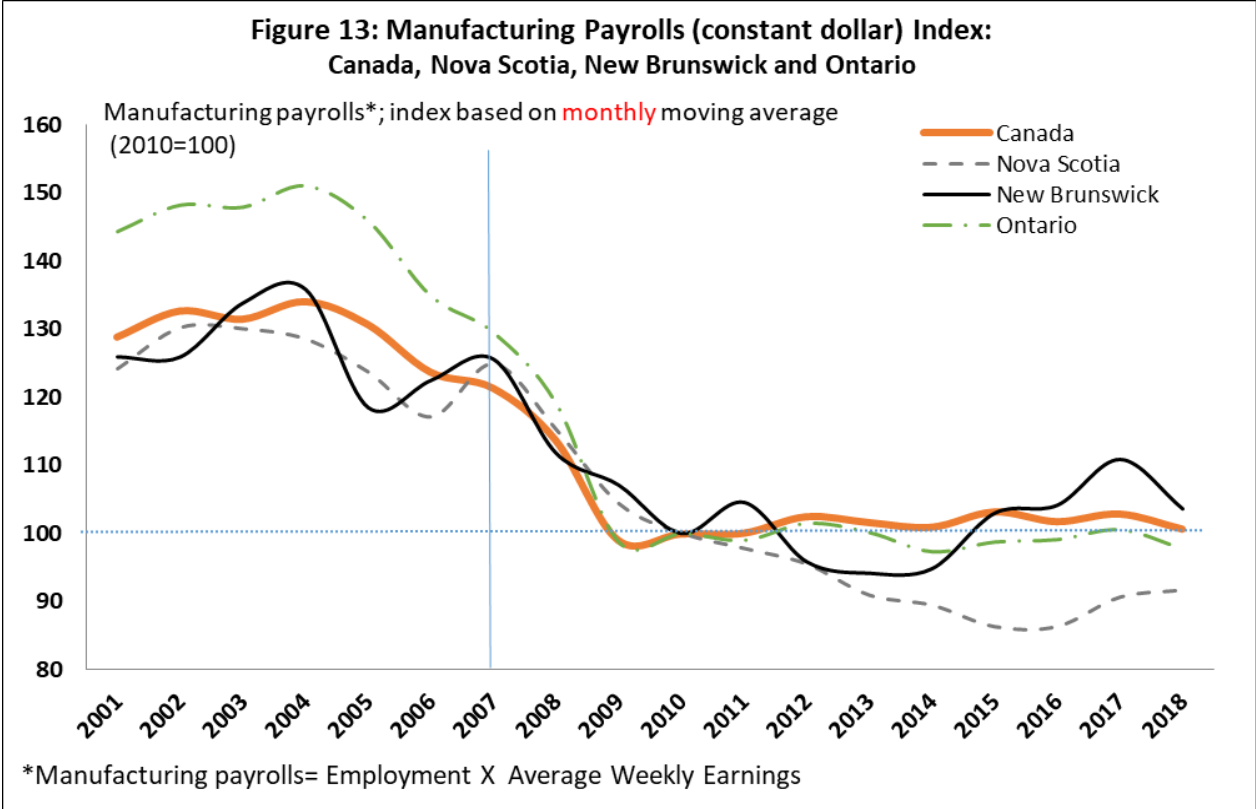


Table: 36-10-0402-01 (formerly CANSIM 379-0030)

Manufacturing payroll, defined as the number of employed times average weekly earnings, shows some notable differences in manufacturing across provinces (Figure 13). Ontario manufacturing payroll declined 40% from 2004 to 2009, before recovering around 10% of the loss by 2018. New Brunswick showed less decline in total manufacturing payroll than Ontario but was comparable to Canada overall, around 20%. Nova Scotia is notable in that its decline in payroll after 2007 was deeper than New Brunswick's and has not recovered.



Source: Average weekly earnings by industry, annual Table: (formerly CANSIM 281-0027). Employment by industry, annual (formerly CANSIM 281-0024)

Because New Brunswick's manufacturing downturn occurred after 2004, the additional loss of value-added in the sector after 2007 was comparable to that for Canada. New Brunswick manufacturing value added has recovered to 2007 levels by 2017, but remains 20% below the 2004 peak value (Figure 14). Like New Brunswick, Nova Scotia's smaller manufacturing value-added had peaked around 2004 and has remained 18% lower than the pre-recession level.

Canada and Ontario show a steep loss in manufacturing GDP after 2007, recovering toward pre-2008 levels by 2017. Accounting for the earlier peak in New Brunswick, and the earlier decline, the overall loss of manufacturing GDP in

New Brunswick, Ontario and Canada has been comparable, but the recovery in New Brunswick has been weaker since 2008, like Nova Scotia and Maine.

New Brunswick has shown the weakest growth in non-manufacturing GDP since 2008 (Figure 15). Whereas Ontario, Canada and the U.S. show steady growth in non-manufacturing GDP after the recession, New Brunswick, Nova Scotia and Maine have shown no growth beyond 2008, 2010 and 2004 respectively.

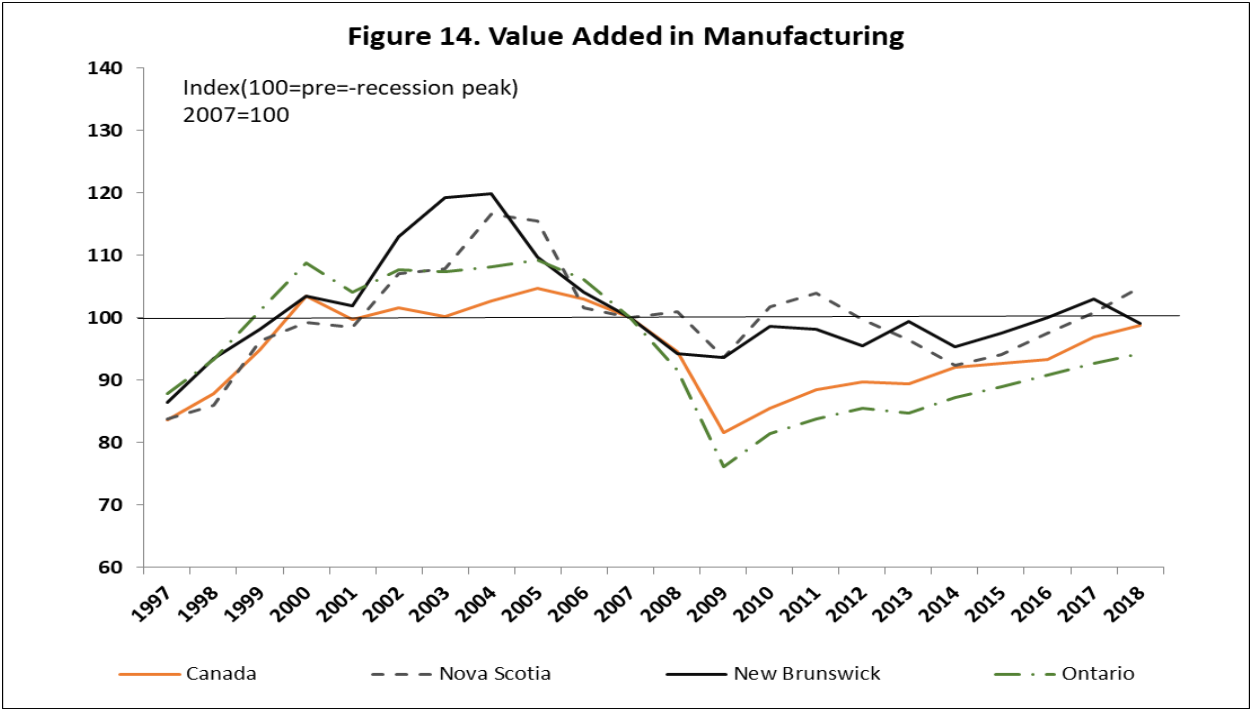


Table: 36-10-0480-01 (formerly CANSIM 383-0033)

