OXFORD ECONOMICS

TORONTO GLOBAL

THE ECONOMIC IMPACT OF RECURSION PHARMACEUTICALS

JANUARY 2024

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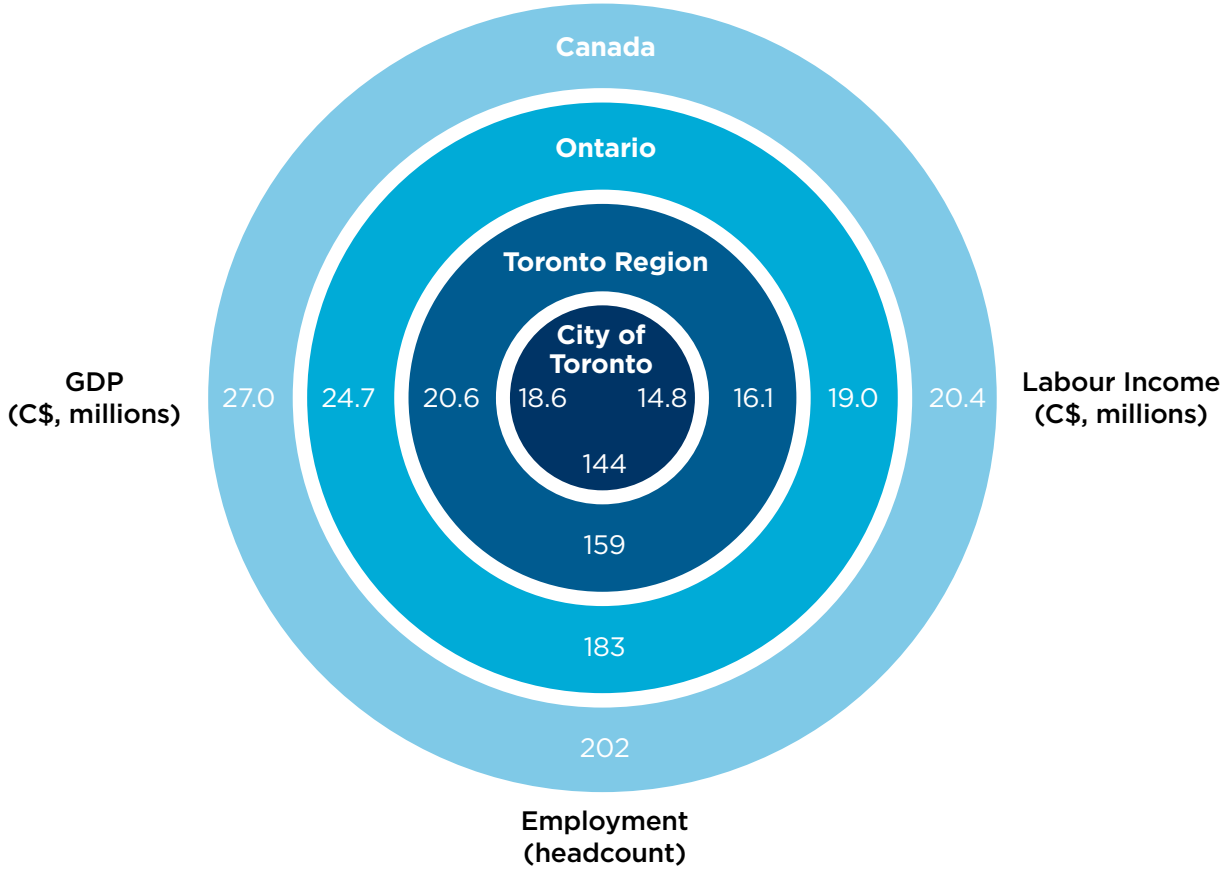
EXECUTIVE SUMMARY

Oxford Economics was commissioned by Toronto Global's SCORE Program to assess the estimated 2023 economic impacts of Recursion Pharmaceutical's newest Canadian facility located in the City of Toronto, Ontario. This Oxford Economics study includes the impacts of Recursion Pharmaceutical's investment and forecast employment of 100 workers at the facility in the City of Toronto, the Toronto Region, Ontario, and Canada.

The total estimated economic impacts[1] at all four geographic levels are summarized in the figure below.[2]

Recursion Pharmaceutical's activities in the City of Toronto impact all geographies. Most notably, the company's activities are expected to contribute C$27.0 million towards GDP, support 202 jobs with C$20.4 million in labour income, and generate C$11.5 million in tax revenues across Canada.

Recursion Pharmaceuticals leverages advanced AI and machine learning capabilities in conjunction with its vast proprietary dataset to support and accelerate the drug discovery process. As a key player in the AI-enabled drug discovery space, the company's impacts extend beyond its direct economic contribution while bolstering the region's role as a leader in biotechnology. As stated by the Premier of Ontario, Doug Ford: "This investment has the potential to positively impact our healthcare system and enhance access to cutting-edge biomedicine, while deeply impacting countless lives in Ontario and beyond."[3]



[1] Total economic impacts include direct, indirect, and induced impacts.
[2] Each amount in the figure represents the total (and not incremental) impact for the region. For example, the total employment impact in the Toronto Region is 159 and reflects an additional 15 jobs outside of the 144 jobs in the City of Toronto.
[3] https://finance.yahoo.com/news/recursion-celebrates-opening-canadian-headquarters-154800518.html

