



*Centre for the  
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# Productivity Trends and Drivers in Manufacturing in New Brunswick

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Centre for the Study of Living  
Standards

Presented at

JDI Roundtable on Manufacturing Competitiveness in New  
Brunswick Annual Forum,  
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September 26, 2019

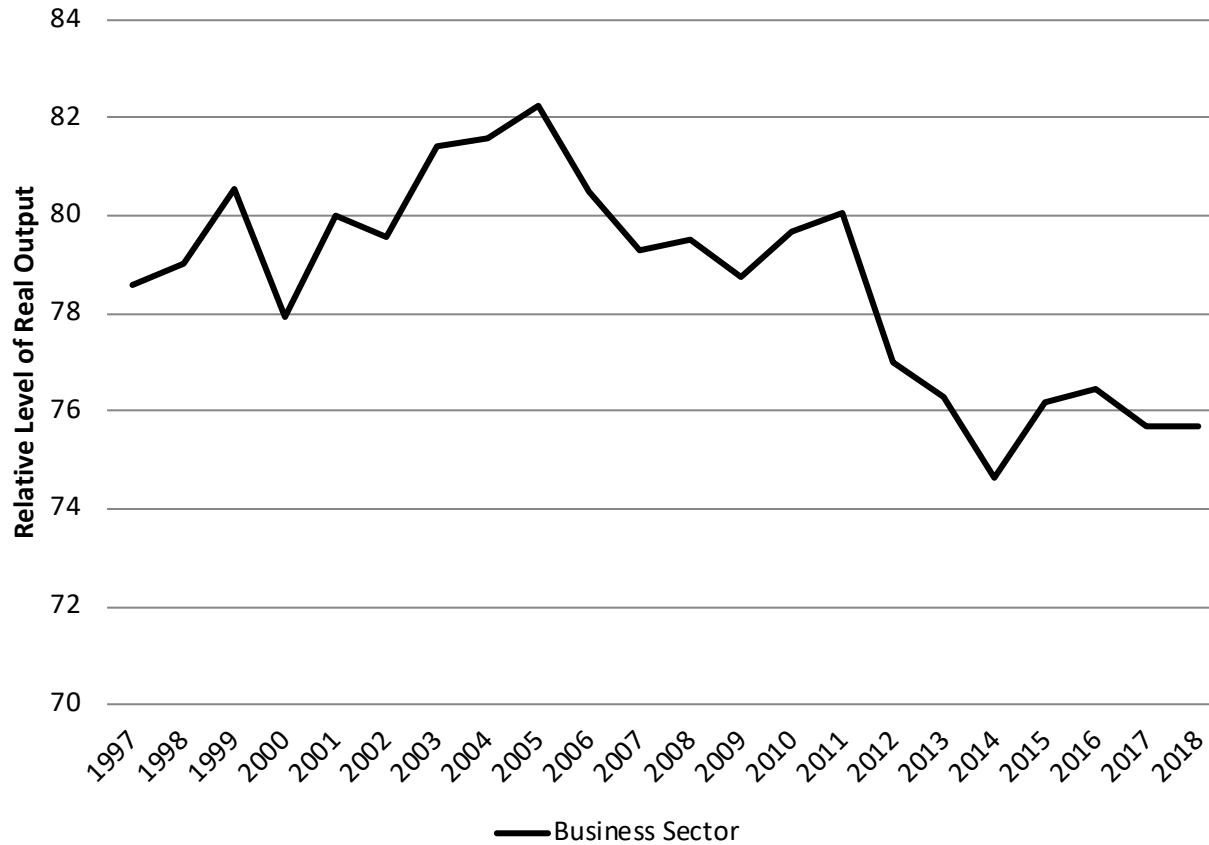
# Outline of the Presentation

- I. What is Productivity and Why Is It Important?
- II. Trends in Manufacturing Productivity in New Brunswick
  - a. Trends in Business Sector
  - b. Trends in Total Manufacturing
  - c. Trends in Manufacturing Industries
- III. Drivers of Manufacturing Productivity in New Brunswick

# What Is Productivity and Why is it Important?

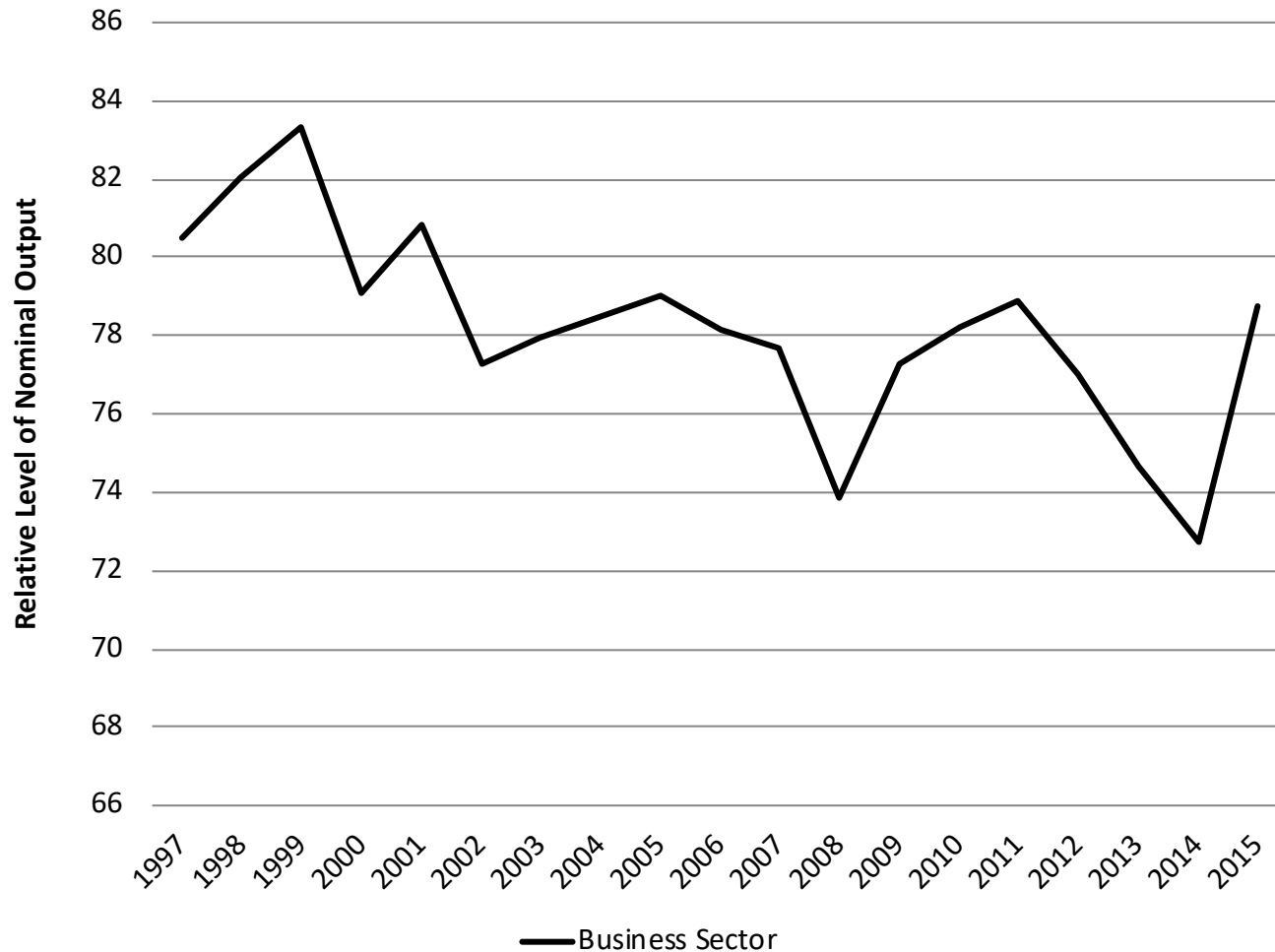
- Definition of Productivity
  - Relation of output to inputs
  - Partial versus total factor productivity
  - Total hours worked employment productivity measures
  - Short run versus long run productivity trends
- Why Productivity Is Important
  - Only sustainable source of real income growth
  - Impact on cost competitiveness
  - Misconceptions about productivity
  - The productivity concept in the public policy context
- Sources of Productivity Data

# Relative Level of Real Output per Hour in New Brunswick Business Sector (Canada = 100 in all years)



Source: Statistics Canada – Table 36-10-0480-01

# Relative Level of Nominal Output per Hour in New Brunswick Business Sector (Canada = 100 in all years)



Source: Statistics Canada – Table 36-10-0480-01

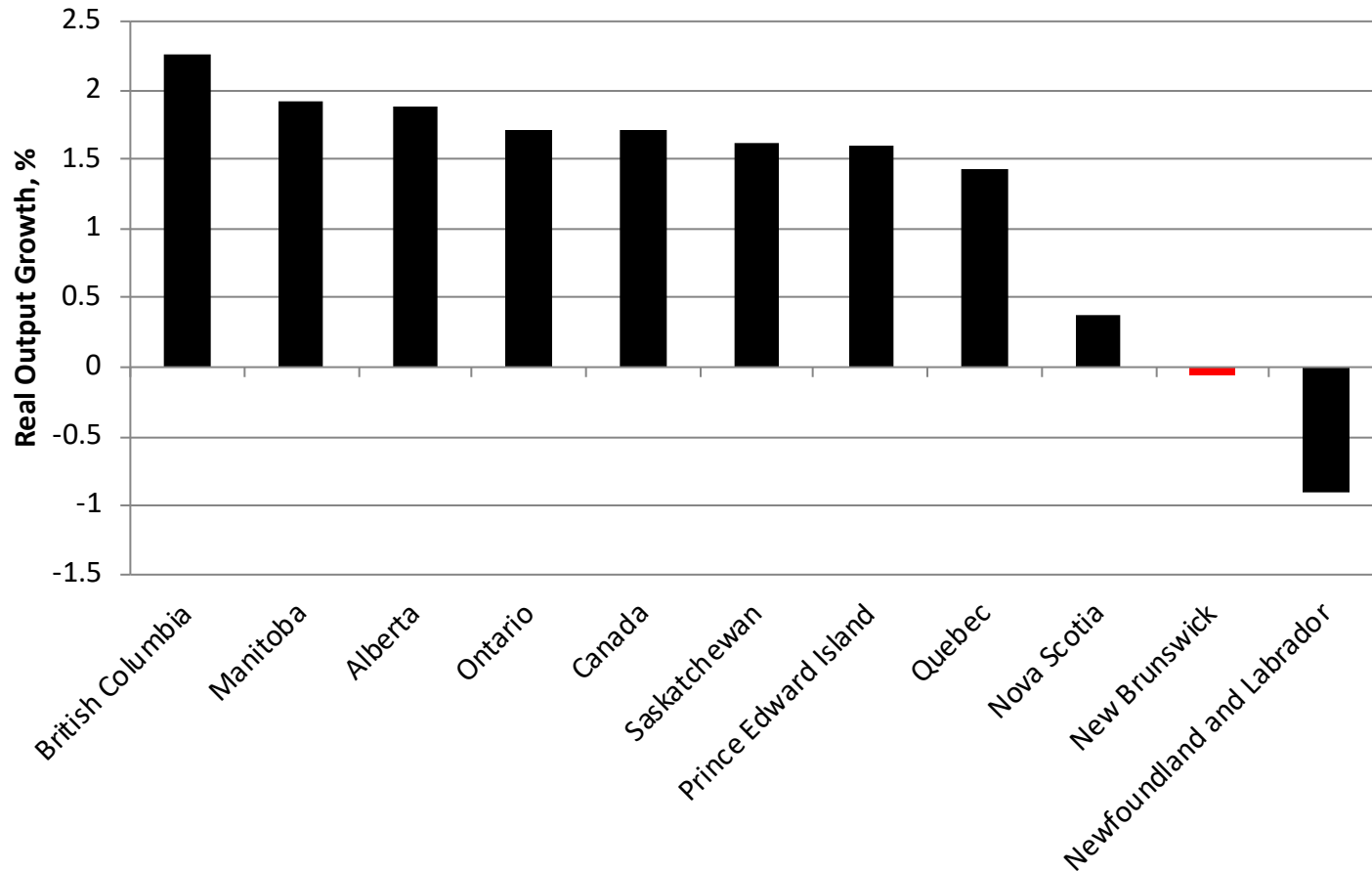
# Comparing Canada and New Brunswick, Business Sector