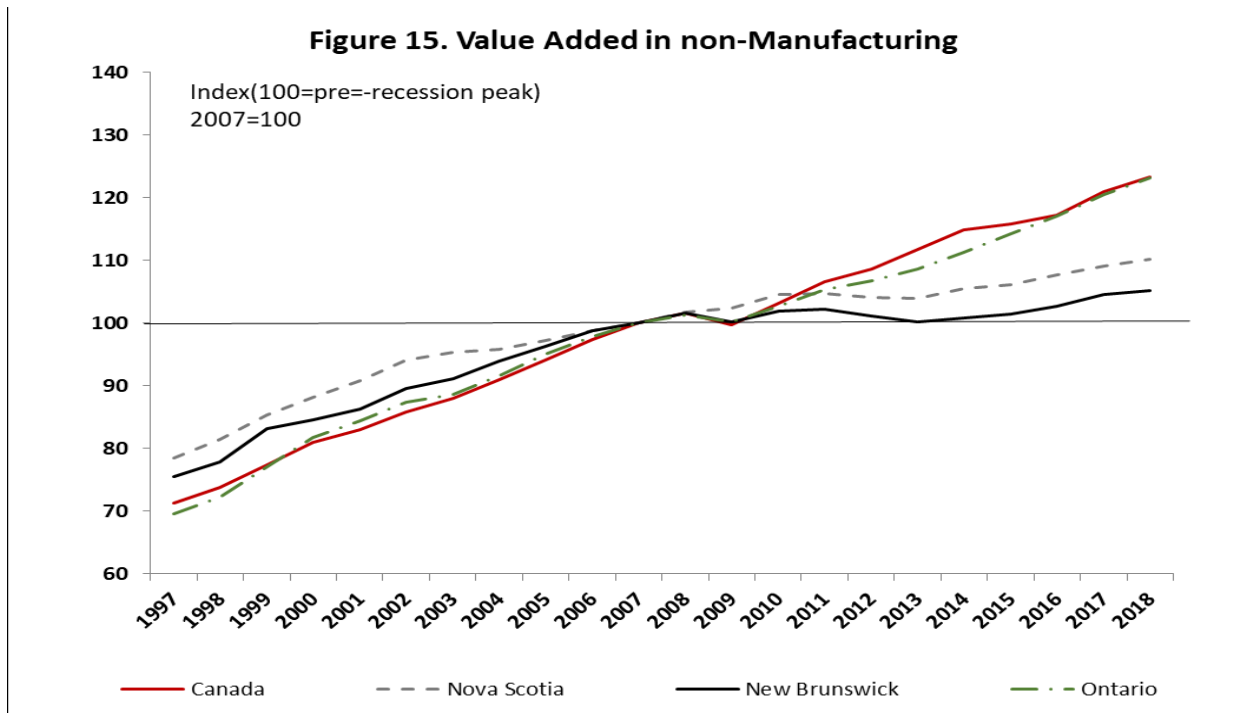


Table: 36-10-0480-01 (formerly CANSIM 383-0033)

Figures 16 to 19 show the logarithmic value (approximate percentage changes over the decade) of the change in employment and value-added for 19 two-digit NAICS manufacturing sectors that constitute manufacturing for Ontario and New Brunswick. Fort et al. (2018, 55) note that for the U.S. prior to 2008, some sectors like Leather Products and Apparel showed declines in both employment and value-added, reflecting labour intensity in the production of goods like clothing and shoes. In contrast, for sectors like Chemicals and Transportation Equipment, value-added increased while employment fell because of increased labour productivity, as workers were replaced with labour-saving technologies like robots. After 2007, there was an increase in the number of sectors with coincident declines in employment and value-added as import penetration challenged the sector.

Ontario shows some similarities to the U.S. prior to the 2008 recession with respect to labour-intensive sectors showing declines in value-added and employment. In the other sectors, however, there tends to be value-added increase associated with no change in employment, as opposed to employment reductions. New Brunswick shows a strong positive correlation between employment change and value-added change for both contracting and expanding industries. This suggests that employment changes, rather than productivity growth, are how New Brunswick manufacturers increased value-added.

After 2007, Ontario's manufacturing sector changes differ from those of the U.S. In Ontario, many sectors have showed employment losses and non-increasing value-added. In short, sectors are less labour intensive but not growing. Five sectors – i.e. Transportation Equipment, Wood Products, Food Manufacturing, Plastics and Rubber Products, and Machinery – exhibit increases in value-added and decreases in employments, suggesting a substitution of capital for labour in production.

New Brunswick manufacturing shows a different adjustment after 2007 than both the U.S. and Ontario. The positive correlation between changes in employment and value-added seen before the recession persists for most sectors. A few show employment loss with no change in value-added, and five – i.e. Primary Metal, Machinery, Non-metallic Mineral Products, Paper, and Chemical – had falling employment and rising value-added.

Notably, two of New Brunswick's largest manufacturing sectors, Wood Products and Food Manufacturing, show continuing reliance on labour-intensive production. In the cases of Food and Wood Products, this differs from how the industries adjusted in the U.S. and Ontario after 2007. This suggests an opportunity for growth through investment and productivity in these sectors.

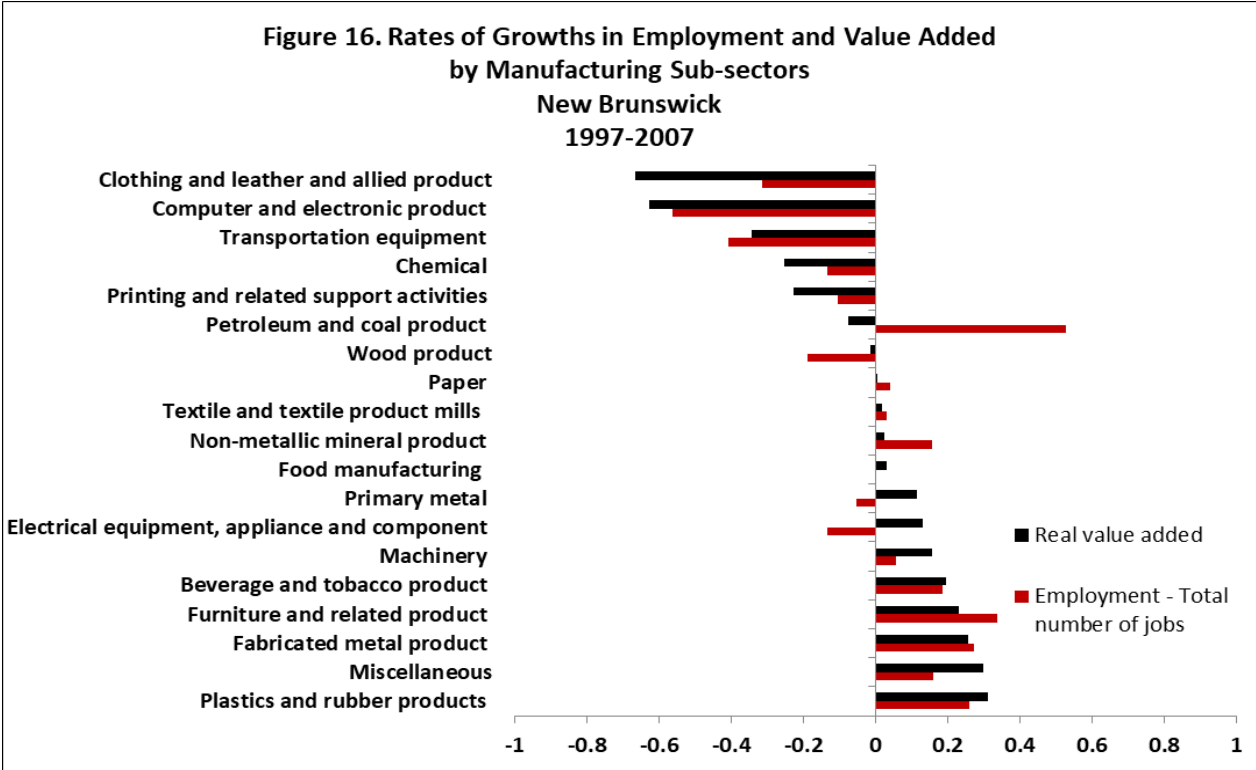


Figure 17. Rates of Growths in Employment and Value Added by Manufacturing Sub-sectors