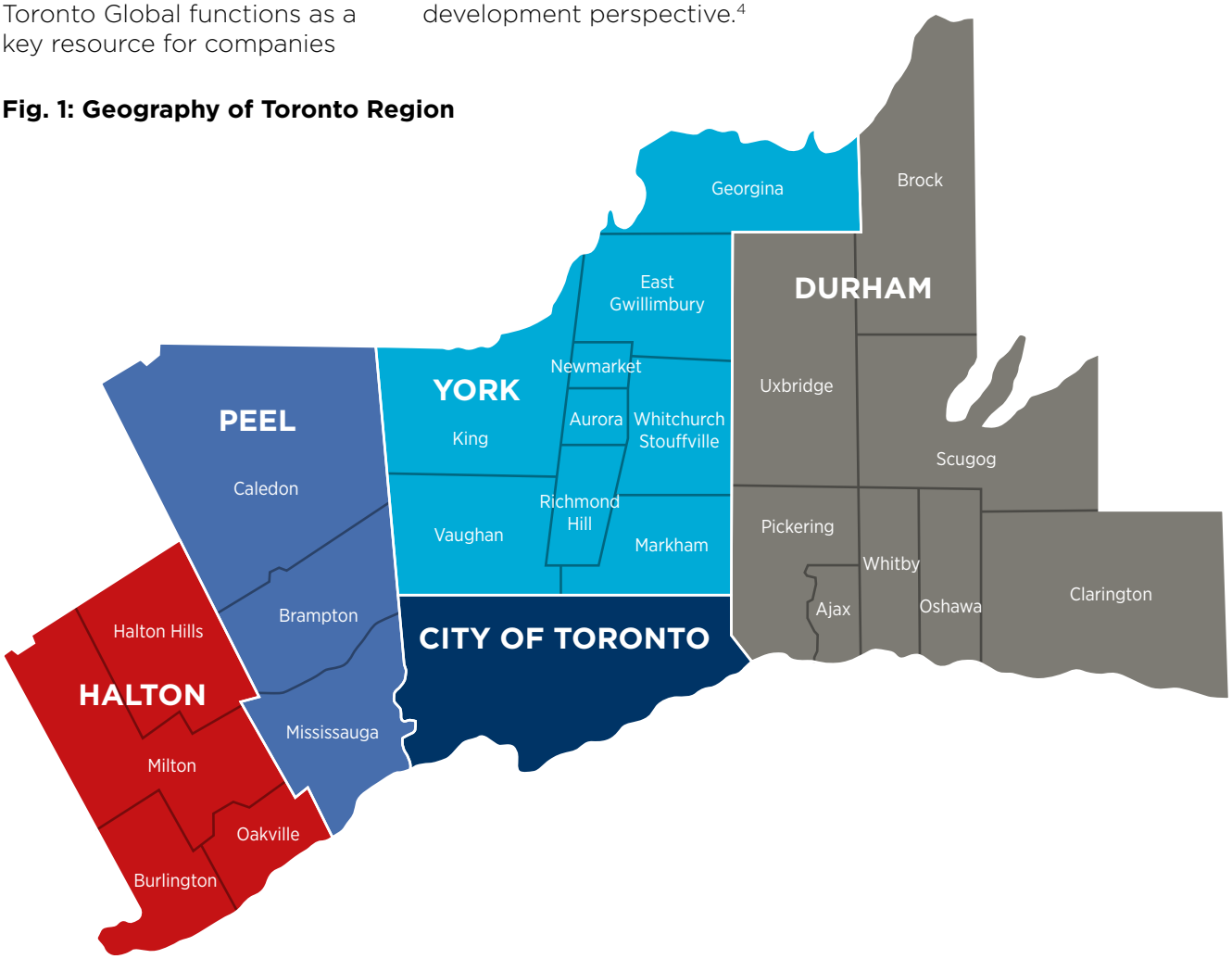
1. INTRODUCTION

Toronto Global partners with companies looking to expand their footprint in the Toronto Region, Canada's business and financial capital. With robust recent economic growth and a strong diversified base of economic activity, the Toronto Region provides opportunities for expanding companies to tap into a diverse and innovative workforce, operate in a competitive business landscape, and serve as a gateway to further opportunities across Canada, North America, and the rest of the world.

Toronto Global functions as a key resource for companies interested in the Canadian market. The organization provides key services, such as facilitating investments and operational transitions, while connecting growing companies with a wide range of regional resources. The **Supply Chain Onshoring, Resilience, and Expansion (SCORE) program** is an initiative funded by FedDev Ontario and executed by Toronto Global to help better understand the impact of the supply chain gaps, risks, and opportunities caused by global disruption from an economic development perspective.[4]

Oxford Economics was commissioned by Toronto Global's SCORE Program to estimate the full economic impact of Recursion Pharmaceutical's newest Canadian facility at the municipal (City of Toronto), regional (Toronto Region), provincial (Ontario), and national levels. The Toronto Region is made up of twenty-five municipalities, see Fig. 1 below. Toronto Global represents the entire region and works with economic development partners across the region to help secure investments in their jurisdictions.

Fig. 1: Geography of Toronto Region



[4] https://torontoglobal.ca/score

One of Toronto Global's clients is **Recursion Pharmaceuticals**, a biotechnology company based in Salt Lake City, Utah, and rapidly making its mark in the biotech industry. Recursion Pharmaceuticals leverages proprietary datasets and advanced computational tools such as machine learning to develop new insights and approaches to drug discovery.[5]

In 2021, Recursion Pharmaceutical announced its newest Canadian facility in Toronto, which expects to employ approximately 100 workers onsite by 2023.[6] The facility, at 28,000 square feet, will be the Canadian headquarters for the company, which already has offices in other parts of the country.[7]

Recent acquisitions made by Recursion Pharmaceuticals in Canada illustrate the company's commitment to expanding its reach while also investing in the AI-enabled drug discovery space.[8] Both Cyclica, headquartered in Toronto, and Valence, headquartered in Montreal, are expected to enhance Recursion's research and innovation capabilities, with the strategic integration bolstering Recursion's position in the marketplace. These acquisitions keep highly skilled talent and cutting-edge research in Canada, strengthening the country's position as a hub for pharmaceutical and biotechnology innovation and creating long term economic benefits.

Recursion Pharmaceuticals CEO Chris Gibson discusses in a recent interview that "Recursion has built one of the largest biological data sets on Earth" upon which machine learning applications can be built to produce innovative insights in biology and chemistry.[9] The revolutionary work being done by the company makes it well poised to attract investment and top talent that can only benefit the local and regional economies. A key example of this is NVIDIA's recent $50 million investment in Recursion Pharmaceuticals, signaling the broader economic potential of the company.

As described in the box in chapter 3, the economic impact analysis in this report includes the activity at the facility itself (the direct impact), along with the full supply chain (indirect) impact, and the economic activity supported by the spending of direct and indirect workers (induced impact). Impacts are measured in terms of GDP, labour income, employment, and taxes generated.

The remainder of this report is organized as follows:

- Chapter 2 describes the modelling inputs around Recursion Pharmaceuticals' direct activity and **its supply chain spending**.
- Chapter 3 presents the **economic impact results** by geography:
  - 3.1 presents results for the municipality (**City of Toronto**)
  - 3.2 presents results for the region (**Toronto Region**)
  - 3.3 presents results for the province (**Ontario**)
  - 3.4 presents results for **Canada**.
- Chapter 4 concludes.
- The Appendix provides additional technical details.