Year	Real Output		Output per Hour		Total Hours		Employment	
	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada
<b>1997-2018</b>	1.34	2.43	1.10	1.28	0.23	1.13	0.45	1.40
<b>1997-2008</b>	2.62	3.10	1.64	1.53	0.95	1.54	1.26	1.85
<b>2008-2018</b>	-0.06	1.71	0.51	1.00	-0.55	0.69	-0.44	0.90

Source: Statistics Canada – Table 36-10-0480-01

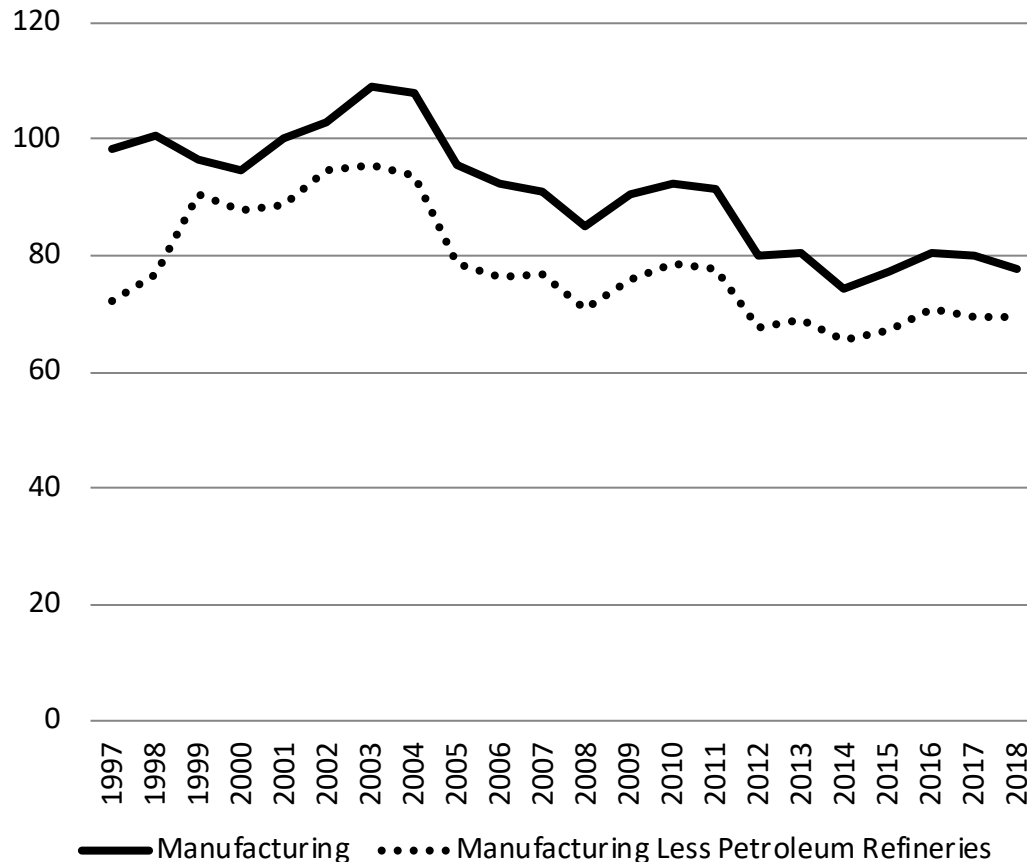
# Real Output Growth in Business Sector by Province, 2008 – 2018

## Compound Annual Growth (%)



Source: Statistics Canada – Table 36-10-0480-01

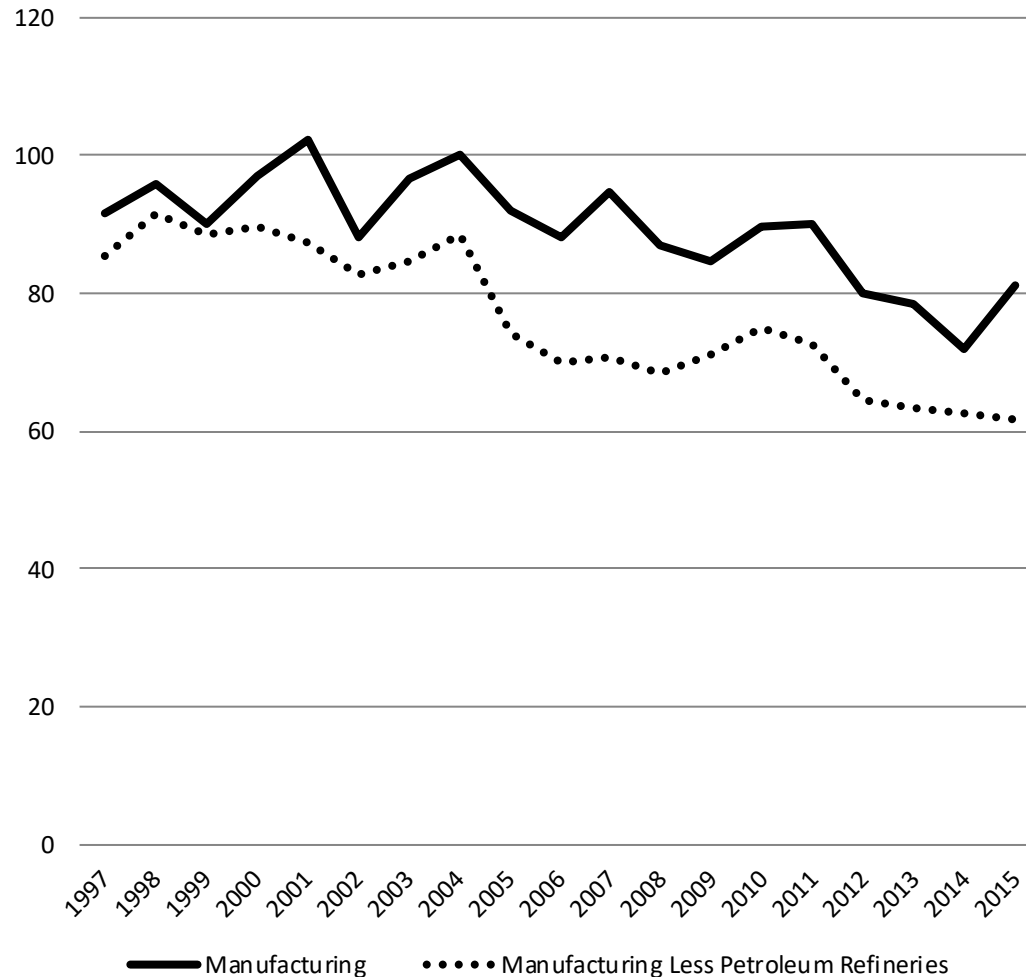
# Relative Level of Real Output per Hour in New Brunswick Manufacturing (Canada = 100 in all years)



Source: Statistics Canada – Table 36-10-0480-01



# Relative Level of Nominal Output per Hour in New Brunswick Manufacturing (Canada = 100 in all years)



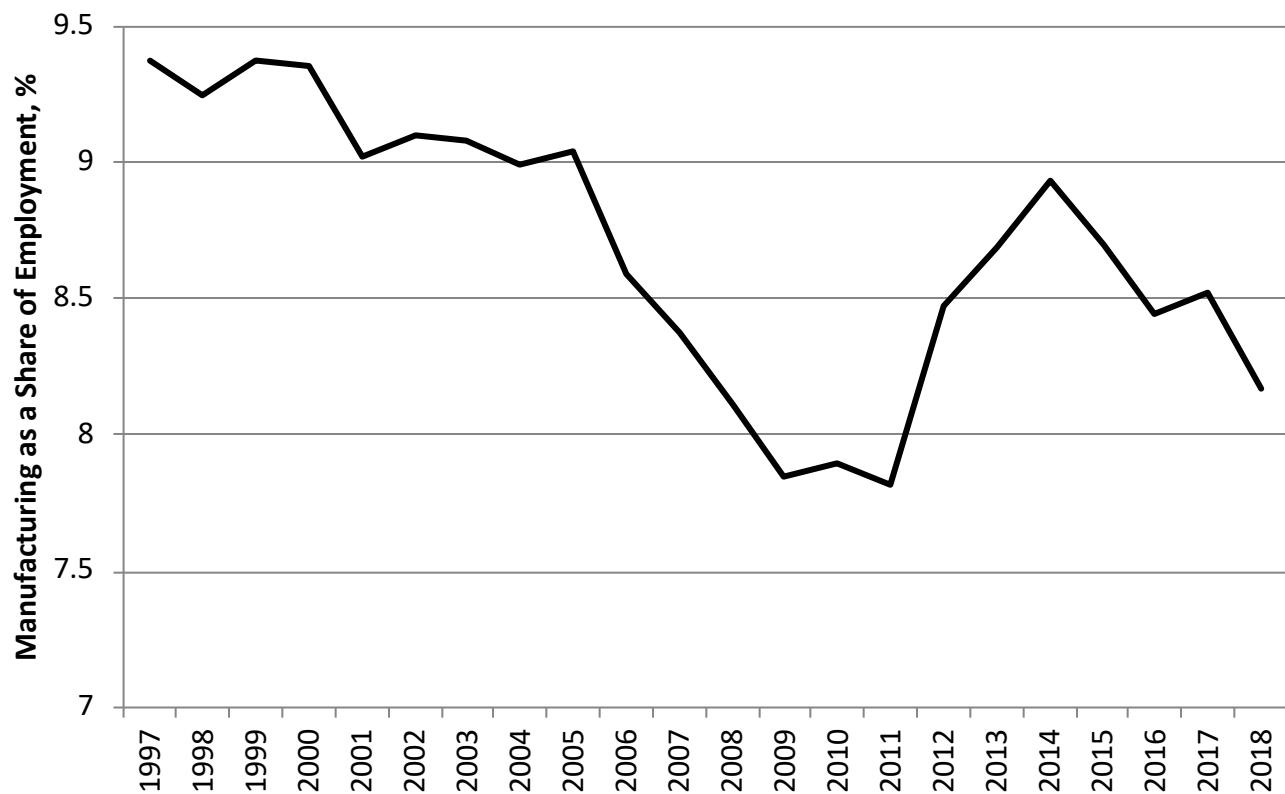
Source: Statistics Canada – Table 36-10-0480-01