**New Brunswick
2008-2017**

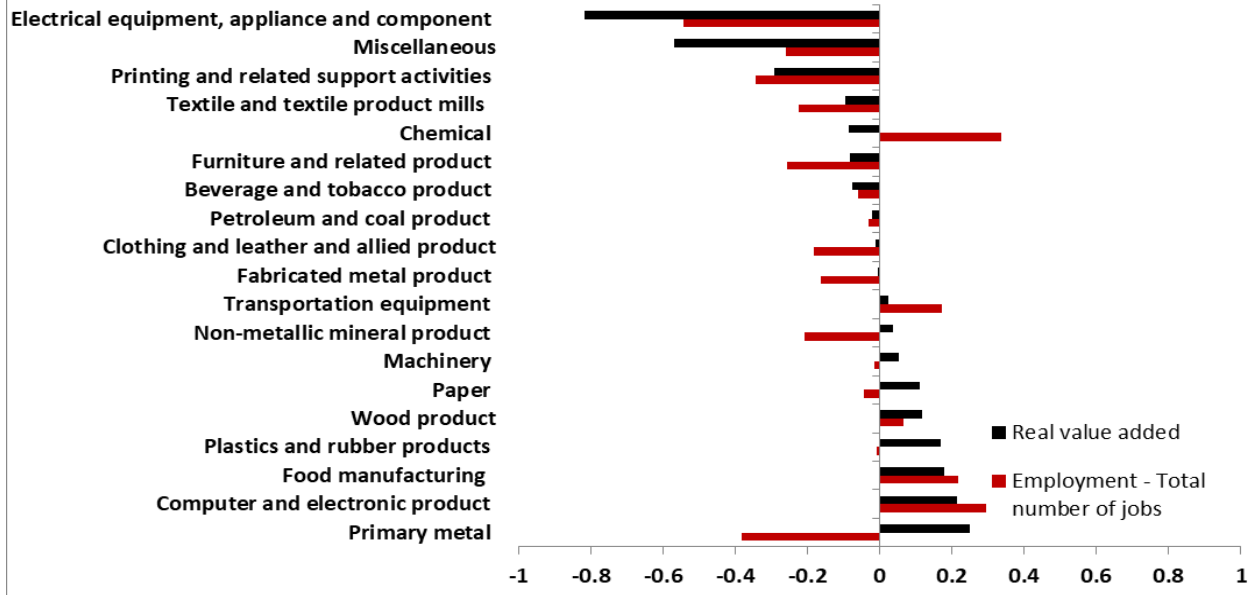
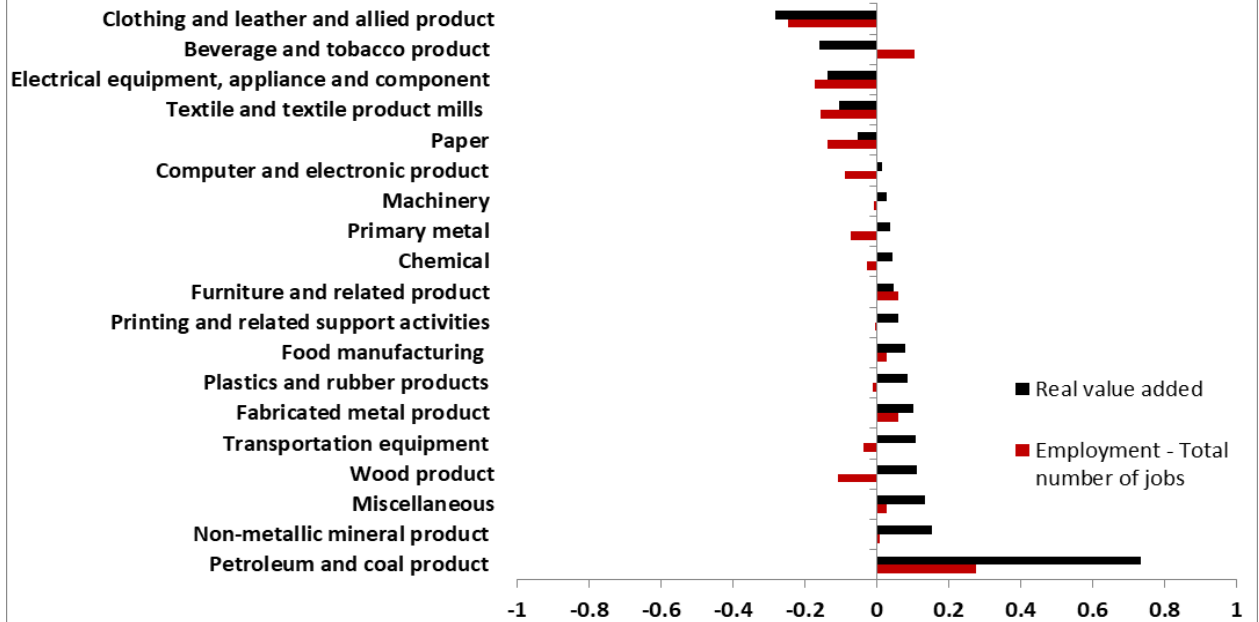


Figure 18. Rates of Growths in Employment and Value Added by Manufacturing Sub-sectors