[5] https://www.recursion.com/approach
[6] https://www.newswire.ca/news-releases/recursion-announces-its-first-major-multidisciplinary-expansion-in-toronto-to-further-tech-enabled-drug-discovery-891672362.html
[7] https://finance.yahoo.com/news/recursion-celebrates-opening-canadian-headquarters-154800518.html
[8] https://ir.recursion.com/news-releases/news-release-details/recursion-enters-agreements-acquire-cyclica-and-valence-bolster
[9] https://www.clinicalleader.com/doc/tapping-into-ai-ml-partnerships-to-advance-drug-discovery-with-recursion-pharma-0001

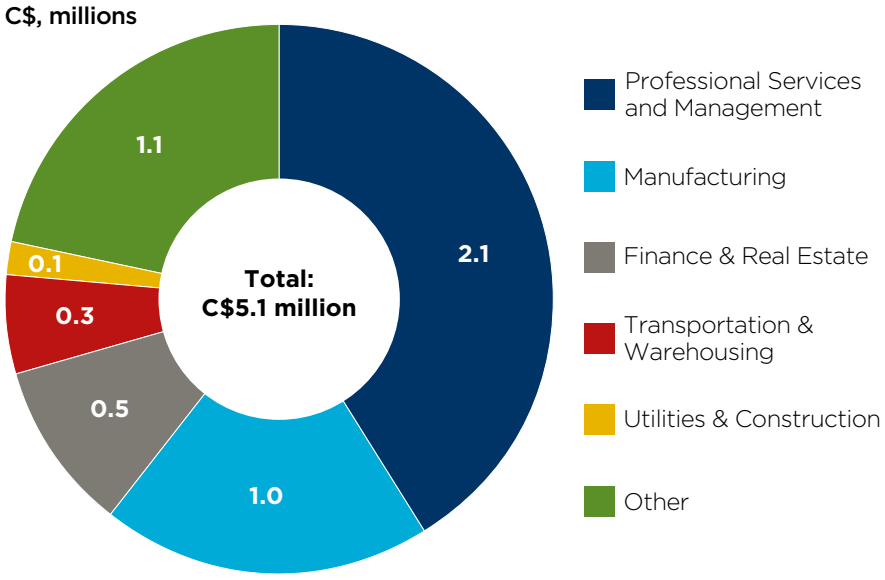
2. RECURSION PHARMACEUTICALS' SUPPLY CHAIN

Recursion Pharmaceuticals' new facility in the City of Toronto is expected to employ 100 workers as part of its broader mission to revolutionize the drug discovery process through advanced machine learning techniques.

For this analysis, Oxford Economics profiled the economic activity taking place at Recursion Pharmaceuticals' Toronto facility using industry-level macroeconomic data. This facility is expected to employ a total of 100 workers in the scientific research and development (R&D) industry. The economic impacts presented below are thus calculated as the sum of the 100 workers' worth of output in the Scientific R&D Services (NAICS 5417) based on industry profiles for Ontario from Statistics Canada.[10] No additional assumptions particular to this facility were made other than its employment and industry designations.

Based on these assumptions, we estimate the facility's supply chain spending to total approximately C$5.1 million (Fig. 2). This supply chain spending includes the broad array of goods and services that the facility purchases as inputs to its production. The majority of this supply chain spending at over 40% went to the outputs of the professional services and management industry (over C$2.1 million) followed by nearly 20% towards the manufacturing industry (at just under C$1.0 million).[11] Out of the total employment supported by the supply chain, the largest represented sector was professional, scientific, and technical services (at 35%), followed by accommodation and food services (at 10%) and administrative, support, and waste management services (at 9%).[12]

Fig. 2: Estimated total global procurement spend, 2023[13]



Source: Oxford Economics

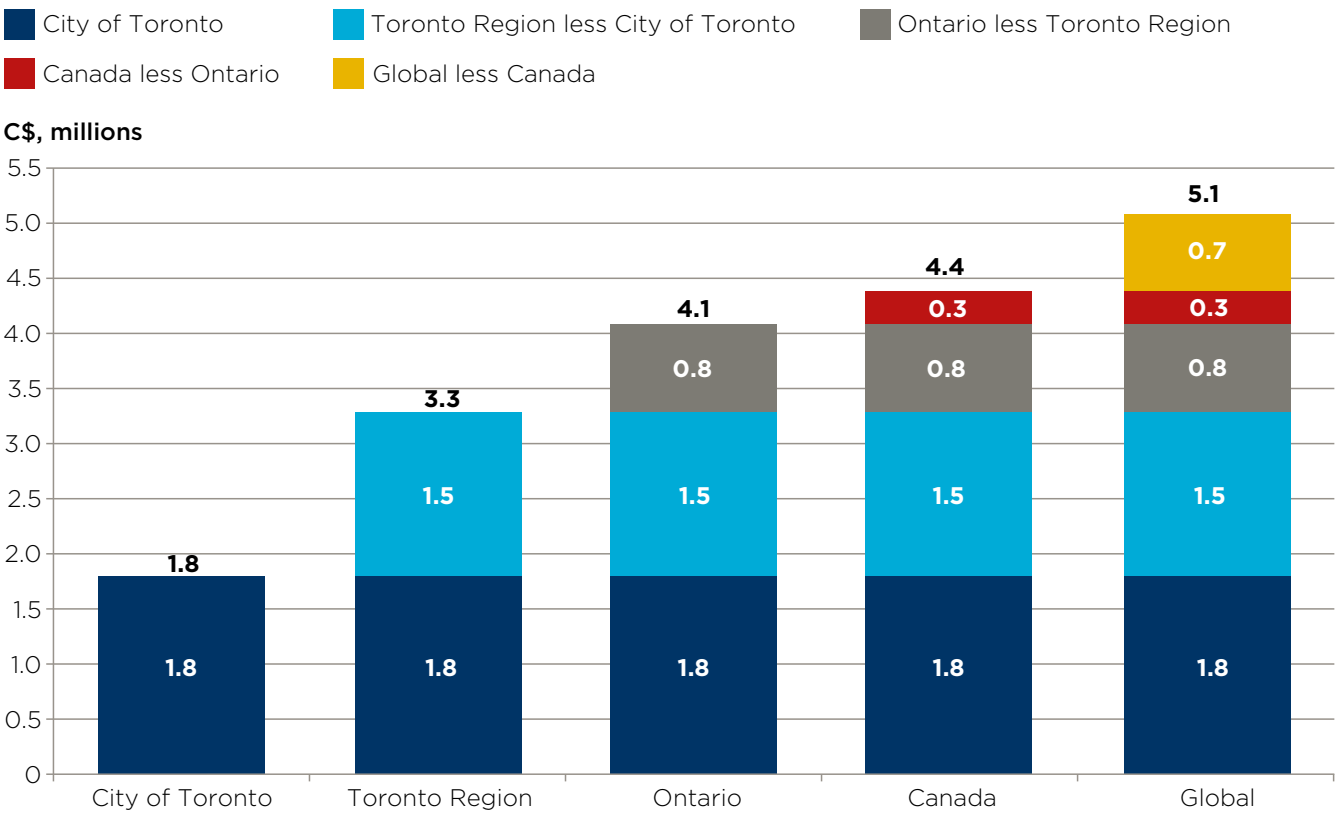
[10] See https://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=1181553 and the Appendix for additional details. Note that it is a basic tenet of NAICS that each establishment (i.e., physical location of economic activity) is assigned a single official industry classification based on its primary economic activity.
[11] The largest category of spending within the professional services and management industry was in management, scientific, and technical consulting services (at over C$0.9 million), followed by computer systems design and related services (at nearly C$0.6 million).
[12] These percentages represent the breakout of the indirect (supply chain) employment at a national level and reflect employment supported in sectors across the entire economy rather than just a few select high skilled industries.
[13] These values are in purchaser prices rather than producer prices and include relevant taxes paid on products. Thus, for example, trade and transport margins on manufactured goods are included here under manufacturing. See the Appendix for more details.