# Comparing Canada and New Brunswick, Manufacturing Sector

Year	Real Output		Output per Hour		Total Hours		Employment	
	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada
<b>1997-2018</b>	0.65	0.80	0.71	1.85	-0.06	-1.03	-0.03	-0.89
<b>1997-2008</b>	0.78	1.13	0.87	2.21	-0.08	-1.05	0.00	-0.80
<b>2008-2018</b>	0.51	0.44	0.54	1.45	-0.03	-1.00	-0.05	-0.98

Source: Statistics Canada – Table 36-10-0480-01

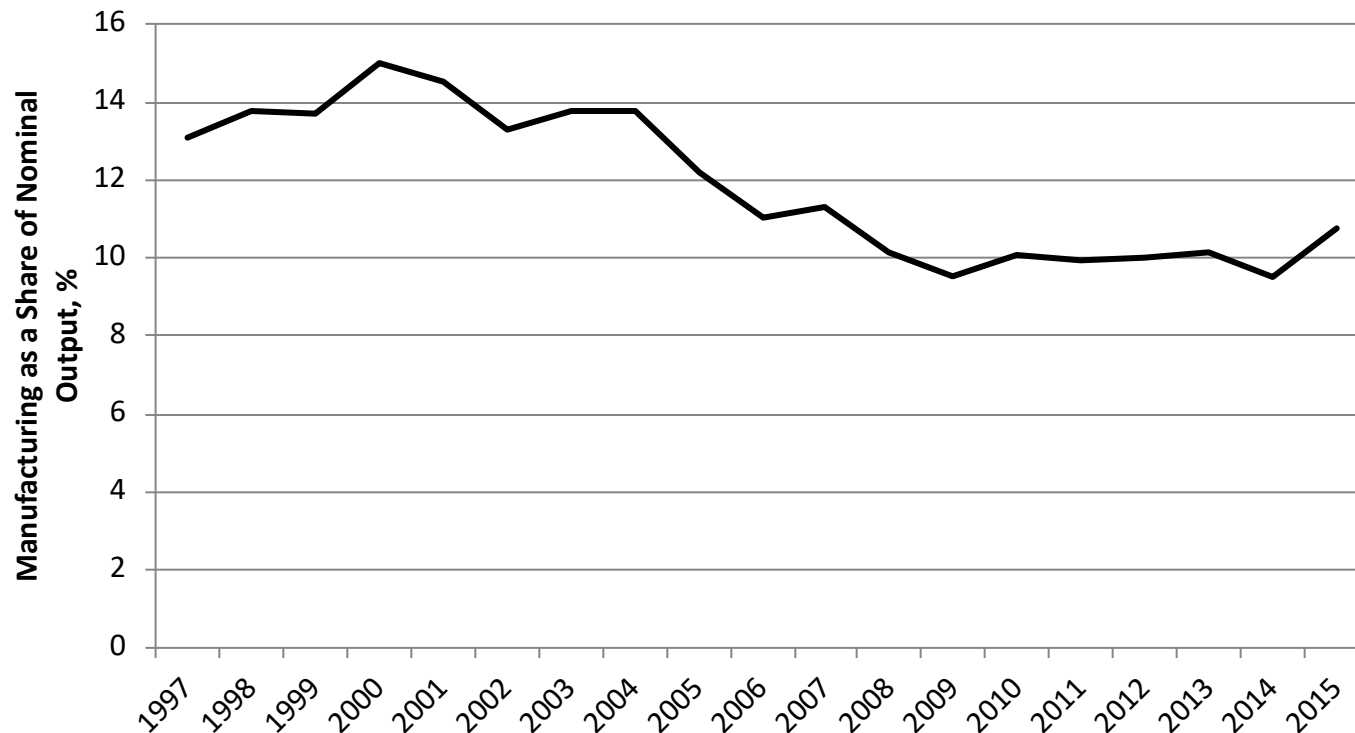
# Trends in Manufacturing Employment as a Share of All Industries Employment in New Brunswick, 1997 - 2018



Source: Statistics Canada – Table 36-10-0480-01

# Trends in Manufacturing Nominal Output as a Share of All Industries

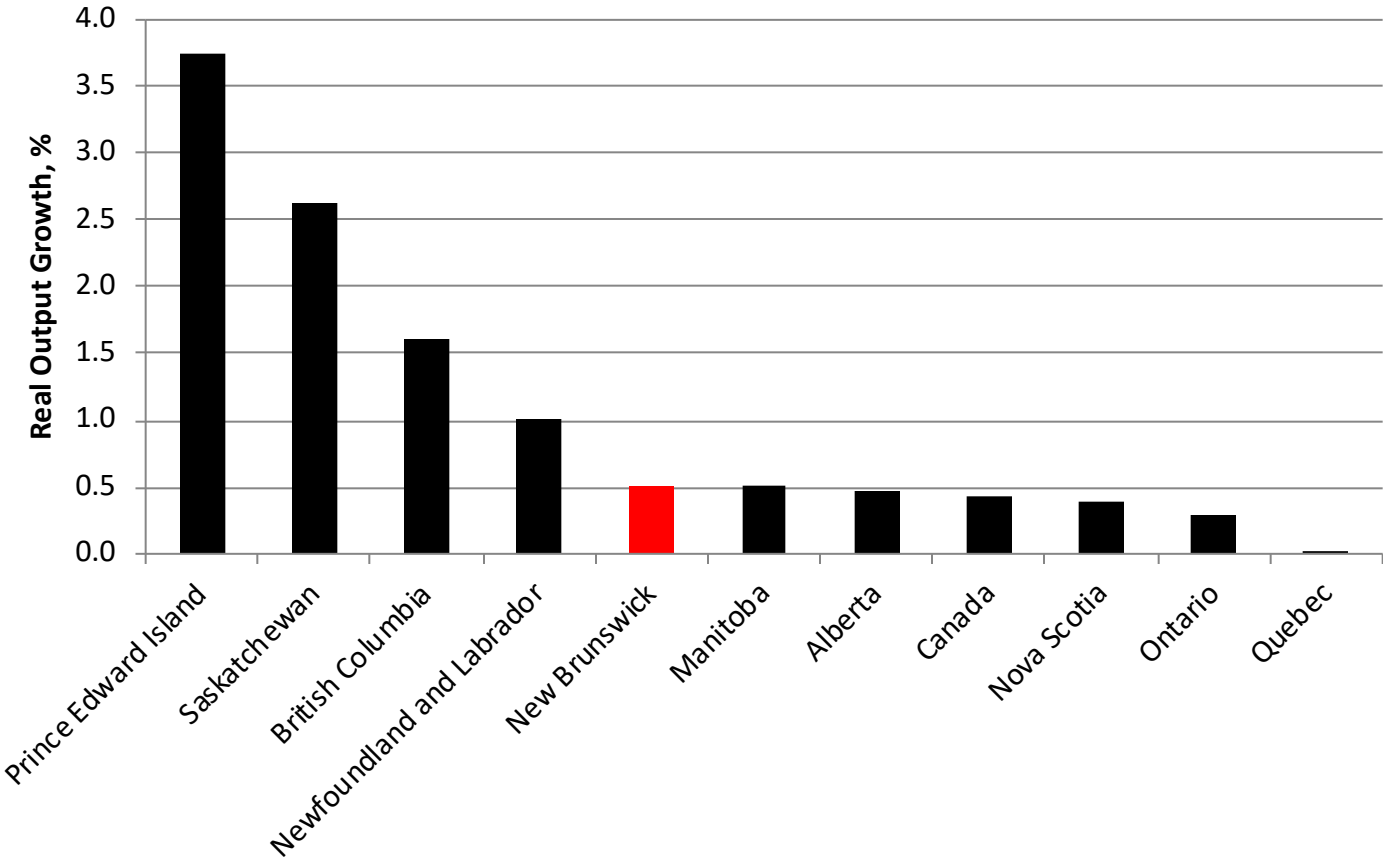
## Nominal Output in New Brunswick , 1997 - 2015



Source: Statistics Canada – Table 36-10-0480-01

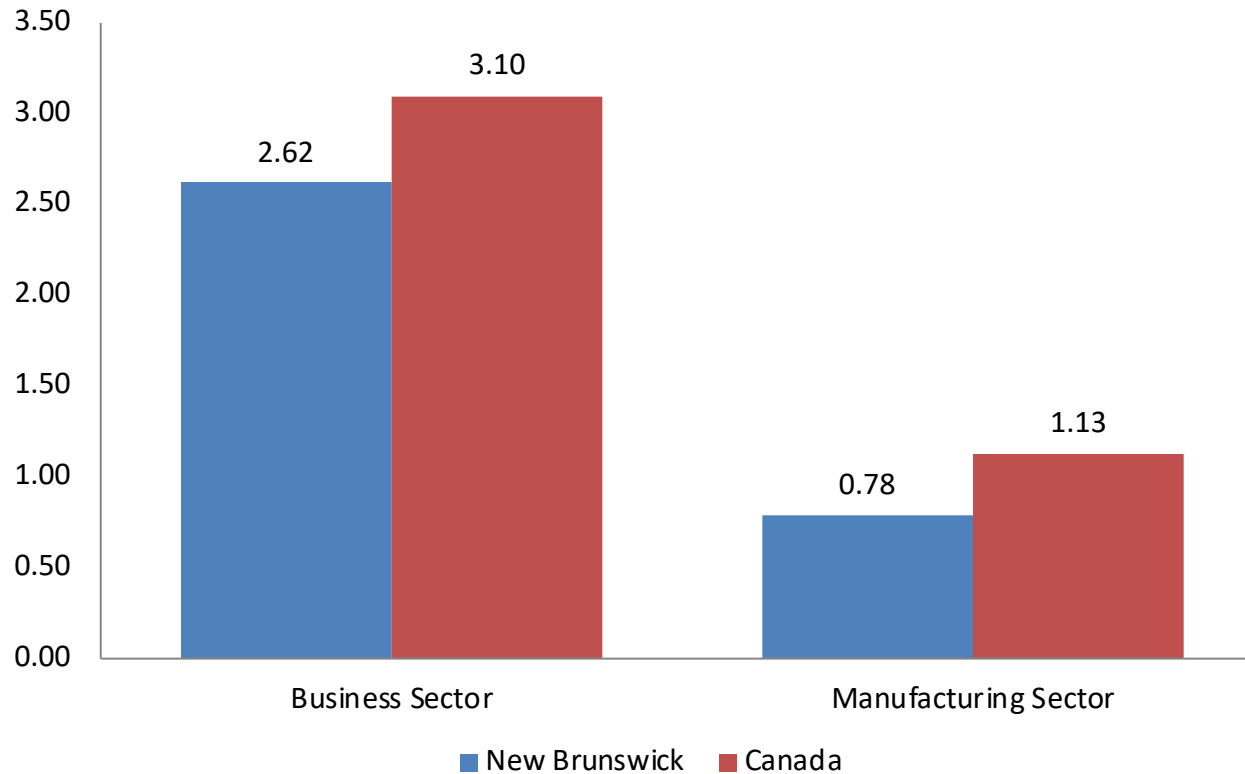
# Real Output Growth in Manufacturing Sector by Province, 2008 – 2018