**Ontario
1997-2007**



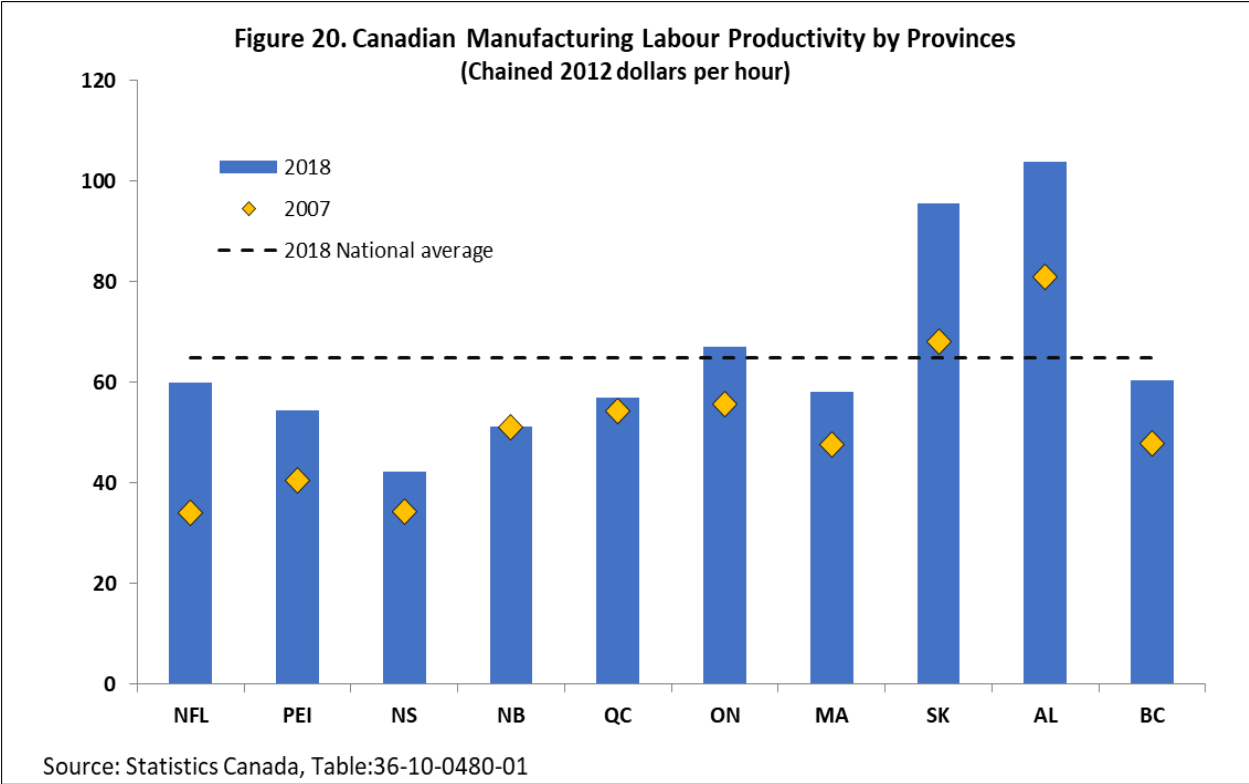
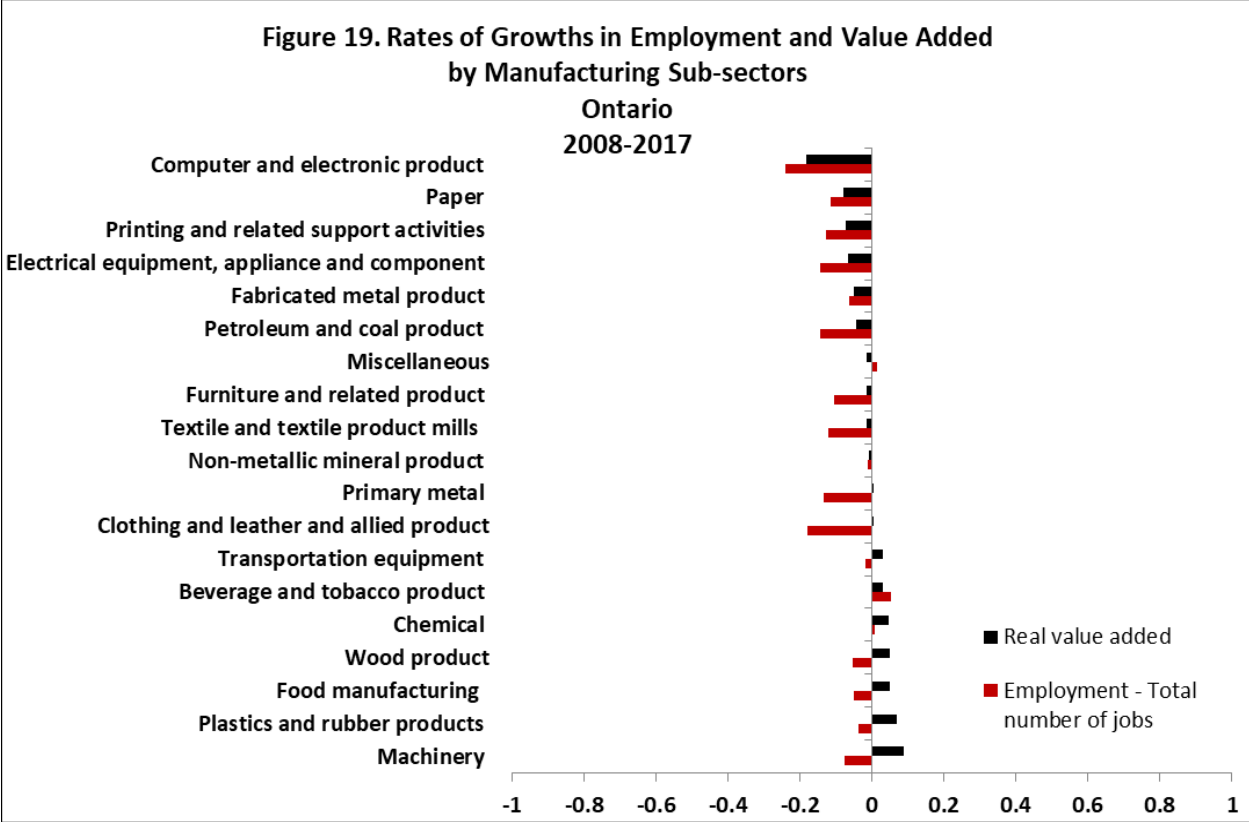


Figure 20 shows that New Brunswick in 2007 had labour productivity in manufacturing close to that of Ontario and the average for all provinces. Whereas Ontario has had increased labour productivity since 2007, New Brunswick's productivity in manufacturing has been stagnant.

Unit labour costs are the ratio of (nominal) total compensation per hour of work to constant dollar labour productivity (output per hour). The measure is intended to capture the extent of wage inflation. We use the provincial consumer price indexes to adjust this measure so that we compare constant dollar total compensation per hour to constant dollar labour productivity. We are seeking to find out whether the real wage uses up a larger share of the real revenue that is produced with the hour of work.

Figure 21 shows that compared to 2007, unit labour costs in all provinces have decreased by 2018. While New Brunswick and Nova Scotia have low wages for labour – suggesting “cheap” labour – the unit labour cost measure shows that relative to productivity, labour is expensive in Nova Scotia and comparable between New Brunswick and Ontario. This finding suggests that New Brunswick's labour market confers no cost advantages to producers, even with low hourly wage rates. This is notable, as a 2015 TD Bank report on manufacturing in the Northeast U.S. found *“low, or in some cases declining labor productivity, is one of the main culprits behind the unfavorable unit labor cost profile across much of the region.”*

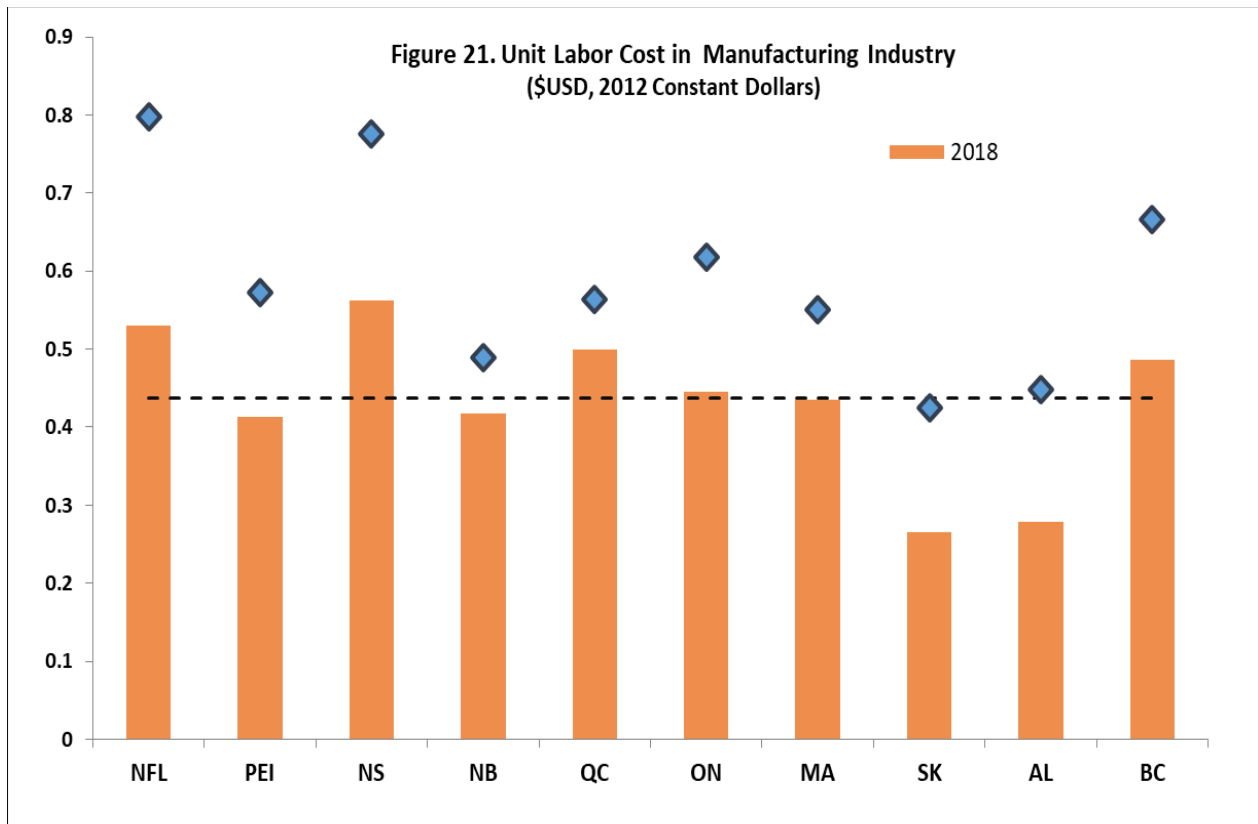


Table: 36-10-0480-01 (formerly CANSIM 383-0033)