In order to calculate the economic impacts of Recursion Pharmaceuticals' activities specifically within the City of Toronto, Toronto Region, and Ontario, it is necessary to apportion Recursion Pharmaceuticals' supply chain spending by these geographies as well. Fig. 3 shows the breakout of the total supply chain spending of C$5.1 million. The total spending is based on the spending data in the 2019 Ontario Input-Output table provided by Statistics Canada, portioned out by employment in the Scientific R&D Services industry, and adjusted to reflect 2023 dollars.

Of the C$5.1 million in total global supply chain spending for Recursion Pharmaceuticals' newest Canadian facility, we estimate that approximately 35% of this (C$1.8 million) will be spent on goods and services produced within the City of Toronto, approximately 65% (C$3.3 million) on goods and services produced in the Toronto Region, approximately 80% (C$4.1 million) on goods and services produced in Ontario, and 86% (C$4.4 million) on goods and services produced across all of Canada.

The intermediate input spending that is spent locally within each region is based on the relevant import shares in the IO table for each region. The regional spending is derived from the underlying Ontario IO model and leverages techniques originally pioneered by Flegg et. al. (1995)[14] among others (see Appendix for further information).

Fig. 3: Estimated supply chain spending by region



Source: Oxford Economics

[14] A. T. Flegg, C. D. Webber & M. V. Elliott (1995) On the Appropriate Use of Location Quotients in Generating Regional Input–Output Tables, Regional Studies, 29:6, 547-561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3. ECONOMIC IMPACT RESULTS

This chapter presents the estimated economic impacts of Recursion Pharmaceuticals in the city of Toronto (section 3.1), the Toronto Region (3.2), Ontario (3.3), and Canada (3.4). The impacts presented in this chapter are measured in terms of GDP, labour income, employment, and tax revenues supported by Recursion Pharmaceuticals, and the total impacts are broken out by direct, indirect, and induced channels where possible. These concepts are explained in further detail in the box on the following page.

The **direct impacts** are identical across all four geographic regions as they represent the economic activity taking place at the Recursion Pharmaceuticals facility itself.

By contrast, the **indirect impacts**, which represent the economic activity of Recursion Pharmaceuticals' full supply chain, and the **induced impacts**, which represent the economic activity supported by the spending of direct and indirect workers out of wages, vary by geographic region.

Larger regions will have larger indirect and induced impacts than the smaller regions they contain because the impacts in the larger region include all of the activity in the smaller region plus additional indirect and induced activity in the remainder of the larger region. With some caveats, the difference between the economic impacts in the larger region and those in the smaller region are close to, and can be thought of as, the impacts in the remainder of the larger region—for example, the difference between Recursion Pharmaceuticals' impacts (whether measured in GDP, labour income, employment, or taxes) in the Toronto Region and its impact in Ontario can be considered as the impact in Ontario outside the Toronto Region.[15]

In addition to the GDP, labour income, and employment impact, each of the four regional subsections below presents Recursion Pharmaceuticals' tax impact. These **tax impacts** include taxes supported by the direct, indirect, and induced economic activity, and include federal, provincial, and municipal taxes. The total tax impacts are broken out within each region by tax type: corporate taxes, taxes on products, income taxes, and municipal taxes.

Taxes on products are based on tax data that are integrated into the Statistics Canada IO data that underly the impact modeling. Corporate taxes, and income and social insurance taxes, are calculated by applying effective tax rates from Statistics Canada data to the capital income and labour income, respectively, from the impact results. Municipal tax estimates are based on Statistics Canada data on the ratio of municipal property tax receipts to GDP for the province of Ontario. This ratio is applied to the GDP impact results from each of the regional models to estimate municipal tax receipts in that region.

[15] The caveat with this oversimplification is that the IO model used to calculate impacts in the smaller region will not capture supply chain spending that leaves the region before returning. For example, if Recursion Pharmaceuticals purchases inputs from a supplier outside the Toronto Region but in Ontario, and that supplier purchases inputs from a supplier inside the Toronto Region, the impact of the economic activity at this second-tier supplier will be captured as part of Recursion Pharmaceuticals' indirect impact in the Ontario model but will be lost in the Toronto Region model, even though it does take place in the Toronto Region. However, these effects are small in magnitude.

AN INTRODUCTION TO ECONOMIC IMPACT METHODOLOGY

An input-output model follows the flow of spending through the economy. The model captures and quantifies the estimated impact of the economic activity of Recursion Pharmaceuticals' operations on supply chains, wage-induced spending, economic leakages, and taxes paid to federal, provincial, and local governments.