## Compound Annual Growth (%)



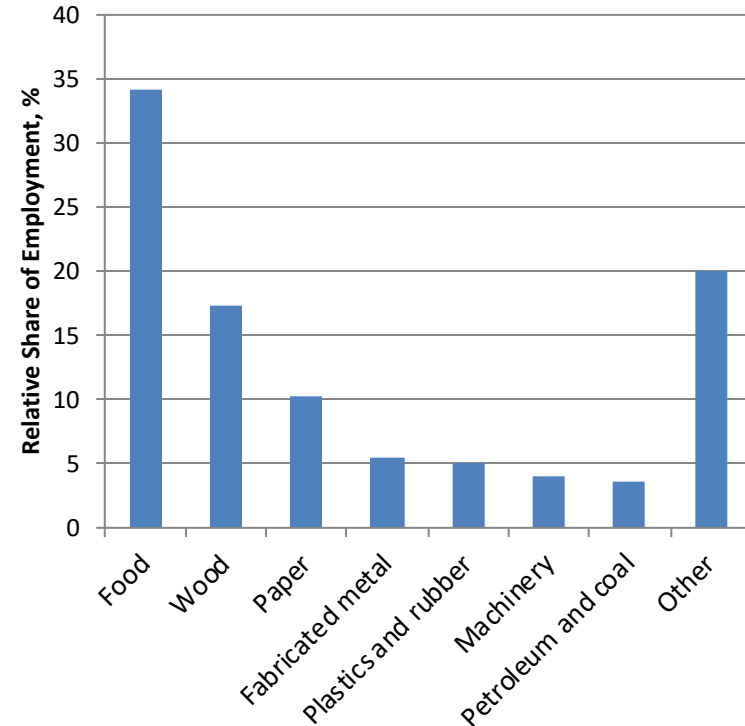
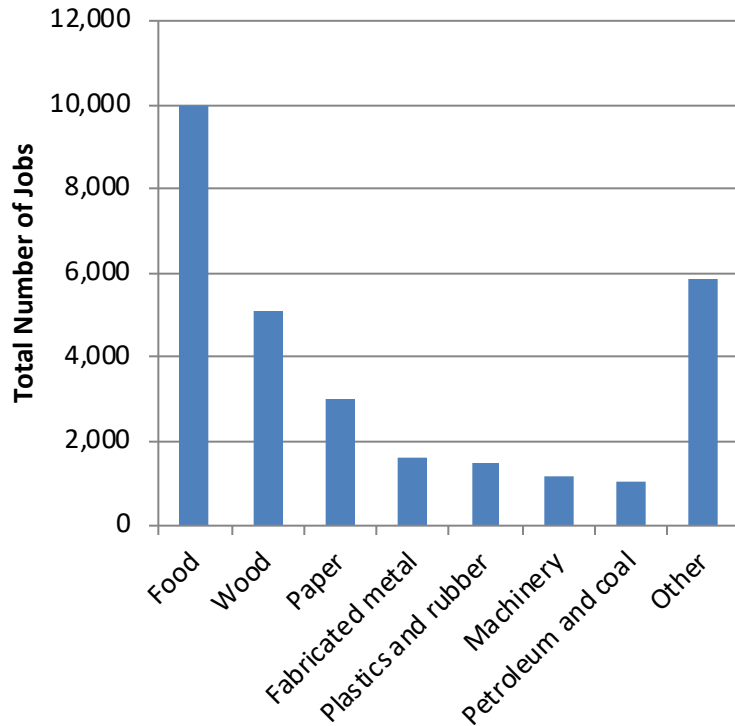
Source: Statistics Canada – Table 36-10-0480-01

# Comparison of Real Output Growth between Canada and New Brunswick, 1997-2008



Source: Statistics Canada – Table 36-10-0480-01

# Employment in New Brunswick Manufacturing by Industry, 2018

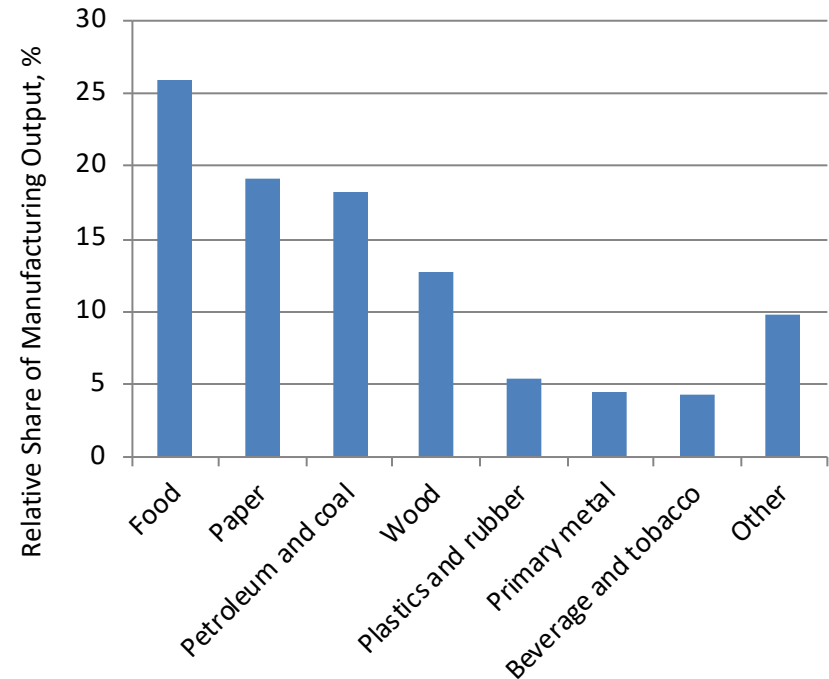
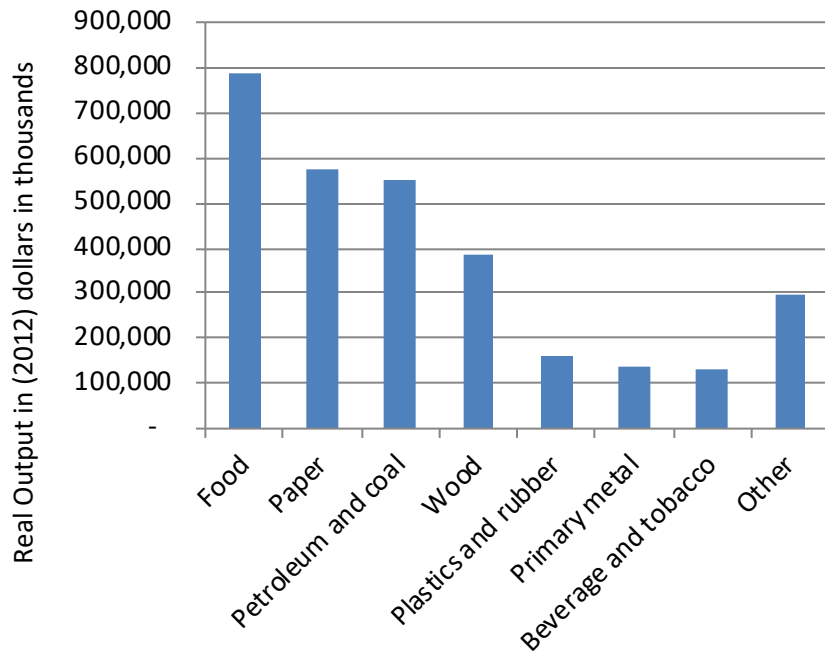


Note: The total number of jobs in the manufacturing sector in New Brunswick is 29,285.

Source: Statistics Canada – Table 36-10-0480-01

# Real Output in New Brunswick Manufacturing by Industry, 2018

Chained 2012 dollars (thousands)



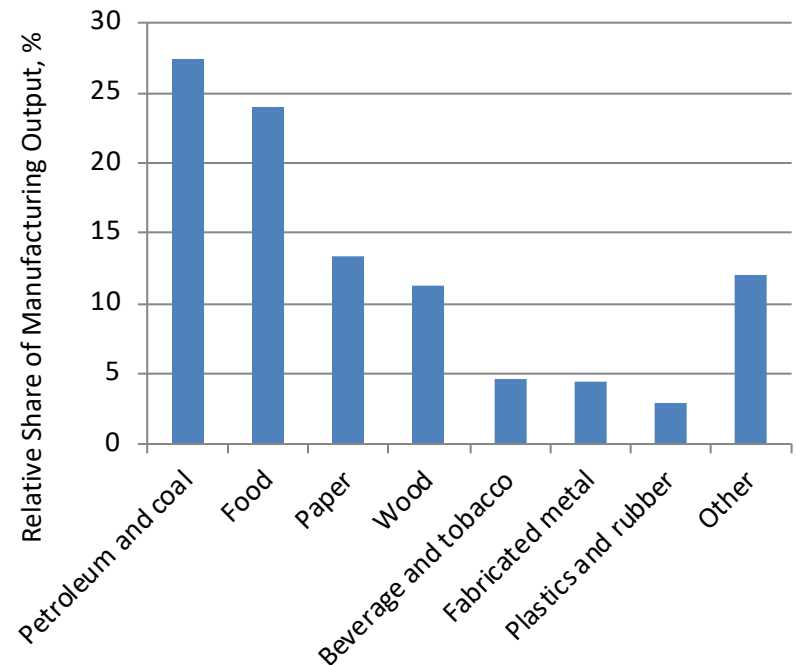
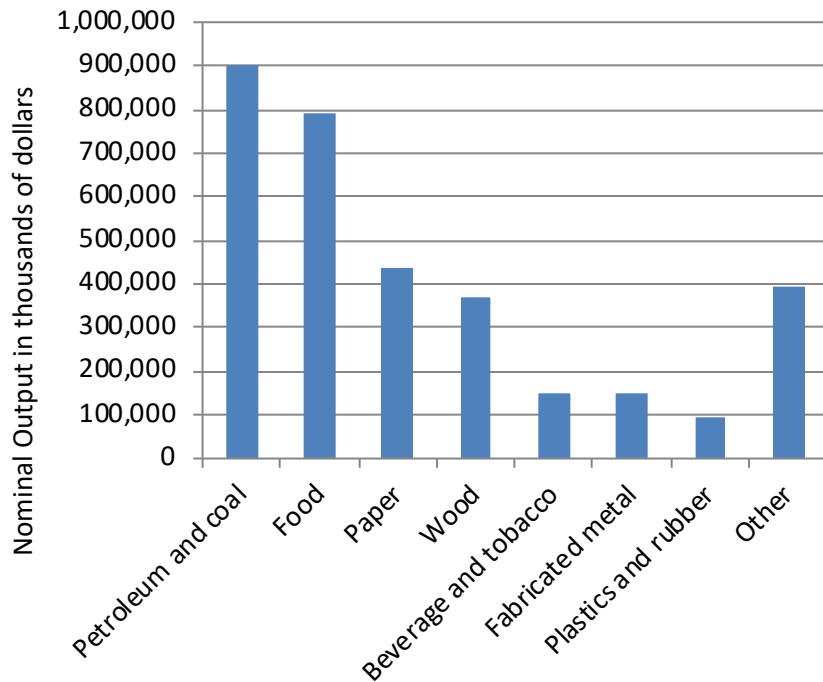
Note: Total real output for the manufacturing sector in New Brunswick is \$3,018,481,000 (2012 dollars).