An alternative measure for unit labour costs is to adjust values to U.S. dollars. For exporting firms, this measure accounts for the cost competitiveness that comes from having sales revenues denominated in U.S. dollars but payroll costs in Canadian dollars. This measure is most informative for exporting that does not rely on imported inputs, as imports of inputs would partially offset the impact of the exchange on revenues. Not surprisingly, the dramatic changes in the Canadian/U.S. dollar exchange rate over the past 20 years has had a large impact on the competitiveness of Canada and New Brunswick as a place to produce.

Earlier, we showed that in U.S. manufacturing before 2008, employment fell as capital intensity of production increased. Wage growth, when combined with productivity growth, maintained the value of unit labour costs over the period.

Yet in New Brunswick, we see a different trend in Figure 21. There has been no increase in labour productivity in New Brunswick manufacturing, so unit labour costs in U.S. dollars have declined only because of the exchange rate. In Ontario, meanwhile, productivity growth along with the depreciating Canadian dollar has reduced the labour cost advantage of New Brunswick. In other words, a lack of productivity growth in New Brunswick has reduced the competitiveness of manufacturers in the province.

Figure 22 gives us an overall picture of Canada's manufacturing industry. Over the period of 1997 to 2018, employment in manufacturing has declined, as described earlier and depicted in the index in the figure. Unlike the U.S., capital per worker was not increasing, nor was productivity. Real wages also remained relatively flat. Unit labour costs in Canadian dollars are not changing a great deal over the period.

What is driving changes in employment is the changing exchange rate and the change in unit labour costs in U.S. dollars. As the Canadian dollar approached par with the dollar prior to 2008, the cost competitiveness of Canadian manufacturers declined. Rather than boost productivity with investment as in the U.S., they shed labour and presumably – as they appear to have done in the past – waited for the exchange to return to earlier levels. Since 2008 and the return of a lower valued dollar, Canadian manufacturing overall has seen no increase in employment, but increases in compensation per hour of labour. For Canada overall, there is evidence of some productivity growth to support the increase in pay, as unit labour costs in Canadian dollars remain steady.

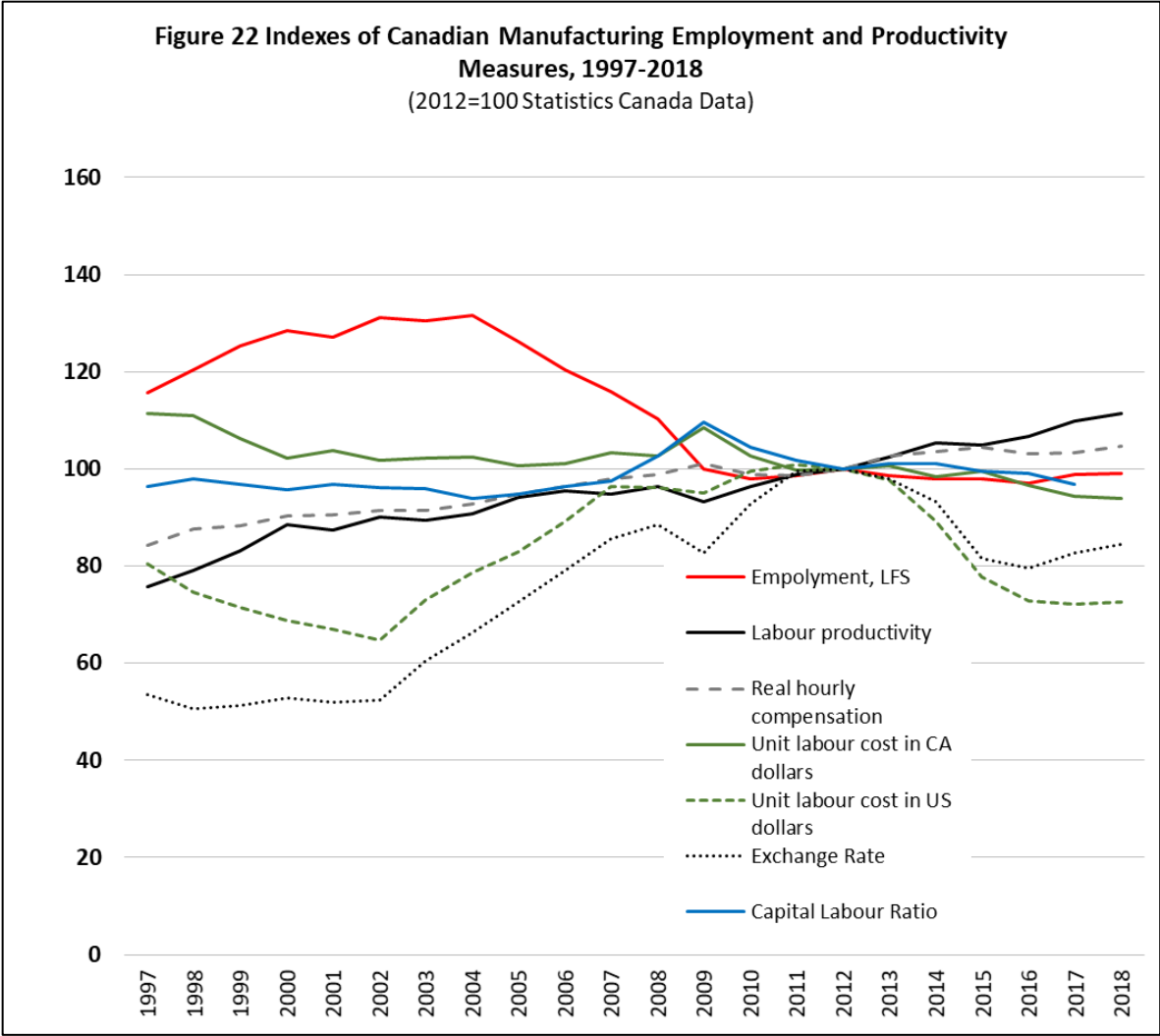
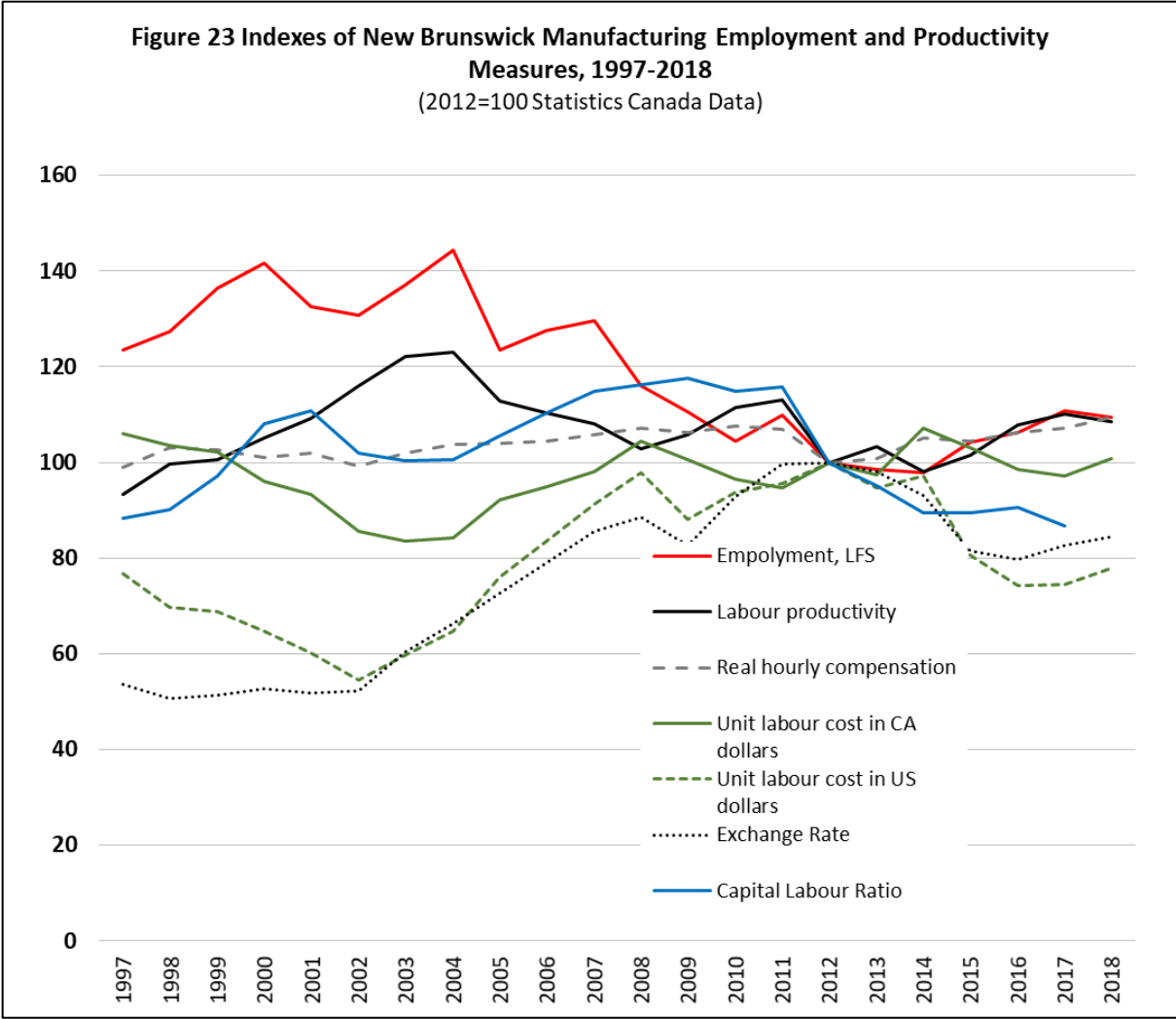