The economic impacts of Recursion Pharmaceuticals are measured through three channels:

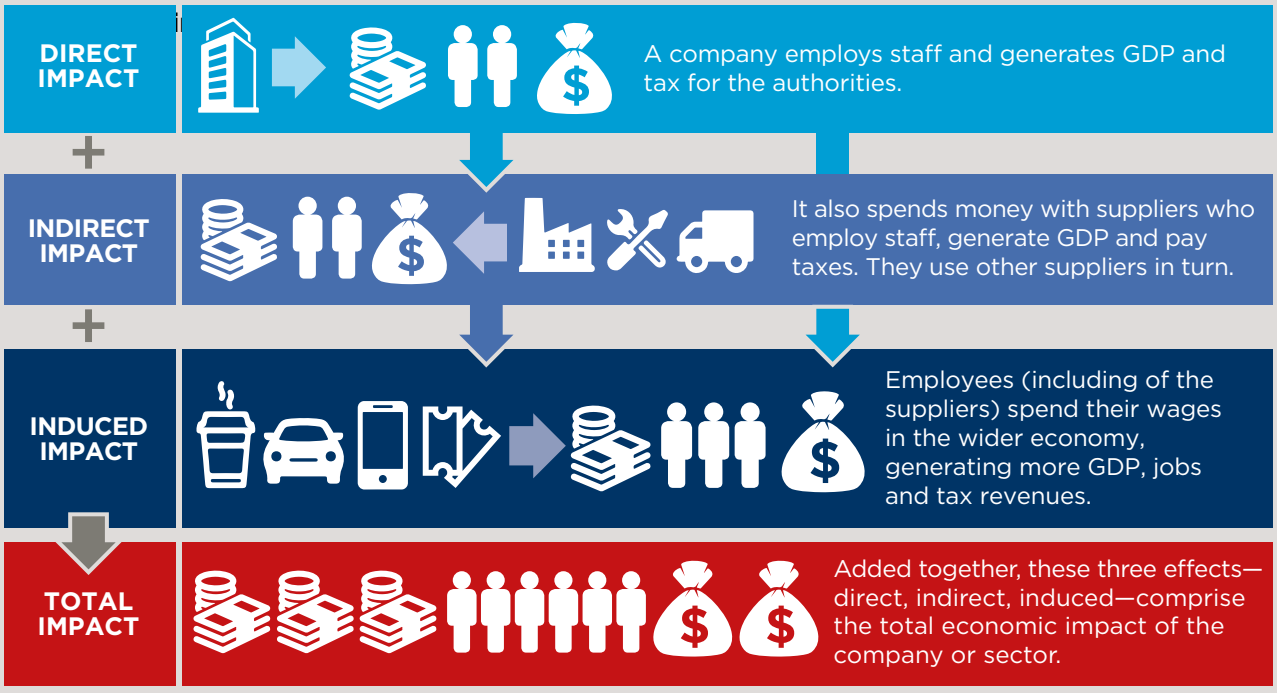
- **Direct impact:** economic activity at Recursion Pharmaceuticals itself.
- **Indirect impact:** economic activity along Recursion Pharmaceuticals' full supply chain.
- **Induced Impact:** economic activity resulting from direct and indirect workers spending their wages in the broader economy.
- **Total impact:** the sum of direct, indirect, and induced impacts.

Oxford Economics' model captures the inter-industry relationships, wage-induced spending, and ripple effects that result from the economic activity of Recursion Pharmaceuticals.

The economic impact is measured in terms of:

- **GDP:** value-added economic activity.
- **Labour Income:** total compensation (including the cost benefits) of workers.
- **Employment:** total jobs, measured on a headcount basis, including both wage and salary workers and the self-employed.
- **Taxes:** total taxes generated by the direct, indirect, and induced economic activity.

Throughout, all results are for 2023 with monetary results expressed in 2023 Canadian dollars, abbreviated C$, unless otherwise specified.



3.1 CITY OF TORONTO

Recursion Pharmaceuticals' newest Canadian facility is located in the City of Toronto, Ontario. The economic impacts on this region are presented in Fig. 4.

