

# Science-Metrix

## Science in Canada and Italy

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Everyone knows that Italy is renowned for its great food, fine arts and fast cars. On the other hand, and particularly in Europe, Canada is known for its vast expanse of land. Neither country is really recognised for its scientific achievements. Yet, Canada ranks 6<sup>th</sup> and Italy 7<sup>th</sup> at the world level in terms of papers published between 1992 and 2002 in highly cited journals (ISI Essential Science Indicators). This report dispels the myths of Italy's strengths in the arts and Canada's concentration on "outdoor sciences". In fact, Canadians publish more extensively in the arts and humanities than Italians do, and Italians are about to overtake Canadians in the production of natural sciences and engineering papers.

### Basic economic statistics

While Italy is about 80% more populated than Canada, Canada has an area 33 times larger than that of Italy. The labour force is proportionally greater in Canada with 51% of the population working in contrast to 41% in Italy. The GDP per capita of both countries is similar.

	Canada	Italy
Area (sq km)	9,976,140	301,230
Population (July 2002 est.)	31,902,268	57,715,625
Labour force (2001)	16,4 million (51% of pop.)	23,6 million (41% of pop.)
GDP*	U.S. \$875 billion	U.S. \$1,402 billion
GDP per capita*	U.S. \$27,700	U.S. \$24,300
Government type	Parliamentary democracy	Republic

\* Purchasing power parity – 2001 est.

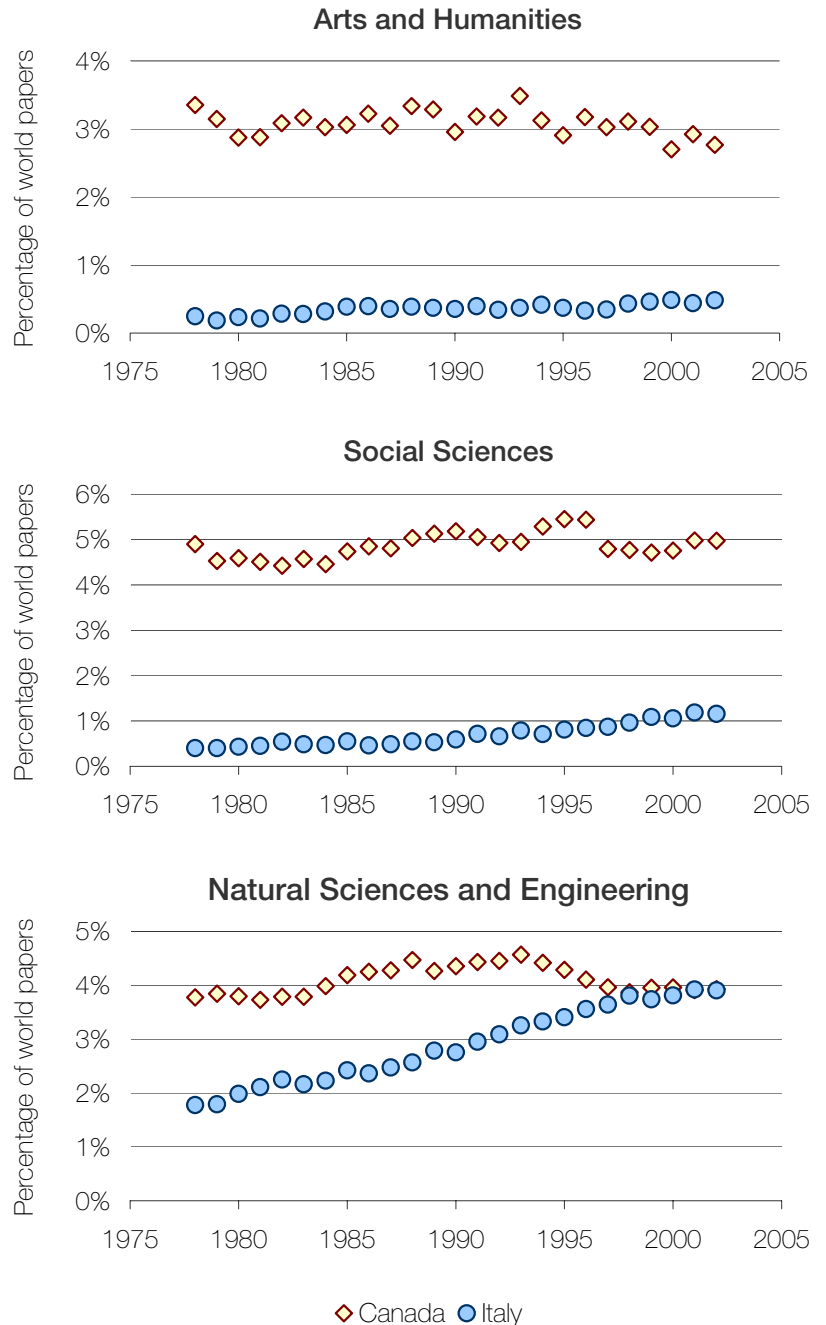
Source: CIA. 2002. *The World Factbook 2002*.