Figure 23 gives the same depiction of New Brunswick's manufacturing sector over the same period. Hourly compensation costs since 2008 have matched productivity increase with the overall effect of maintaining the level of unit labour costs in Canadian dollars. However, with the lower value of the Canadian dollar driving lower unit labour costs, employment is not rising as strongly (unlike the pre-2008 period).

This could be the reason for labour shortages in the province. Employers want to respond to the cyclical opportunities created by the low dollar without raising wages beyond what is justified by productivity growth, but the workers are not available in the same supply as before 2008.



Opportunities and Challenges in New Brunswick Manufacturing

Why are we experiencing labour shortages?

Labour shortages in New Brunswick are likely a result of the lack of investment to modernize the manufacturing sector. Producers remain reliant on relatively labour-intensive production, unlike their comparators in Ontario in at least two of the province’s larger sectors: Food Products and Wood Products. An aging workforce, combined with out-migration to other provinces, has resulted in lower available labour supply than prior to 2008. The depreciation of the Canadian dollar since 2012 has likely put cyclical pressure on labour demand.

A puzzle for many economists is the following: Why aren't wages rising if there are labour shortages? One answer is that given labour productivity and competitive pressures (as indicated by unit labour costs), wages can't go higher. Or, at least, they can't go higher permanently to address cyclical/transitory increases in labour demand.

One solution to labour shortages is to increase labour supply through higher immigrant intake and retention, and reducing out-migration. Better alignment of education and training investments, particularly through the post-secondary education system, would result in greater labour availability with improved matching of skills supply to skills demands.

But investment in labour saving technology to drive productivity growth is also an approach to deal with labour shortages. Acemoglu and Restrepo (2018) point out that automation in production has occurred in most nations with aging populations. We need a better understanding of why New Brunswick has not seen the same industrial transformation.

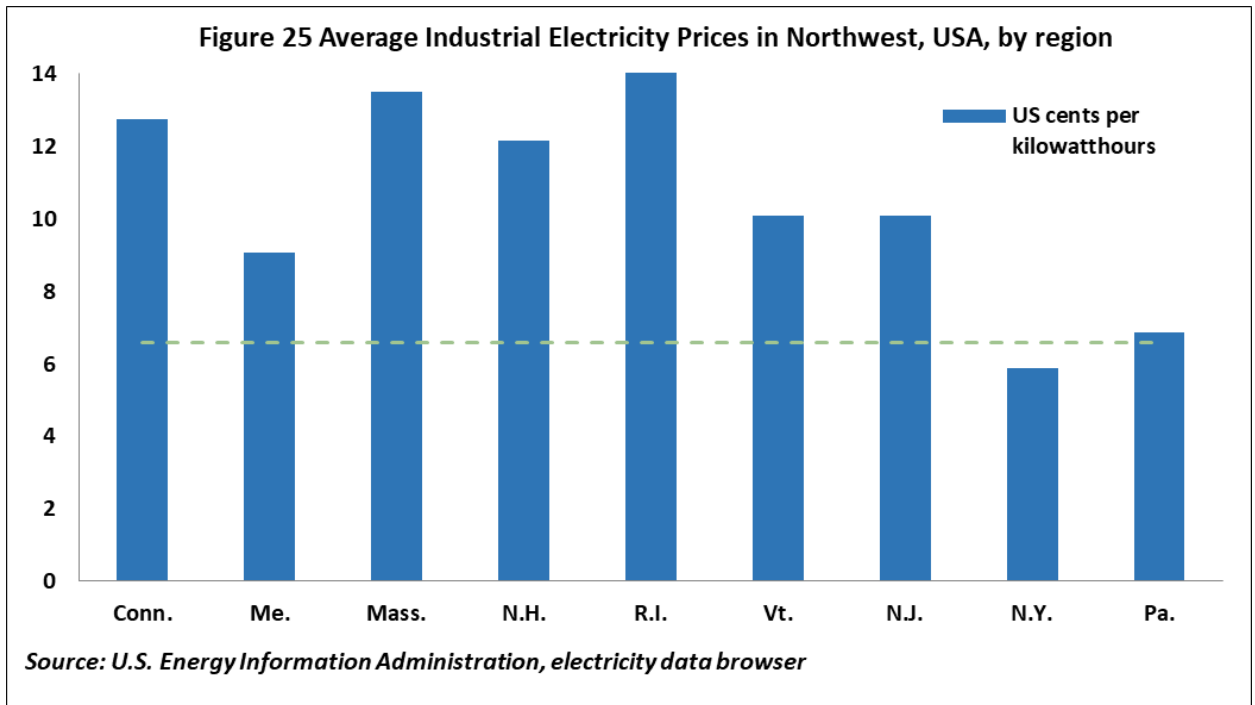
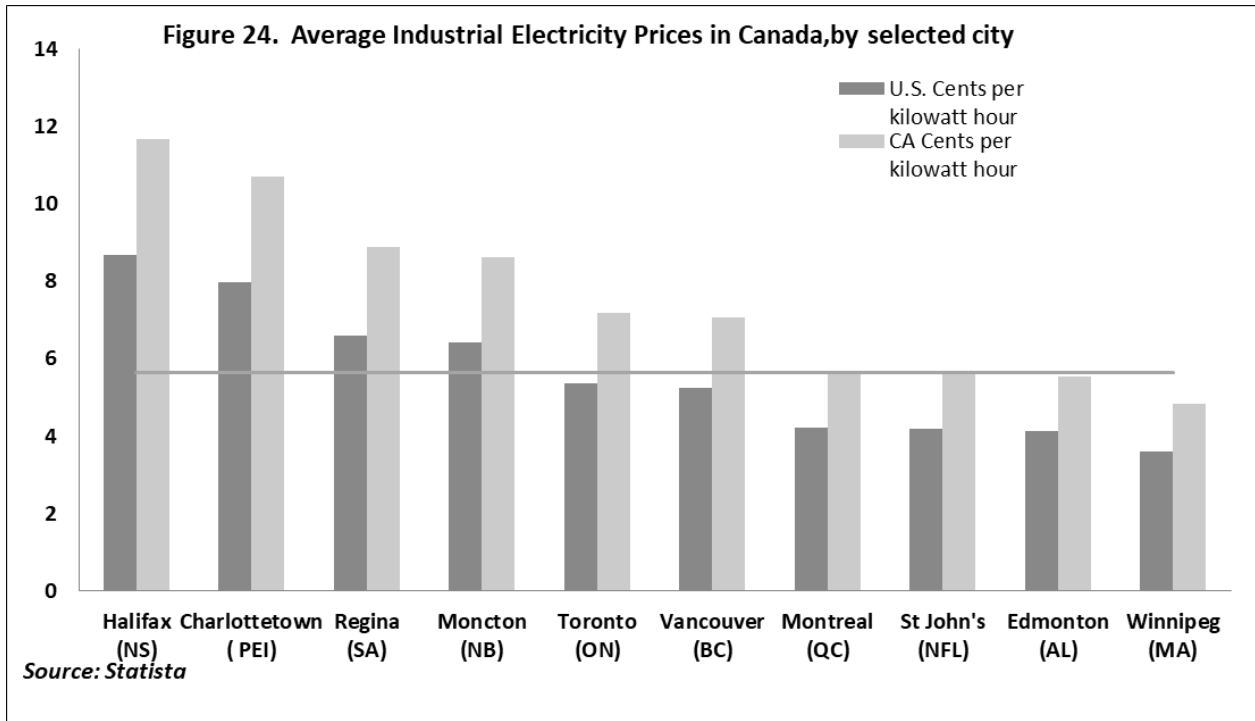
Why are energy costs such as big issue as identified by the CME? What about the carbon tax?