Source: Statistics Canada – Table 36-10-0480-01



# Nominal Output in New Brunswick Manufacturing by Industry, 2015

## Current Dollars (thousands)

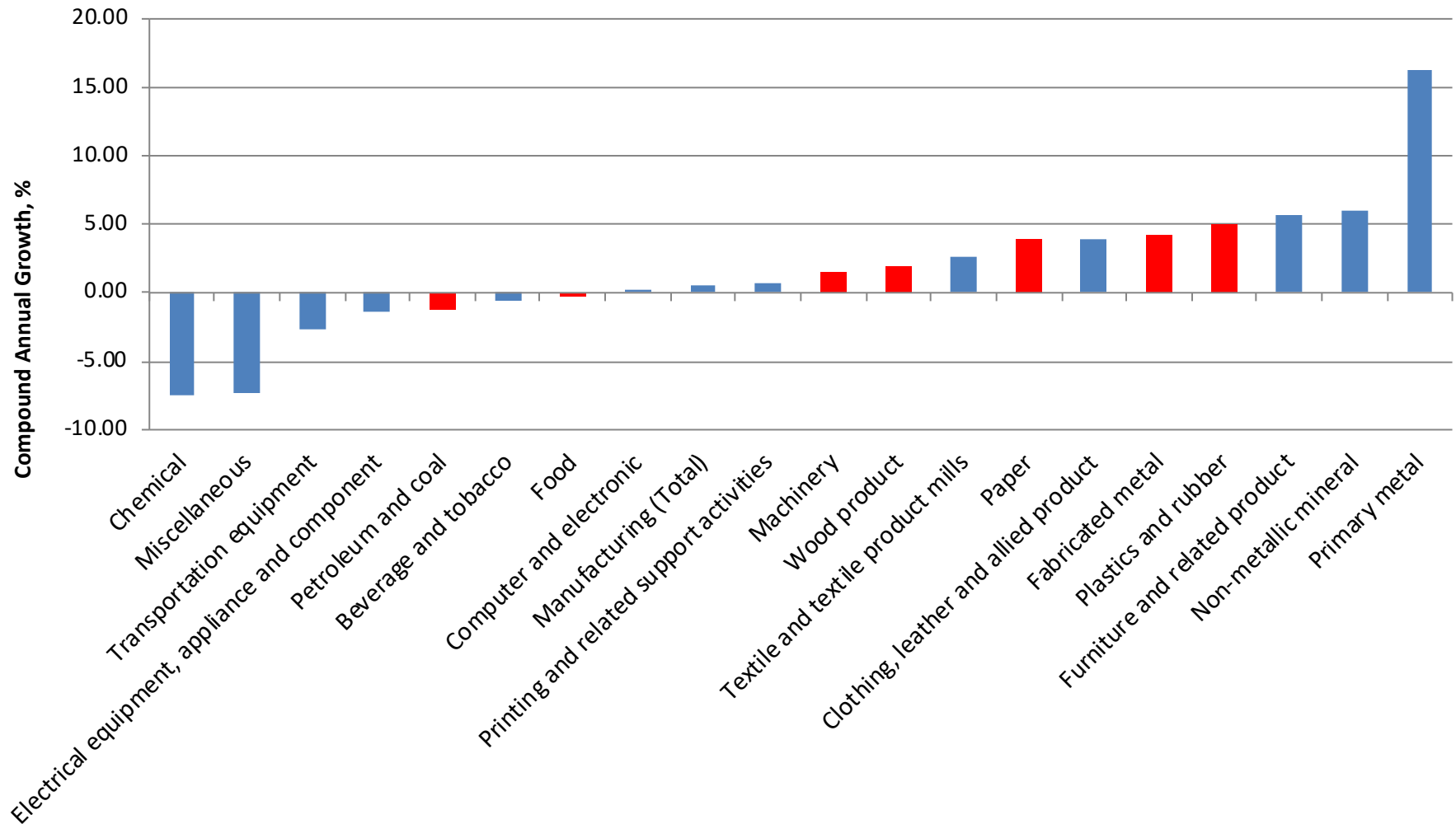


Note: Total nominal output for the manufacturing sector in New Brunswick is \$3,277,497,000.