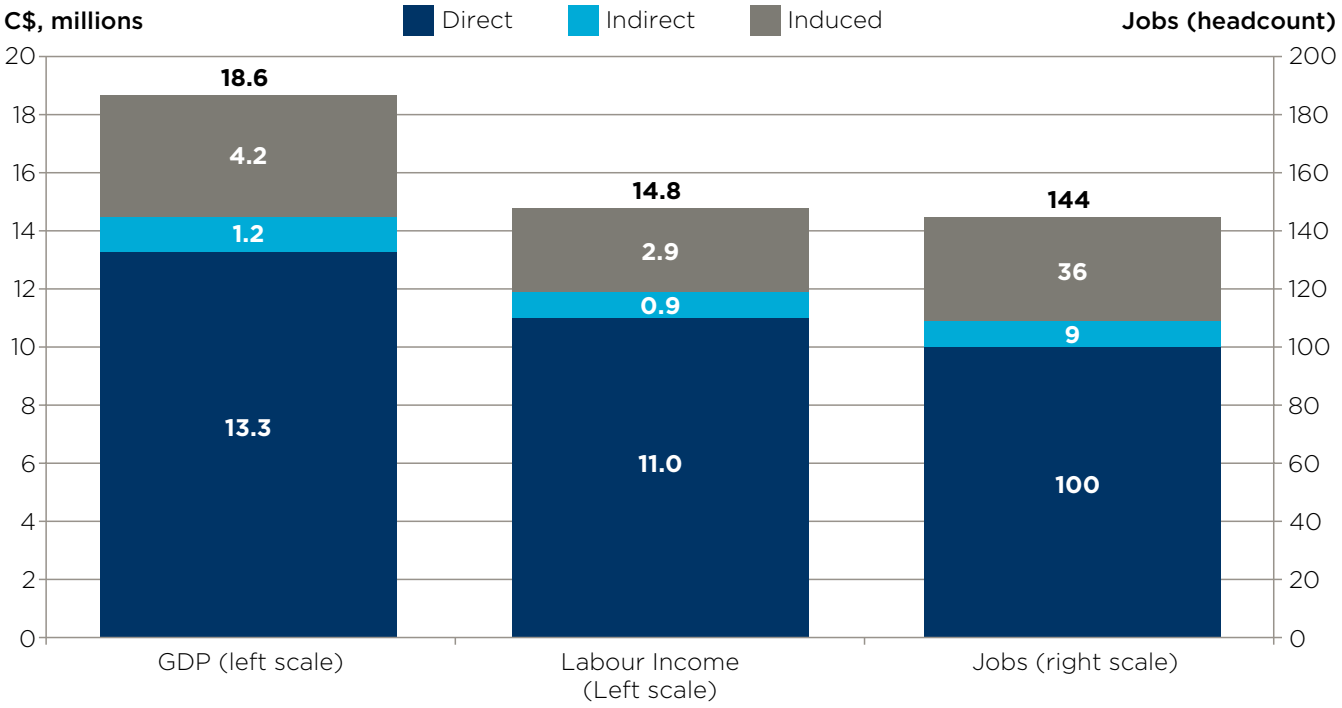
GDP impacts

In 2023, activities at Recursion Pharmaceuticals' newest Canadian facility are expected to contribute C$13.3 million in GDP to the City of Toronto's economy. Supply chain spending (indirect impact) is estimated to support another C$1.2 million contribution to the municipality's GDP while wage induced spending (induced impact) is estimated to support a C$4.2 million contribution. In total, this amounts to a C$18.6 million estimated contribution to the City of Toronto's GDP.

Labour income and employment impacts

In 2023, 100 workers are to be employed at Recursion Pharmaceuticals' newest Canadian facility, making up the direct employment impact. They are expected to receive approximately C$11.0 million in labour income. The activities across the company's supply chain (indirect impact) are estimated to support another nine workers receiving approximately C$0.9 million in labour income. The wage induced spending of the direct and indirect workers makes up the induced impact, which would support another 36 workers and C$2.9 million in labour income. In total, the activities at the facility, across its supply chain, and the wages of those employed at both are expected to support 144 workers receiving C$14.8 million in labour income.

Fig. 4: City of Toronto economic impacts of Recursion Pharmaceuticals' newest Canadian facility, 2023



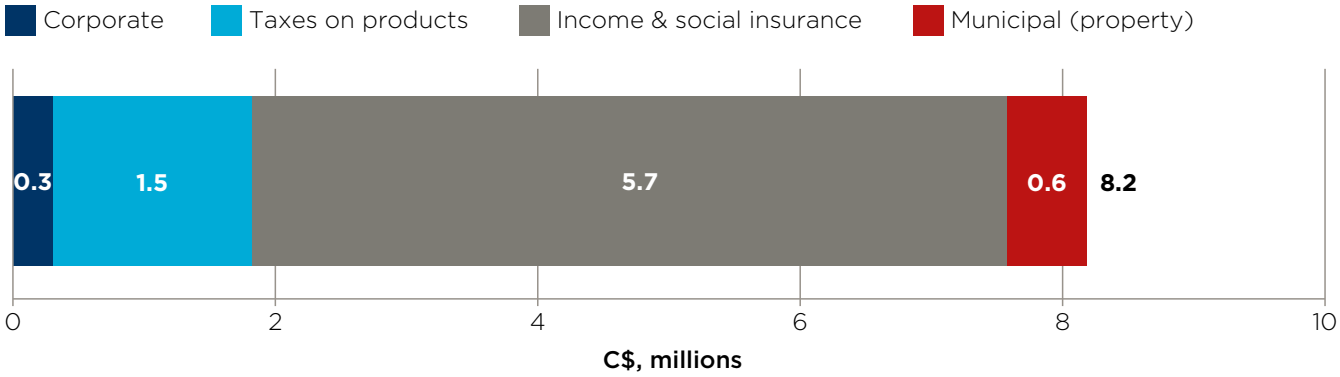
Source: Oxford Economics

Totals may not add due to rounding

Tax Impacts

Recursion Pharmaceuticals' activities in the City of Toronto are expected to produce C$8.2 million in tax revenues. Out of this total tax impact, approximately C$0.3 million is estimated to go towards corporate taxes (federal and provincial revenue), C$1.5 million towards taxes on products (federal and provincial revenue), C$5.7 million towards income taxes and social insurance (federal and provincial revenue), and C$0.6 million towards municipal taxes. These tax impacts are calculated based on effective tax rates derived from Statistics Canada data and applied to the above economic impact results—see tax impact notes at the start of chapter 3.

Fig. 5: City of Toronto tax impacts of Recursion Pharmaceuticals' newest Canadian facility, 2023



Source: Oxford Economics

Totals may not add due to rounding

3.2 TORONTO REGION IMPACTS

The City of Toronto, where Recursion Pharmaceuticals' newest Canadian facility is located, is part of the broader **Toronto Region**. As described in the Introduction, the Toronto Region is made up of the following municipalities: Durham, Halton, Peel, York, and the City of Toronto. The economic impacts on this region are presented in Fig. 6.