Energy is an important share of manufacturing costs. In terms of the work presented above, energy costs are paid out of the share of labour productivity that is not expended on labour compensation. In the absence of productivity growth or higher export prices, energy costs become a more acute pressure for manufacturers. As with labour costs for exporters, the cost of energy in Canadian dollars relative to their revenue will change with exchange rate.

New Brunswick power rates offer no cost advantages for producers relative to other provinces. New Brunswick's industrial rates are lower than in Nova Scotia, but not Ontario, Quebec or Manitoba. Relative to the U.S., after accounting for the exchange rate, New Brunswick power rates are lower than in most states in the Northeast, but remember that those are the states that have experienced pronounced decline in manufacturing. Obviously, higher power rates in the absence of productivity growth will reduce the competitiveness of New Brunswick manufacturers.

Carbon taxes need to be considered in this context, as well as the fact New Brunswick's electricity generation still has considerable supply produced from carbon-emitting fuels. Consequently, the federal carbon tax levied on New Brunswick in April 2019 – and scheduled to increase in value over the next four years – will raise power costs and other energy costs. Unlike households in New Brunswick, manufacturers will not receive any kind of rebate or offset in these carbon tax induced increases in production expenditure. And because the

other Atlantic provinces did not have this particular form of tax applied, the increase in power, gasoline and other fuel costs is not occurring in those places. The same applies to Quebec and the U.S. Northeast. As such, the carbon tax will further erode manufacturer competitiveness in New Brunswick.



Diversification of industries and export markets

New Brunswick's manufacturing sector output is generated by a small number of industries. While opportunities remain to grow them, there could be opportunities to increase the number and size of industries with export presence in New Brunswick. Similarly, New Brunswick manufacturers are extremely dependent on the U.S. market. If New Brunswick could increase exports to other markets, this may be a path to growing the manufacturing sector. And unlike the U.S., where automation displaces employment in firms producing for the domestic market, New Brunswick could increase total employment through automation – by raising productivity and improving competitiveness – because the output is destined for export. A higher global market share means that automation in an exporting economy is not a jobs killer.

Discussion

Given the importance of the manufacturing sector for New Brunswick, what policies will support the growth of, and employment in, this sector? Baily and Bosworth (page 19) start with the caveat that the importance of manufacturing for an economy is not sufficient for justifying special treatment for the sector, such as subsidies or special tax rates. However, they do point out that there is a need to ensure that existing policies are supportive of manufacturing, or at least do not discriminate against it (page 22). This latter point requires government to recognize the high degree of trade exposure of manufacturers in New Brunswick.

Policies that raise producer costs like 2019's federal imposition of a carbon tax, or increases in WorkSafeNB premiums, cannot be passed on to consumers. This means they diminish the attractiveness of New Brunswick as a location to produce.

Business costs and tax burdens

In a world of global supply chains and producing for external markets, in which the producer is a price taker, taxes on capital and other business costs are influential for where producers locate and invest. Baily and Bosworth focus on the marginal rate of corporate taxation because in the U.S., prior to the election of Donald Trump, the tax rate was high in relationship to those of other countries.

Canada has had lower corporate income tax rates than the U.S., but the Trump tax reforms have reduced the size of our tax advantage for investors. New Brunswick actually has a “not high” statutory Corporate Income Tax rate and, like all manufacturing in the Atlantic region, producers are further supported

with the federal Atlantic Investment Tax Credit (AITC). Yet, New Brunswick taxes away the advantages for manufacturers with respect to Corporate Income Tax through provincial property tax, which manufacturers in other provinces do not face. Since September 2019, the Government of New Brunswick has been investigating whether to include the value of machinery and equipment in assessed property values, on the basis of ensuring that industry pays its fair share of property tax.

In April of 2019, the federal government imposed its backstop carbon pricing scheme on New Brunswick when the province failed to develop its own scheme. Therefore, business costs for manufacturers have increased, and is no way to offset the increases in transportation costs due to the higher cost of fuels. As this new tax was imposed only New Brunswick in the region, federal carbon pricing is an example of a tax policy that will create a competitive disadvantage for manufacturers in the province.

Labour market policies and regulations are set by the provinces. Workers' compensation, minimum wages and provincial statutory (paid) holidays can thus introduce differences in labour costs across provinces. For example, in New Brunswick since 2014, legislation altered the WorkSafeNB contract resulting in workers' compensation payroll taxes going from among the lowest in Canada to among the highest in only a few years. New Brunswick also introduced a new statutory holiday in February and moved the minimum wage in the province toward \$14 per hour. While this was nominally comparable to other provinces like Ontario and Alberta, it represented a larger portion of average paid wage rates. To the extent that minimum wages can affect the full distribution of wages paid, moving to a minimum wage above 50% of the average paid wage would represent a larger impact of that province's minimum wage, relative to higher-wage provinces. For trade exposed manufacturers, none of these costs can be passed on to buyers of their produce, so they are an erosion of profitability and competitiveness.

Holden (2019, 19) reviews tax policies which should incent manufacturers in Atlantic Canada to invest in new technologies. This includes Ottawa's decision in 2018 to match tax provisions that allowed businesses to immediately write off all qualifying capital expenditures in the year in which they were made. While this improvement to the Accelerated Capital Cost Allowance (ACCA) should be beneficial for manufacturers in the region, CME consultations with manufacturers in New Brunswick found the ACCA had limited impact because it was not enough to offset the general deterioration of the business cost. While the improved ACCA will partially offset other policies that undermine manufacturer competitiveness, it alone does not do enough to stimulate new investment.