Source: Statistics Canada – Table 36-10-0480-01

# Labour Productivity in 3-Digit Manufacturing Industries in New Brunswick, 2008-2018

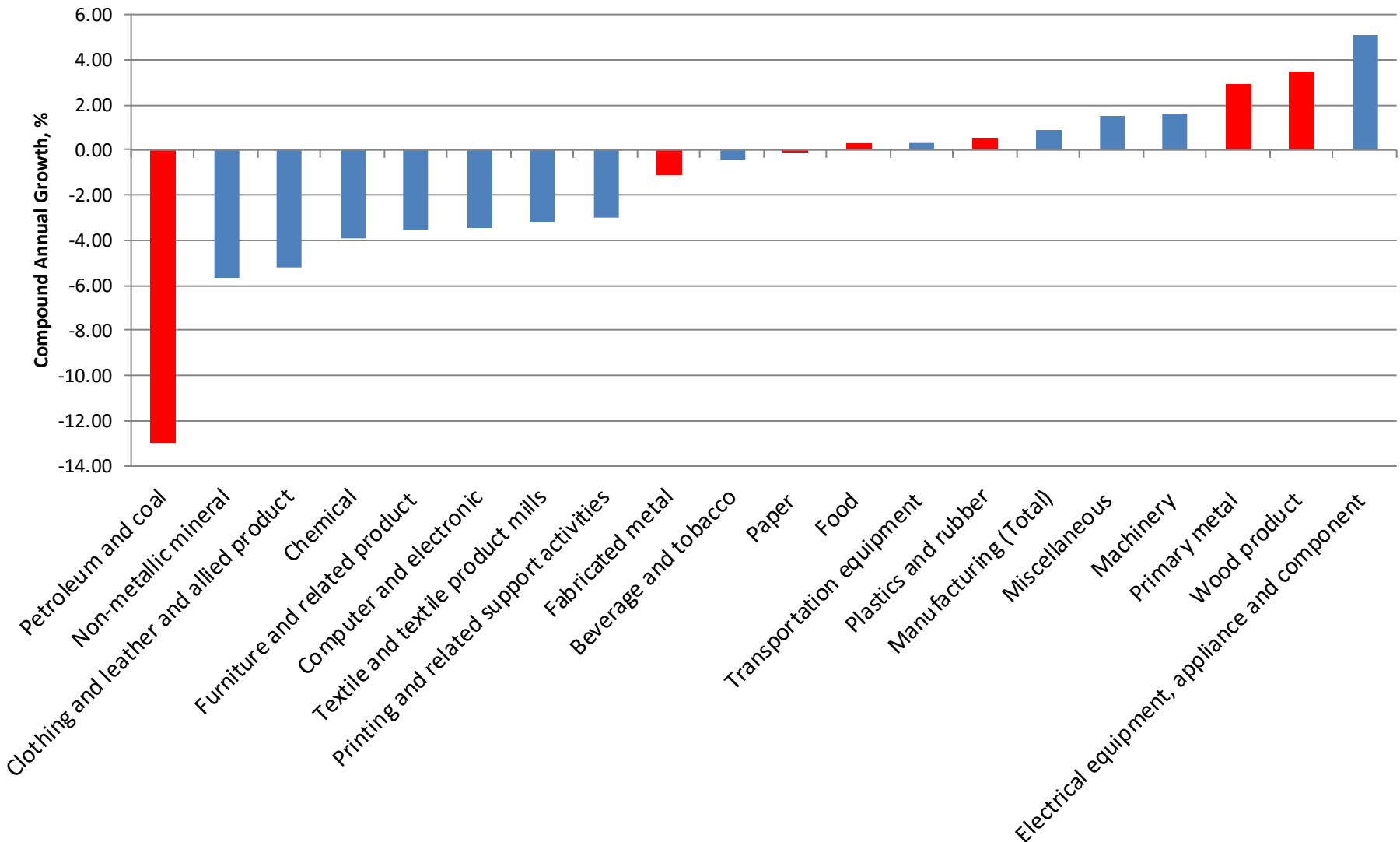
## Compound Annual Growth



Source: Statistics Canada – Table 36-10-0480-01

# Labour Productivity in 3-Digit Manufacturing Industries in New Brunswick, 1997-2008

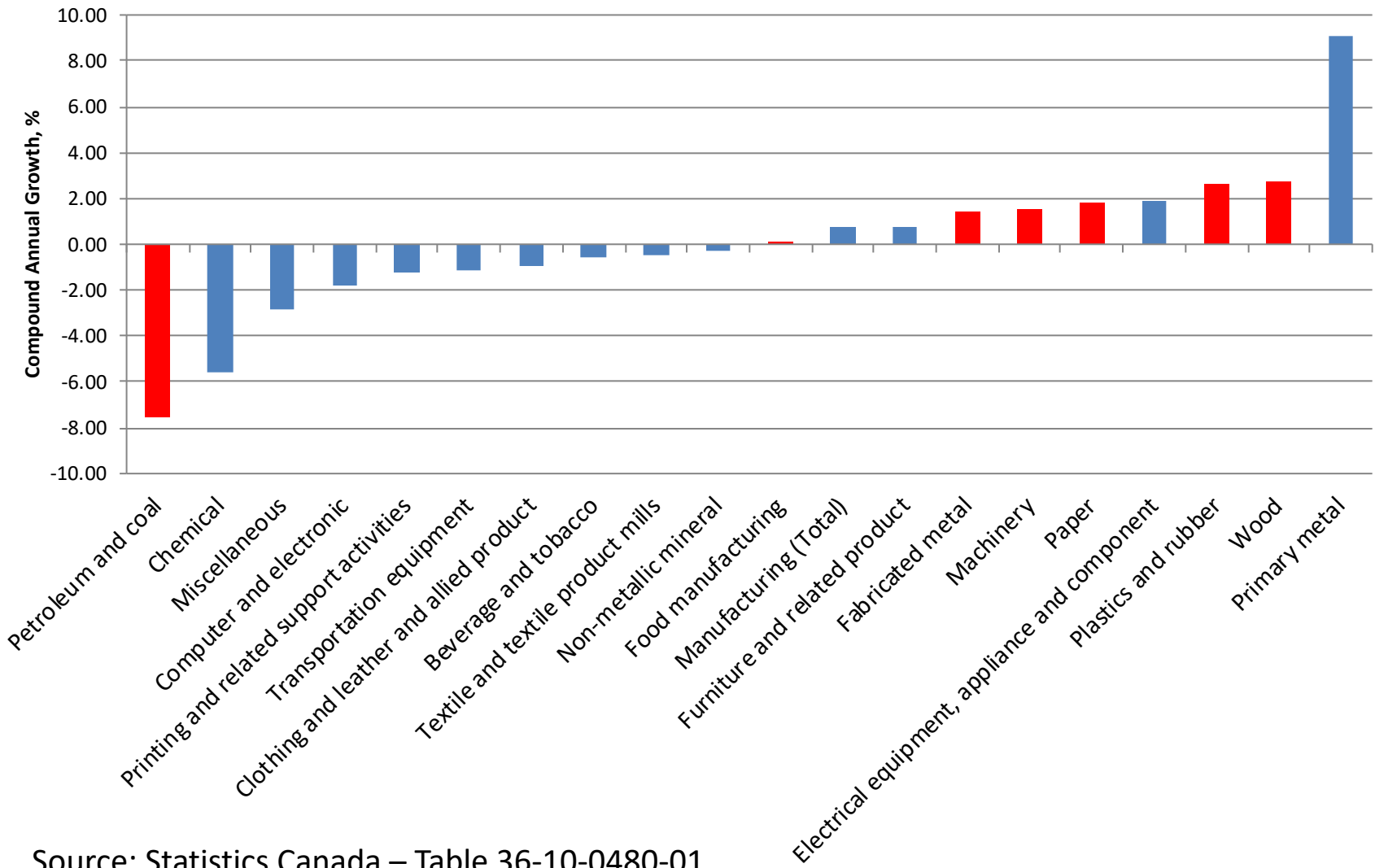
## Compound Annual Growth



Source: Statistics Canada – Table 36-10-0480-01

# Labour Productivity in 3-Digit Manufacturing Industries in New Brunswick, 1997-2018

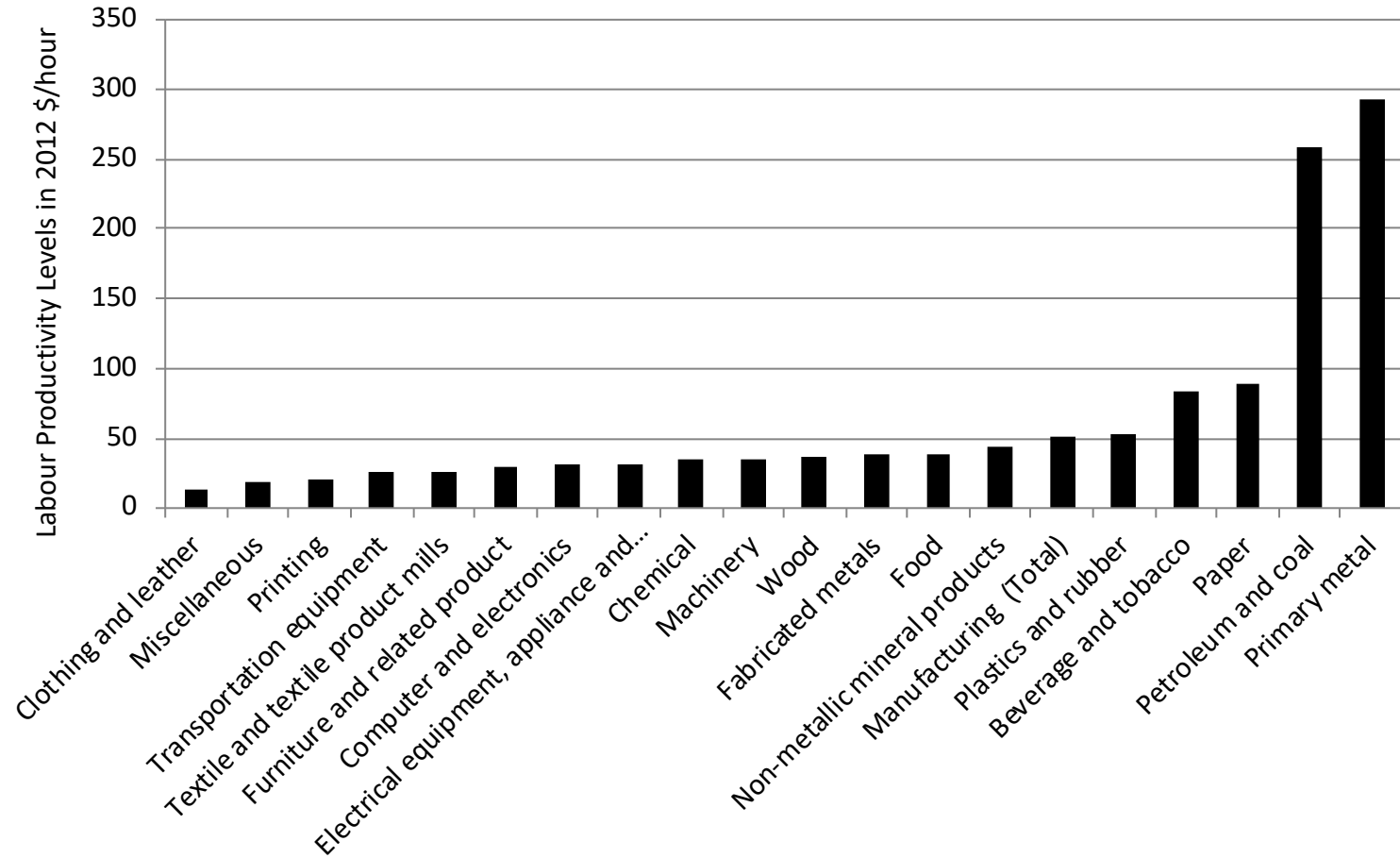
## Compound Annual Growth



Source: Statistics Canada – Table 36-10-0480-01

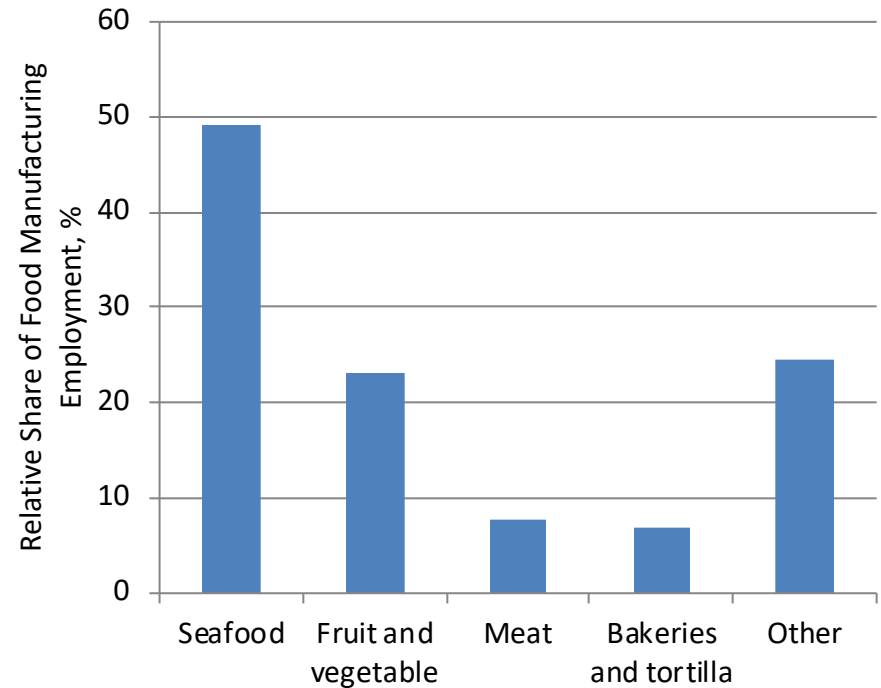
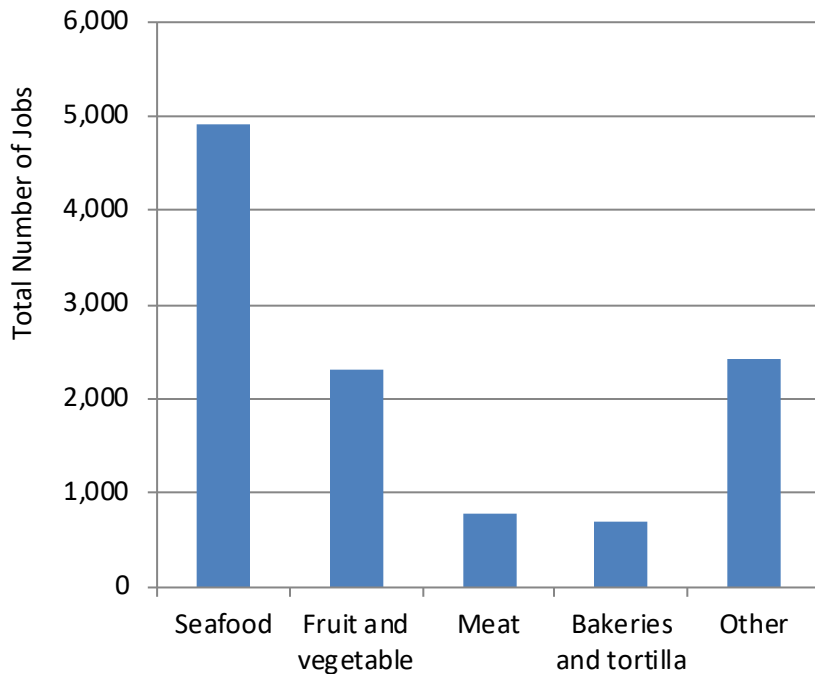
# Labour Productivity Levels in 3-Digit Manufacturing Industries in New Brunswick, 2018