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Canada's output in the arts and humanities is around 3% on average whereas Italy does not produce much more than 0.5% of the world's output. This shows that Canadians in fact produce many more papers about the *belles lettres* and the *beaux arts* than Italians do. Similarly, in spite of a drop in output in the late 1990s, Canada has a much larger output in the social sciences than Italy – about 5% versus 1.2%. However, it is noteworthy that Italy's output has been rising steadily during the last 25 years, whereas Canadian output is more or less stable.

In the natural sciences and engineering, Canada's production of papers has been oscillating around the 4% mark of world output. This contrasts with Italy's production, which has been growing steadily from 1.8% 25 years ago to 3.9% last year. Hence, Italy has reached the same level of scientific production as Canada and, if the trend is maintained, will overtake it in the coming years.

### Percentage of World's Papers by Canada and Italy 1978-2002



Source: Compiled by Science-Metrix from AHCI, SSCI, SCI

Considering their strengths in science, where should Italy and Canada collaborate? One of the most advantageous fields is clinical medicine. Both countries specialise in this field, that is, their proportion of world papers in clinical medicine is higher than their general average. In addition, both countries clinical medicine papers are more cited than papers in this field are on average. In the area of human health, there is also a possibility for collaboration in immunology, although the strength of both countries is not as pronounced in this field compared to their strength in clinical medicine. Psychology and psychiatry is another field where both countries are more often cited than the world average, and it is one field where Canada puts greater emphasis than on average.

Canada and Italy would also mutually benefit from scientific collaboration in mathematics and in physics and, to a lesser extent, in chemistry. Importantly, space science and computer science are among the most promising fields for scientific and technological collaboration. Although neither country puts strong emphasis on materials science and engineering, both countries publish papers that are cited more often than the world average in those fields, so there is potential for high-quality collaboration.

**Distribution of Scientific Papers by Field in Canada and Italy, 1997-2001**

Field	Index of specialisation		Relative impact	
	Canada	Italy	Canada	Italy
Ecology/Environmental	<b>1.7</b>	0.7	<b>20%</b>	-14%
Plant & Animal Sciences	<b>1.5</b>	0.6	<b>13%</b>	-11%
Agricultural Sciences	1.0	0.8	<b>23%</b>	0%
Biology & Biochemistry	<b>1.1</b>	1.0	<b>8%</b>	-23%
Microbiology	0.9	0.8	<b>5%</b>	-19%
Molecular Biology	<b>1.2</b>	1.0	1%	-26%
<b>Chemistry</b>	0.7	1.0	<b>28%</b>	<b>5%</b>
<b>Mathematics</b>	<b>1.1</b>	<b>1.3</b>	<b>16%</b>	<b>5%</b>
<b>Physics</b>	0.6	<b>1.2</b>	<b>20%</b>	<b>22%</b>
Geosciences	<b>1.7</b>	1.0	<b>7%</b>	-18%
<b>Space Science</b>	1.0	<b>2.3</b>	<b>33%</b>	<b>13%</b>
<b>Materials Science</b>	0.7	0.6	<b>15%</b>	<b>5%</b>
<b>Engineering</b>	1.0	1.0	3%	<b>11%</b>
<b>Computer Science</b>	<b>1.1</b>	<b>1.3</b>	<b>10%</b>	<b>8%</b>
<b>Clinical Medicine</b>	1.0	<b>1.2</b>	<b>34%</b>	<b>11%</b>
Neurosciences	<b>1.4</b>	<b>1.3</b>	4%	-19%
<b>Immunology</b>	1.0	<b>1.1</b>	<b>8%</b>	2%
Pharmacology	0.9	<b>1.2</b>	<b>20%</b>	-3%
<b>Psychology/Psychiatry</b>	<b>1.7</b>	0.4	<b>5%</b>	<b>18%</b>
Social Sciences	<b>1.3</b>	0.2	-6%	4%
Economics & Business	<b>1.3</b>	0.5	-5%	-32%

Source: Compiled by Science-Metrix from Essential Science Indicators

These data dispel lasting myths about the science systems of Italy and Canada. Both countries are active in strategically important fields and can mutually benefit from collaboration.



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