Labour shortages and skills shortages

Many New Brunswick manufacturers respond to market opportunities by hiring more workers to produce more output. This was likely the efficient way to adjust firm production, particularly for small firms, when labour was abundant. Yet since 2008, as the exchange rate once again improved competitiveness of exporters in New Brunswick, this path to expanding production has not proved as easy to pursue since the workers are not available, at least at wage costs that employers are willing or able to pay and remain in the province. One reason for this development is that with population aging, there are simply fewer workers competing for the available jobs. Second, among the workers that are available, their skills are deficient or not a match for what the employer needs.

Baily and Bosworth identify the need to improve the skills of the available workforce in the U.S. and develop more of the potential labour supply. Those recommendations apply to New Brunswick as well. New Brunswick has invested more in university education than college-based vocational training and job training programs. In turn, New Brunswick's younger population is catching up to the rest of Canada with respect to university education, but those graduates are less likely to stay in New Brunswick and they don't meet the skills and training requirements for the majority of projected 120,000 job openings in the province over the next 10 years. Most of these projected job openings are for replacement of workers exiting the labour force, and most of those positions do not require university education.

A 2014 Conference Board of Canada report evaluated New Brunswick as a low-performing province with respect to education and skills development (<https://www.conferenceboard.ca/hcp/provincial/education.aspx>). New Brunswick scored below neighboring Nova Scotia and was ranked as being as poor performing as the U.S., where Baily and Bosworth note that "both American companies and foreign companies investing in the United States report that the skills of the work force are comparatively weak. It lags behind many other countries in developing effective vocational education and job-training programs, and the educational attainment of young workers is falling behind that of countries like Canada, Japan, and Korea." For the U.S., these authors recommend the German example, where a high-quality vocation education system exists to improve the skills of its workforce.

Like the rest of Canada and the U.S., New Brunswick has some challenges with deteriorating physical infrastructure. But there are also problems with vintage of the infrastructure, and underinvestment in connecting infrastructure in neighbouring provinces and states. Generally, deficient infrastructure can raise producer costs or erode profitability by raising the costs of getting goods to market and importing inputs needed for production.

New Brunswick has been investing in improving its ports such as Saint John and Belledune, but also faces problems with deteriorating secondary highways and rail infrastructure. Some infrastructure was built decades ago and does not easily accommodate the larger vehicles and heavier loads that can be carried by truck, rail and ship. Plus, there are still 41 kilometres of single-lane highway in Quebec that prevents Maritime-based shippers from using LCVs to their full extent. Needless to say, improving infrastructure that supports producers getting their goods to market can only improve competitiveness, so long as the costs of financing those improvements are not borne through offsetting taxes on manufacturers or shipper costs.

Exchange Rate Impacts on Productivity Growth

New Brunswick manufacturing has high trade exposure to the market and, unsurprisingly, its output and employment are strongly influenced by changes in the exchange rate between the Canadian and U.S. dollars. The exchange rate may also be a limiting factor on productivity in manufacturing and a risk to producer competitiveness over the long term.

Fung, Baggs and Beaulieu (2011) discuss the positive impact of a Canadian dollar depreciation on domestic goods producers as goods become relatively cheaper in U.S. dollars for American consumers. On the other hand, firms with a high share of imported intermediate inputs see their costs of production rise, with depreciation offsetting some of their improvement in competitive position. Prolonged periods of a lower-valued Canadian dollar vis-à-vis the U.S. dollar create a competitive advantage for domestic firms that may undermine their incentive to increase productivity.

Fung et al. identify two opposing effects of the exchange rate on investment. A depreciation of the domestic currency would positively influence plant investment because of the increase in output and profits. But, a depreciation could reduce investment by making imported machinery and equipment more expensive in domestic currency units. They report that the literature suggests the impact of the exchange rate on investment is insignificant in the Canadian manufacturing sector (page 1218). Fung et al. do find that depreciation of the Canadian dollar to have a positive effect on manufacturing productivity because of the increase in the scale of production due to higher manufacturing shipments.

Harris (2001, 304) finds that for highly open economies like New Brunswick, exchange rate undervaluation provides short-term increases in productivity growth, but long term costs in productivity performance. Harris believes that the sustained real depreciation of the Canadian dollar over the 1990s had longer-term costs in terms of slower productivity growth. Harris hypothesizes three

channels by which the low value of the Canadian dollar reduced productivity growth during that era.

First, the lower value of the Canadian dollar raised the cost of imported investment goods. Profit incentives were thus for producers to expand production for the short term, rather than investing in capital to improve long term competitiveness.

Second, a sustained low value of the Canadian dollar negatively impacts innovation and research and development by raising the cost of importing technology and by shifting profit opportunities, where price competition works relative to competition on new or improved product and process innovation.

Third, “exchange rate depreciations can reduce the forces of creative destruction” by altering entry and exit of firms and plants. A low dollar can sustain and encourage growth of small, inefficient firms longer than would be the case without the advantage of the currency valuation. During a period of major technological change, capital and labour are sheltered in old slow-growth sectors, and this reduces the rate at which the New Economy, high growth sectors can expand. This process can contribute to the perception of labour shortages in the economy because too many workers are hoarded in lower-productivity firms.

What isn't clear is how New Brunswick, and Canada can wean manufacturers off their reliance on the exchange rate to support their competitiveness, rather than investing and innovating to raise productivity as U.S. manufacturers have. New Brunswick does not control the exchange rate.

Conclusions

Manufacturing in New Brunswick as a sector has shown remarkable resilience in terms of its contribution to employment and GDP compared to other provinces, as well as the State of Maine and the United States. At the same time, New Brunswick manufacturers remain dependent on labour for production and have not shown much in the way of capital deepening. Consequently, labour productivity remains lower than outside the region and has grown only slowly since the 2008 recession. At the current time, the manufacturers are facing economic headwinds related to tighter labour markets, rising energy costs and a generally poor business climate.

Resilience of the sector in the presence of economic headwinds suggests that the province can grow its manufacturing sector. If we addressed disadvantages that exist through the tax system and other business costs, improved labour and skills availability, and improved our infrastructure, then would that be enough to

spur the transformation of more of our manufacturers into more capital intensive and less labour dependent exporters? Or do we need additional policies that address the challenge of scaling up to drive average costs down to competitive levels?

Reference

Daron Acemoglu, Pascual Restrepo (2018) "Demographics and Automation", NBER Working Paper No. 24421. Issued in March 2018
<https://www.nber.org/papers/w24421>

Teresa C. Fort, Justin R. Pierce, and Peter K. Schott (2018) "New Perspectives on the Decline of US Manufacturing Employment," *Journal of Economic Perspectives*, 32(2) Spring, pages 47-72.

[2] Martin Baily and Barry Bosworth, "US manufacturing: Understanding Its Past and Its Potential Future" *Journal of Economic Perspectives* 28(1): 2-26.

Bureau of Labor Statistics, Productivity Data,
<https://www.bls.gov/bls/proghome.htm#productivity>

Conference Board of Canada, Education Provincial Rankings-How Canada Performs <https://www.conferenceboard.ca/hcp/provincial/education.aspx>

[3] Ksenia Bushmeneva, "Why are we not seeing a manufacturing rebound in the Northeast?", *Special Report TD Economics*, August 24, 2015.

Teresa C. Fort, Justin R. Pierce, and Peter K. Schott, "New Perspectives on the Decline of US Manufacturing Employment," *Journal of Economic Perspectives*, 32(2) Spring 2018, pages 47-72.

Loretta Fung, Jen Baggs and Eugene Beaulieu, Plant Scale and Exchange-Rate-Induced Productivity Growth *Journal of Economics & Management Strategy*, Volume 20, Number 4, Winter 2011, 1197-1230.

Harris, R.G., 2001, "Is There a Case for Exchange Rate Induced Productivity Changes," in L. Schembri, ed., *Revisiting the Case for Flexible Exchange Rates*, Ottawa: Bank of Canada.

Statistics Canada CANSIM database tables

[4] Trevor Tombe and Robert Mansell. "IF IT MATTERS, MEASURE IT: UNPACKING DIVERSIFICATION IN CANADA" *SPP research papers*, 9(36) November 2016