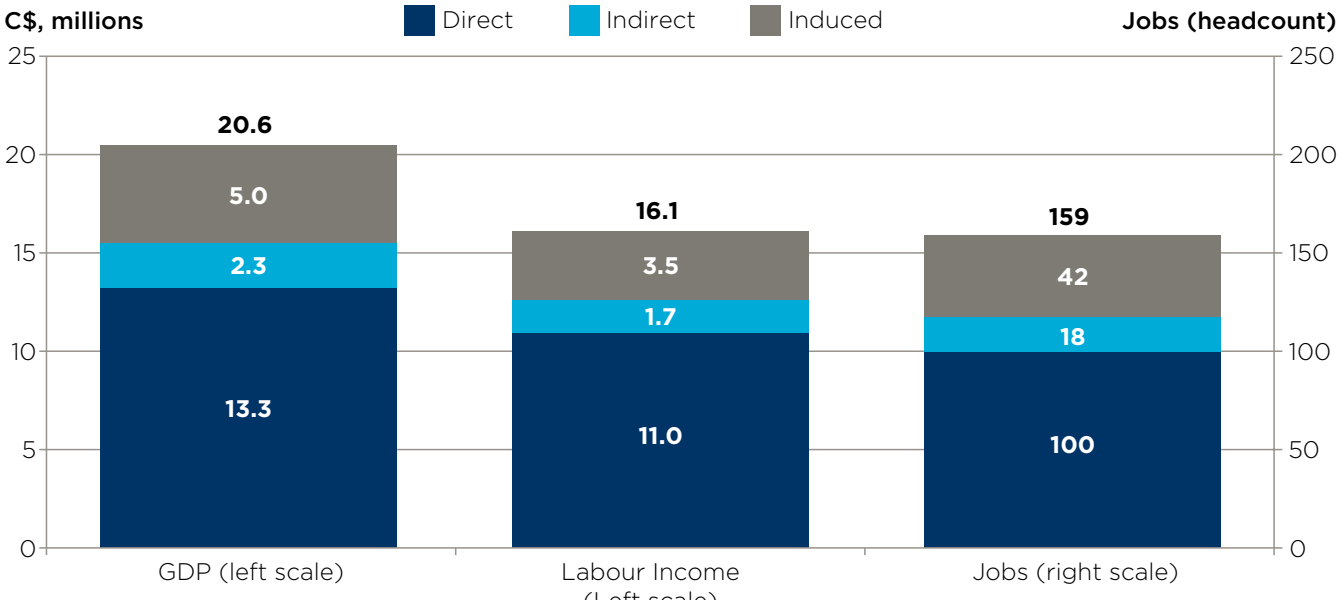
GDP impacts

In 2023, activities at the Recursion Pharmaceuticals' newest Canadian facility are expected to contribute C$13.3 million in GDP to the Toronto Region's economy. The indirect impact (supply chain activities) is expected to support another C$2.3 million contribution to Toronto Region's GDP. Meanwhile, wage induced spending (induced impact) is estimated to support a C$5.0 million contribution to the Toronto Region. In total, this amounts to a C$20.6 million estimated contribution to the region's GDP. The difference in GDP impact between the Toronto Region and the City of Toronto represents the impact of the activity that occurs within the Toronto Region outside of the City of Toronto, with a minor caveat (refer to footnote 10).

Labour income and employment impacts

In 2023, 100 workers will be hired at Recursion Pharmaceuticals' newest Canadian facility, making up the direct employment impact. They are expected to receive approximately C$11.0 million in labour income. The activities across the company's supply chain (indirect impact) are estimated to support another 18 workers across the Toronto Region receiving approximately C$1.7 million in labour income. The wage induced spending of the direct and indirect workers makes up the induced impact, which would support another 42 workers and C$3.5 million in labour income across the Toronto Region. In total, the activities at the facility, across its supply chain, and the wages of those employed at both are expected to support 159 workers across the Toronto Region receiving C$16.1 million in labour income.

Fig. 6: Toronto Region economic impacts of Recursion Pharmaceuticals' newest Canadian facility, 2023



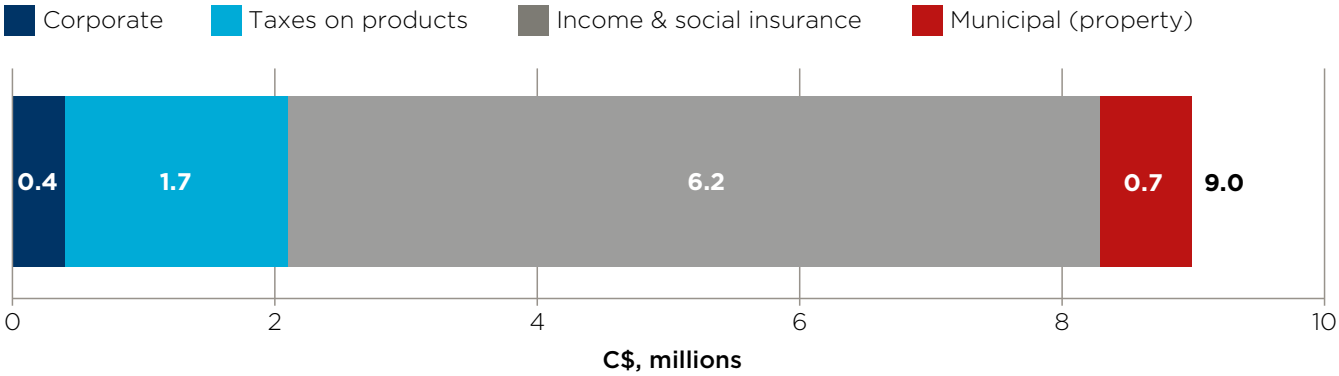
Source: Oxford Economics

Totals may not add due to rounding

Tax Impacts

Recursion Pharmaceuticals' activities are expected to generate a total of C$9.0 million in tax revenue in the Toronto Region. Out of this total amount, C$0.4 million is estimated in corporate taxes (federal and provincial revenue), C$1.7 million is expected in taxes on productions (federal and provincial revenue), C$6.2 million is estimated in income taxes and social insurance (federal and provincial revenue), and C$0.7 million is estimated in municipal taxes. The difference between these municipal taxes of C$0.7 million and the aforementioned C$0.6 million in taxes at the City of Toronto consist of the additional municipal taxes collected by other municipalities within the Toronto region. The municipal tax impacts are calculated based on effective tax rates derived from Statistics Canada data and applied to the above economic impact results—see tax impact notes at the start of chapter 3.

Fig. 7: Toronto Region tax impacts of Recursion Pharmaceuticals' newest Canadian facility, 2023



Source: Oxford Economics

Totals may not add due to rounding

3.3 ONTARIO PROVINCIAL IMPACTS

Fig. 8 presents the estimated economic impact results for Recursion Pharmaceuticals' newest Canadian facility for the province of **Ontario**.