Chained 2012 \$/hour



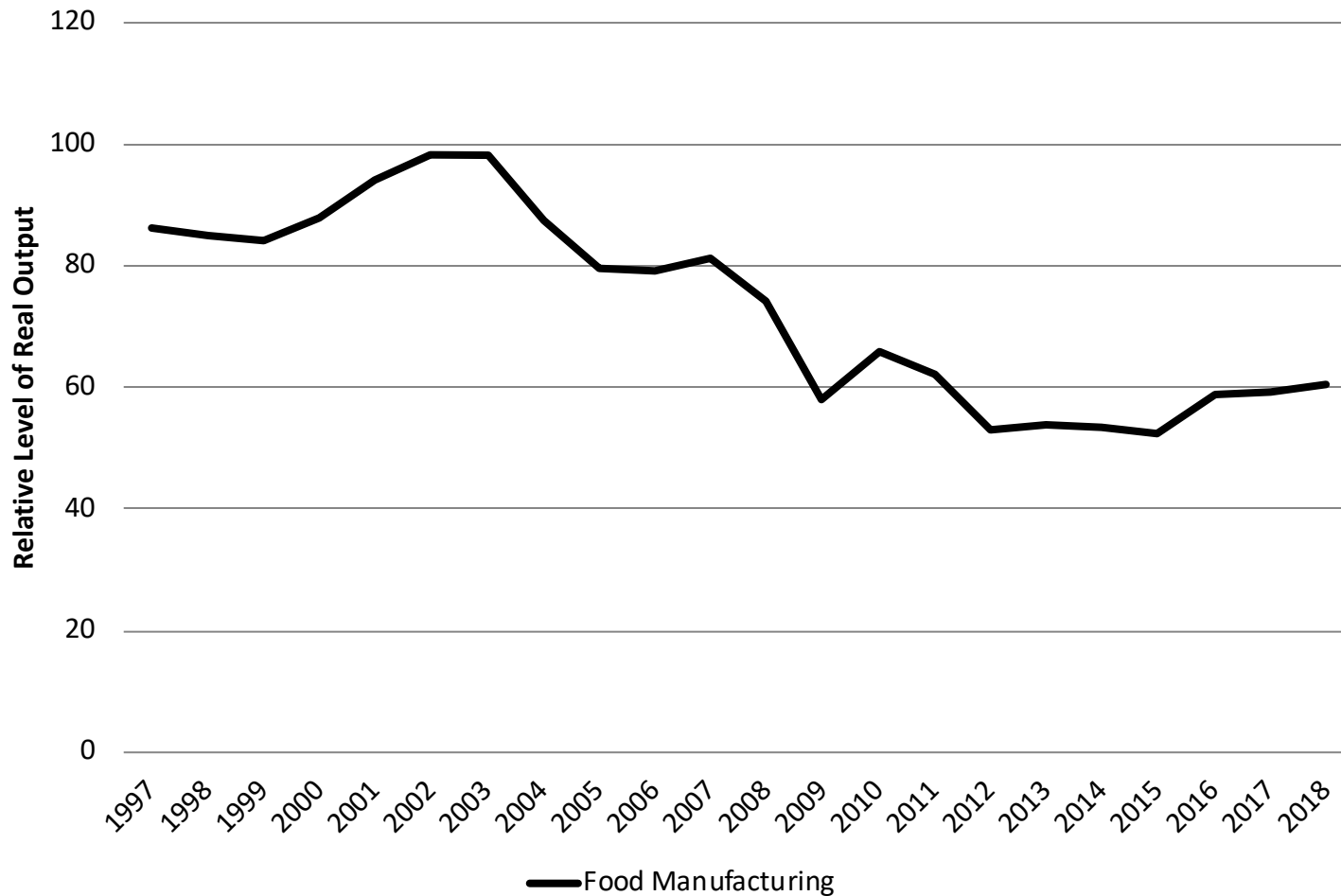
Source: Statistics Canada – Table 36-10-0480-01

# Employment in Food Processing Industry in New Brunswick, 2018



Note: The total number of jobs in the food manufacturing sector in New Brunswick is 9,980.

# Relative Level of Real Output per Hour in New Brunswick Food Manufacturing (Canada = 100 in all years)



Source: Statistics Canada – Table 36-10-0480-01

# Comparing Canada and New Brunswick, Food Manufacturing Sector

Year	Real Output		Output per Hour		Total Hours		Employment	
	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada
1997-2018	2.09	2.15	0.04	1.76	2.05	0.38	1.93	0.46
1997-2008	0.31	2.37	0.30	1.67	0.01	0.69	-0.21	0.72
2008-2018	4.08	1.90	-0.25	1.86	4.34	0.04	4.35	0.17

Source: Statistics Canada – Table 36-10-0480-01



# Relative Level of Real Output per Hour in New Brunswick Wood Manufacturing (Canada = 100 in all years)



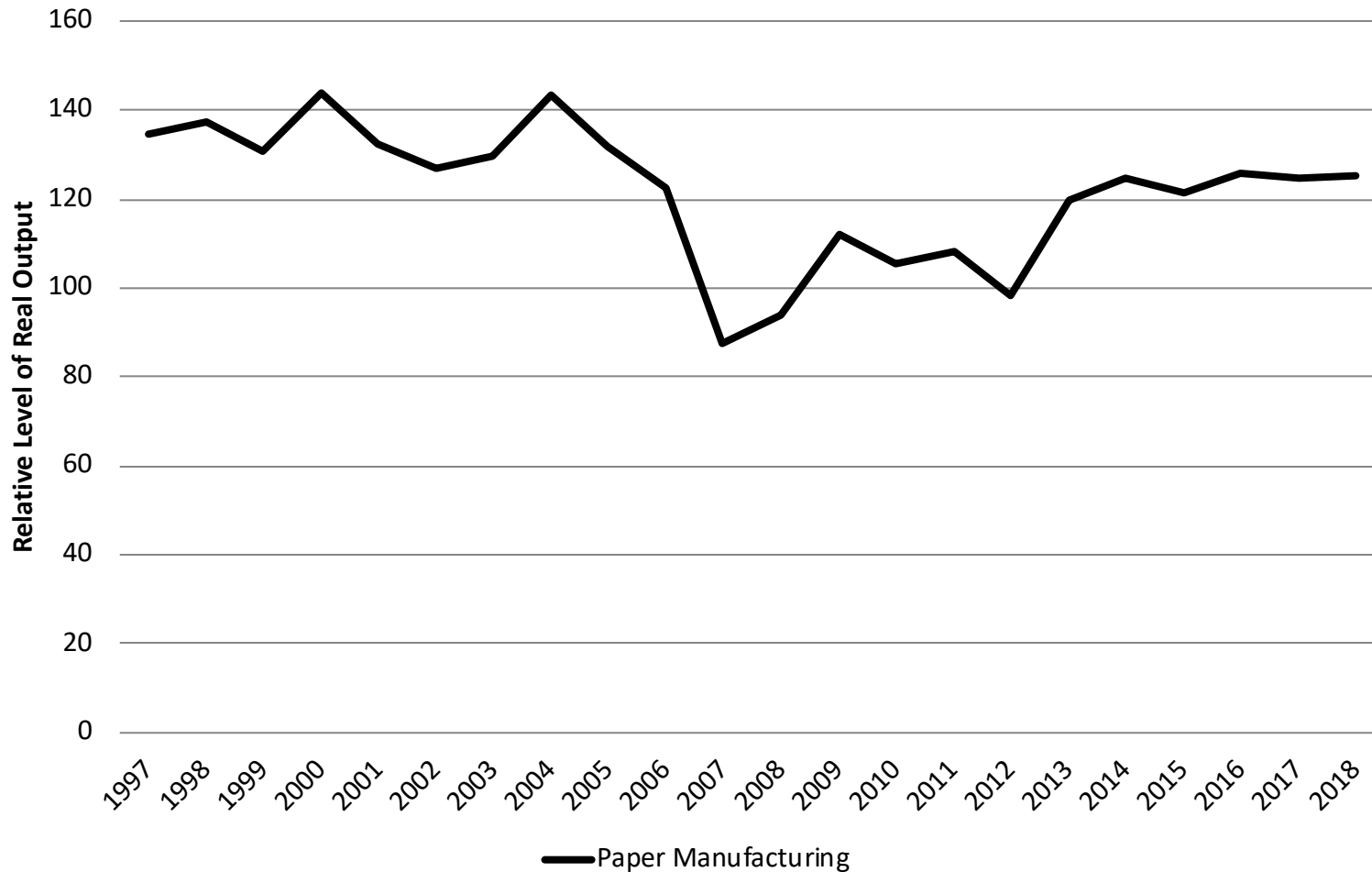
Source: Statistics Canada – Table 36-10-0480-01

# Comparing Canada and New Brunswick, Wood Manufacturing Sector

Year	Real Output		Output per Hour		Total Hours		Employment	
	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada
<b>1997-2018</b>	0.77	1.98	2.72	3.88	-1.89	-2.26	-1.70	-2.14
<b>1997-2008</b>	-1.12	1.05	3.45	6.10	-4.43	-3.90	-4.10	-3.62
<b>2008-2018</b>	2.90	1.05	1.92	1.48	0.97	-0.42	1.02	-0.49

Source: Statistics Canada – Table 36-10-0480-01

# Relative Level of Real Output per Hour in New Brunswick Paper Manufacturing (Canada = 100 in all years)



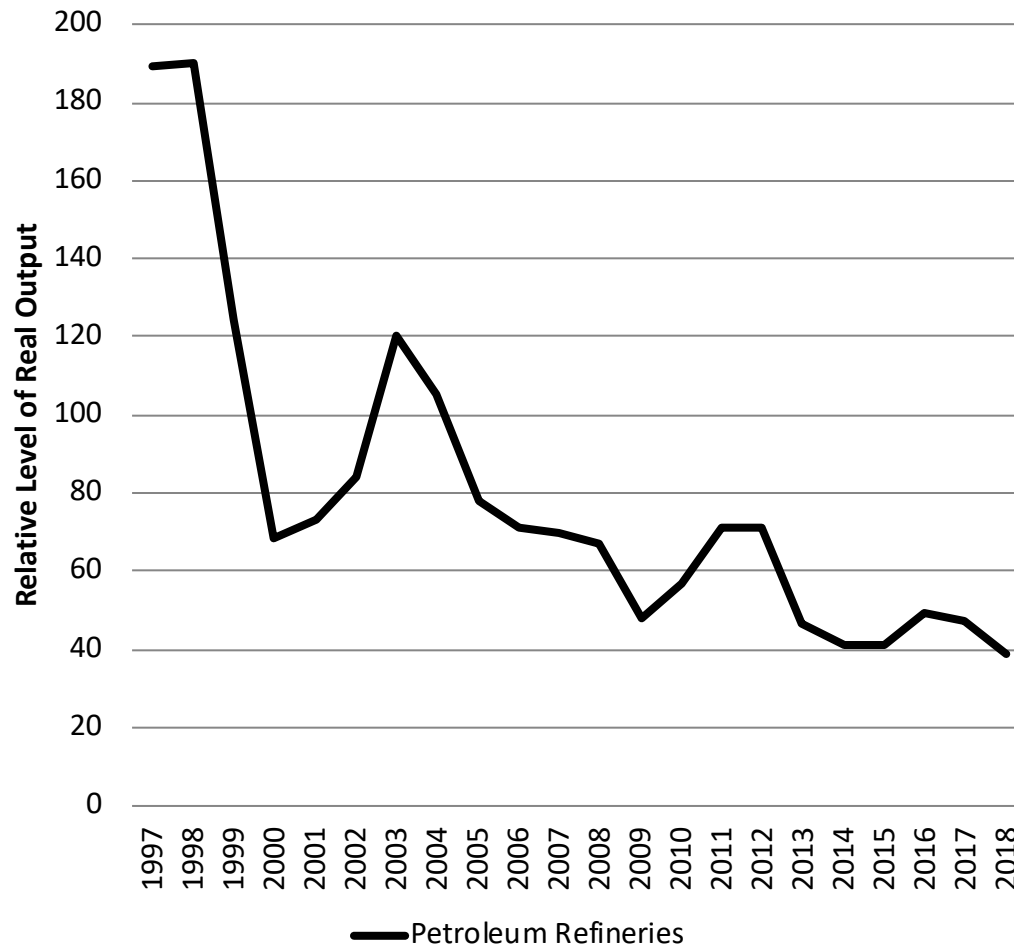
Source: Statistics Canada – Table 36-10-0480-01

# Comparing Canada and New Brunswick, Paper Manufacturing Sector

Year	Real Output		Output per Hour		Total Hours		Employment	
	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada
<b>1997-2018</b>	0.36	-1.03	1.81	2.14	-1.42	-3.11	-1.79	-3.09
<b>1997-2008</b>	-1.24	-0.48	-0.07	3.22	-1.17	-3.58	-1.58	-3.46
<b>2008-2018</b>	2.14	-1.62	3.92	0.98	-1.70	-2.58	-2.03	-2.69

Source: Statistics Canada – Table 36-10-0480-01

# Relative Level of Real Output per Hour in New Brunswick Petroleum Refineries (Canada = 100 in all years)



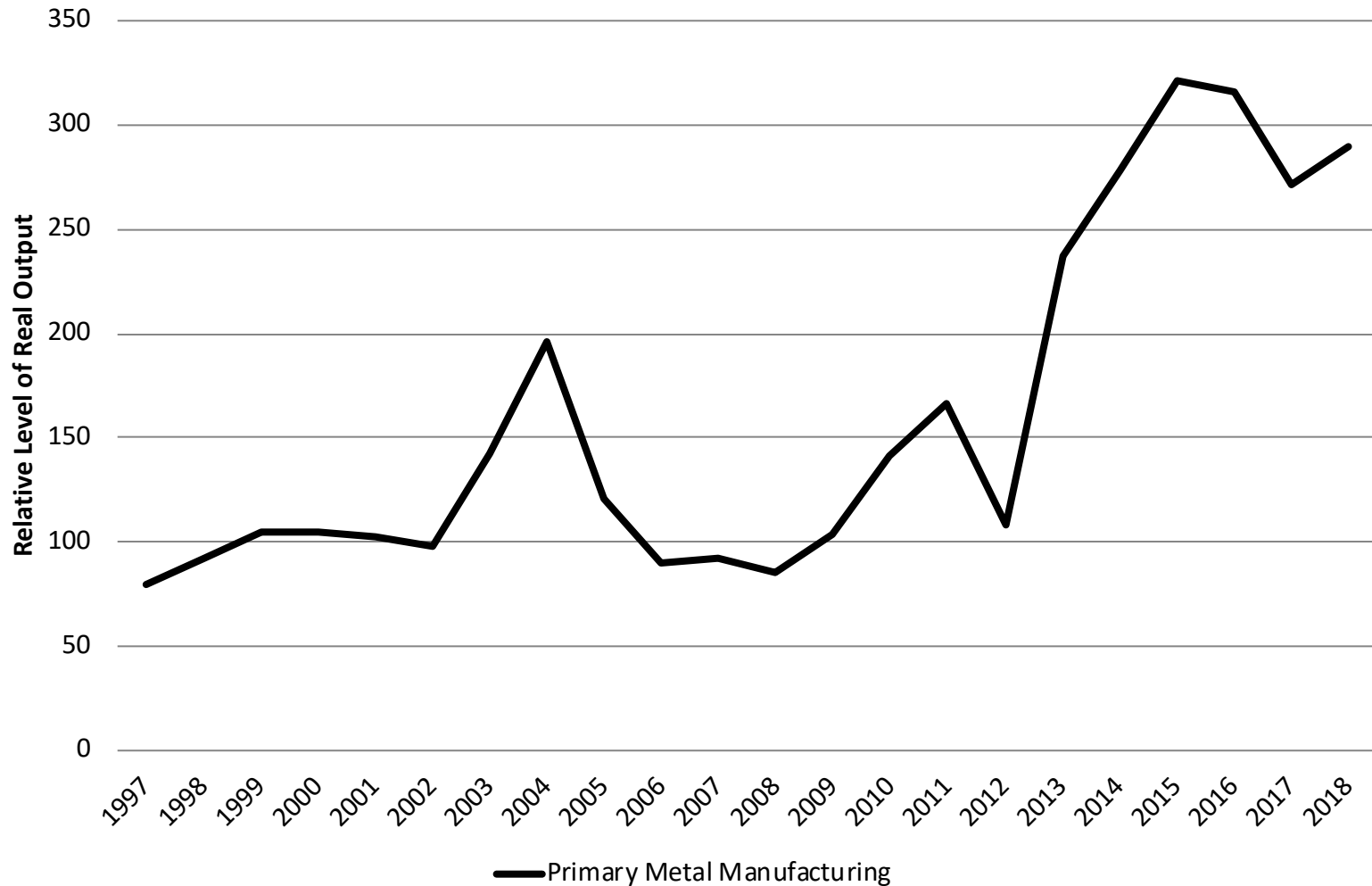
Source: Statistics Canada – Table 36-10-0480-01

# Comparing Canada and New Brunswick, Petroleum Refineries Sector

Year	Real Output		Output per Hour		Total Hours		Employment	
	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada
<b>1997-2018</b>	-1.93	1.76	-7.81	-0.59	6.38	2.37	6.72	2.46
<b>1997-2008</b>	-1.56	3.60	-12.98	-4.41	13.12	8.37	13.70	8.13
<b>2008-2018</b>	-2.32	-0.21	-1.75	3.78	-0.58	-3.85	-0.47	-3.44

Source: Statistics Canada – Table 36-10-0480-01

# Relative Level of Real Output per Hour in New Brunswick Primary Metal Manufacturing (Canada = 100 in all years)



Source: Statistics Canada – Table 36-10-0480-01

# Comparing Canada and New Brunswick, Primary Metal Manufacturing Sector

Year	Real Output		Output per Hour		Total Hours		Employment	
	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada	New Brunswick	Canada
<b>1997-2018</b>	4.53	0.84	9.08	2.58	-4.17	-1.70	-4.11	-1.59
<b>1997-2008</b>	2.99	1.53	2.92	2.24	0.07	-0.70	0.56	-0.45
<b>2008-2018</b>	6.24	0.08	16.29	2.95	-8.64	-2.79	-8.99	-2.83

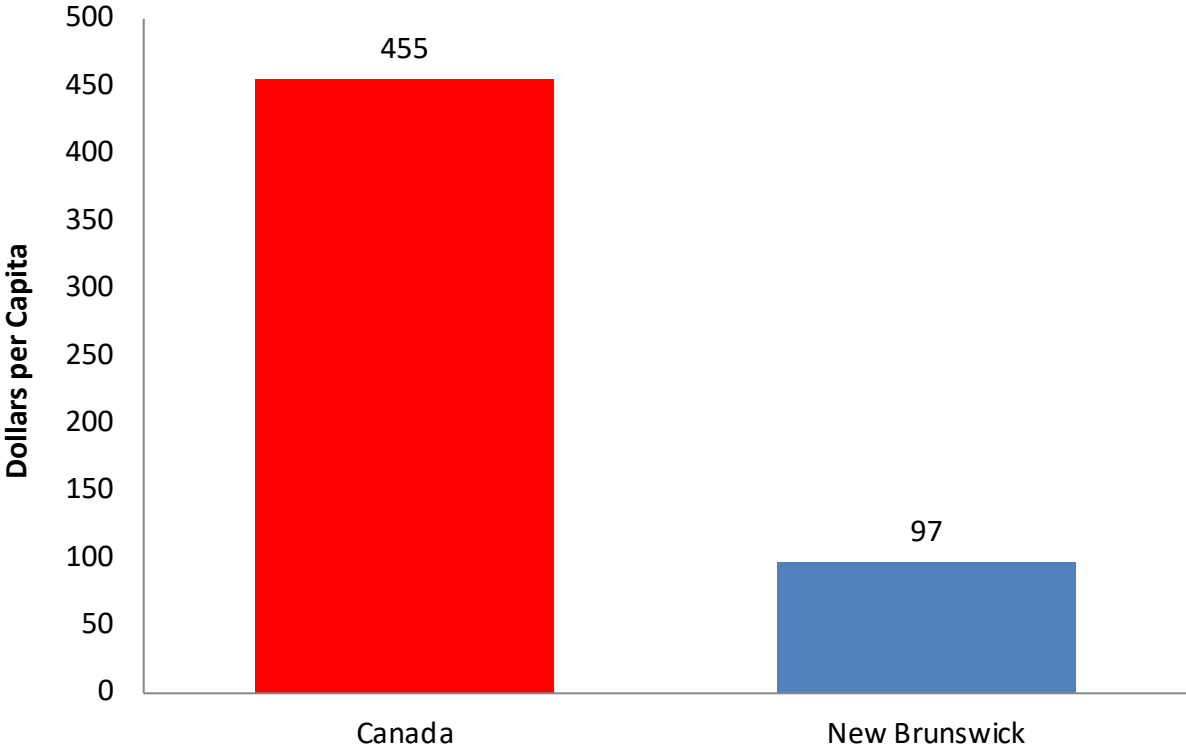
Source: Statistics Canada – Table 36-10-0480-01



# How Economists Think about Productivity Growth: The Growth Accounting Framework

- Labour quality
- Capital per worker or capital intensity
- Total factor productivity
  - Technical progress (disembodied technical change)
  - Economies of scale and scope
  - Capacity utilization
  - Measurement error
- More Fundamental Drivers of Productivity
  - Competition
  - Governance
  - X-inefficiency versus x-efficiency
  - Allocation and reallocation of resources
  - Resource base
  - Business culture

# Business Enterprise R&D Funding per Capita, 2014



Source: New Brunswick Innovation Agenda, April 2018

<https://www2.gnb.ca/content/dam/gnb/Departments/eco-bce/pdf/en/NBIInnovationAgenda.pdf>