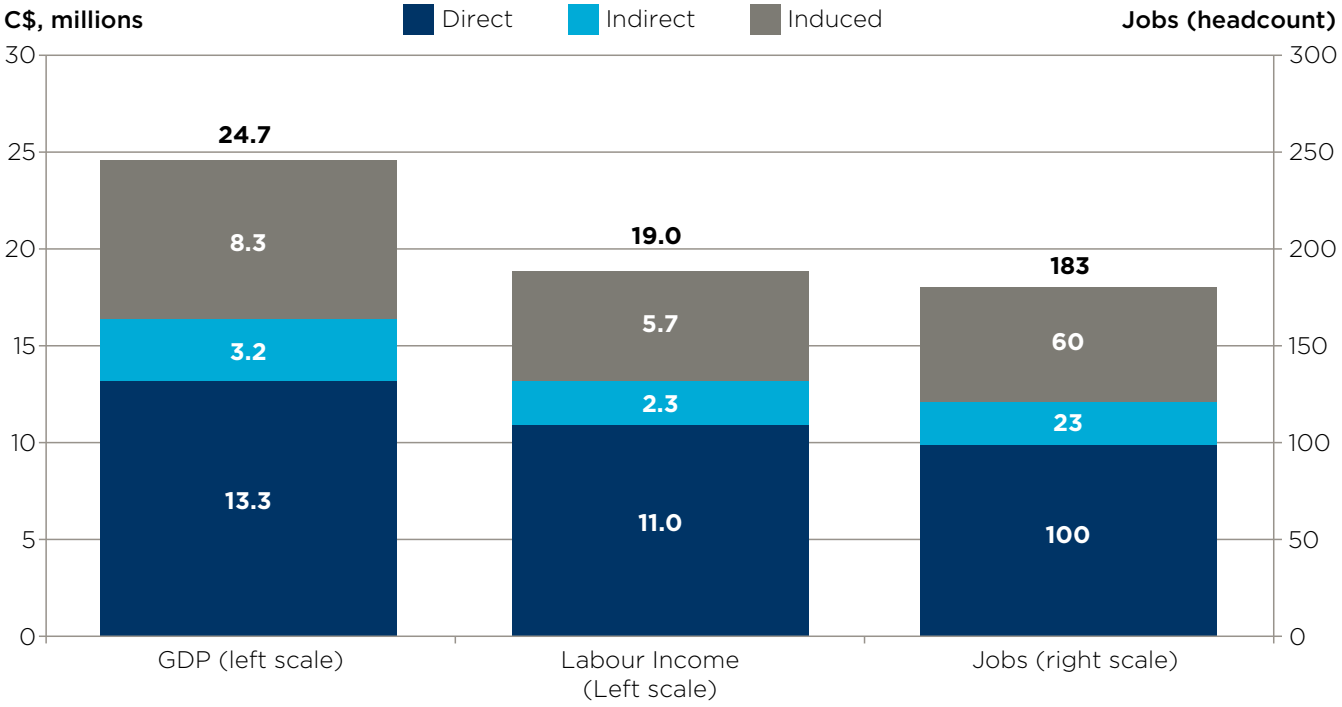
GDP impacts

In 2023, activities at Recursion Pharmaceuticals' newest Canadian facility are expected to contribute C$13.3 million in GDP to Ontario's economy. The indirect impact (supply chain activities) is expected to support another C$3.2 million contribution to the province's GDP. Meanwhile, wage induced spending (induced impact) is estimated to support a C$8.3 million contribution to Ontario. In total, this amounts to a C$24.7 million estimated contribution to the province's GDP. The difference in GDP impact between Ontario and the Toronto Region represents the impact of the activity that occurs within Ontario outside of the Toronto Region, with a minor caveat (refer to footnote 10).

Labour income and employment impacts

In 2023, 100 workers are expected to be employed at Recursion Pharmaceuticals' newest Canadian facility, making up the direct employment impact. They are expected to receive approximately C$11.0 million in labour income. The activities across the company's supply chain (indirect impact) are estimated to support another 23 workers across Ontario receiving approximately C$2.3 million in labour income. The wage induced spending of the direct and indirect workers makes up the induced impact, which would support another 60 workers and C$5.7 million in labour income across the province. In total, the activities at the facility, across its supply chain, and the wages of those employed at both are expected to support 183 workers across Ontario receiving C$19.0 million in labour income.

Fig. 8: Ontario economic impacts of Recursion Pharmaceuticals' newest Canadian facility, 2023



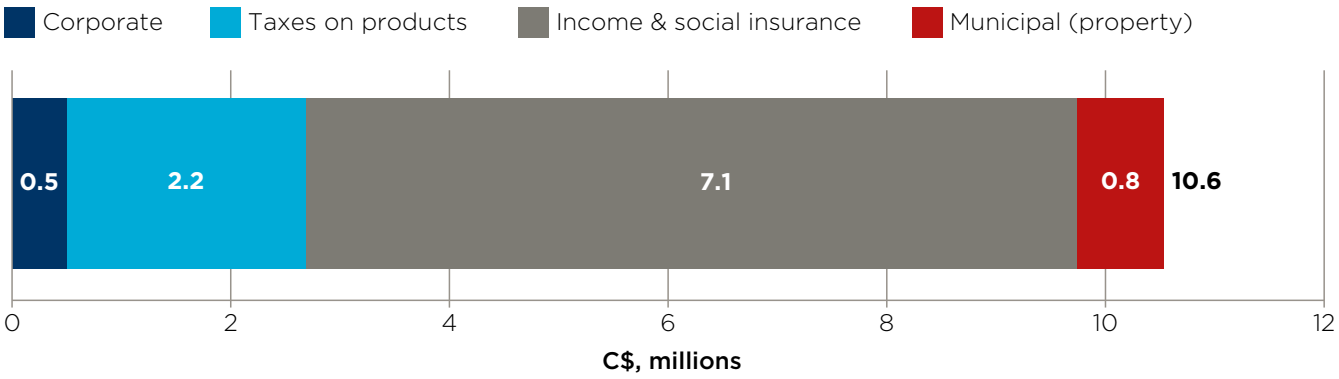
Source: Oxford Economics

Totals may not add due to rounding

Tax Impacts

The total tax impact of Recursion Pharmaceuticals' newest Canadian facility is estimated to result in C$10.6 million in revenues in Ontario out of which C$0.5 million are estimated to be corporate taxes (federal and provincial revenue), C$2.2 million are estimated towards taxes on products (federal and provincial revenue), C$7.1 million are expected to go towards income taxes and social insurance (federal and provincial revenue), and C$0.8 million are estimated to be municipal taxes. These tax impacts are calculated based on effective tax rates derived from Statistics Canada data and applied to the above economic impact results—see tax impact notes at the start of chapter 3.

Fig. 9: Ontario tax impacts of Recursion Pharmaceuticals' newest Canadian facility, 2023



Source: Oxford Economics

Totals may not add due to rounding

3.4 NATIONAL IMPACTS

This chapter presents the economic impacts of Recursion Pharmaceuticals' newest Canadian facility for Canada.

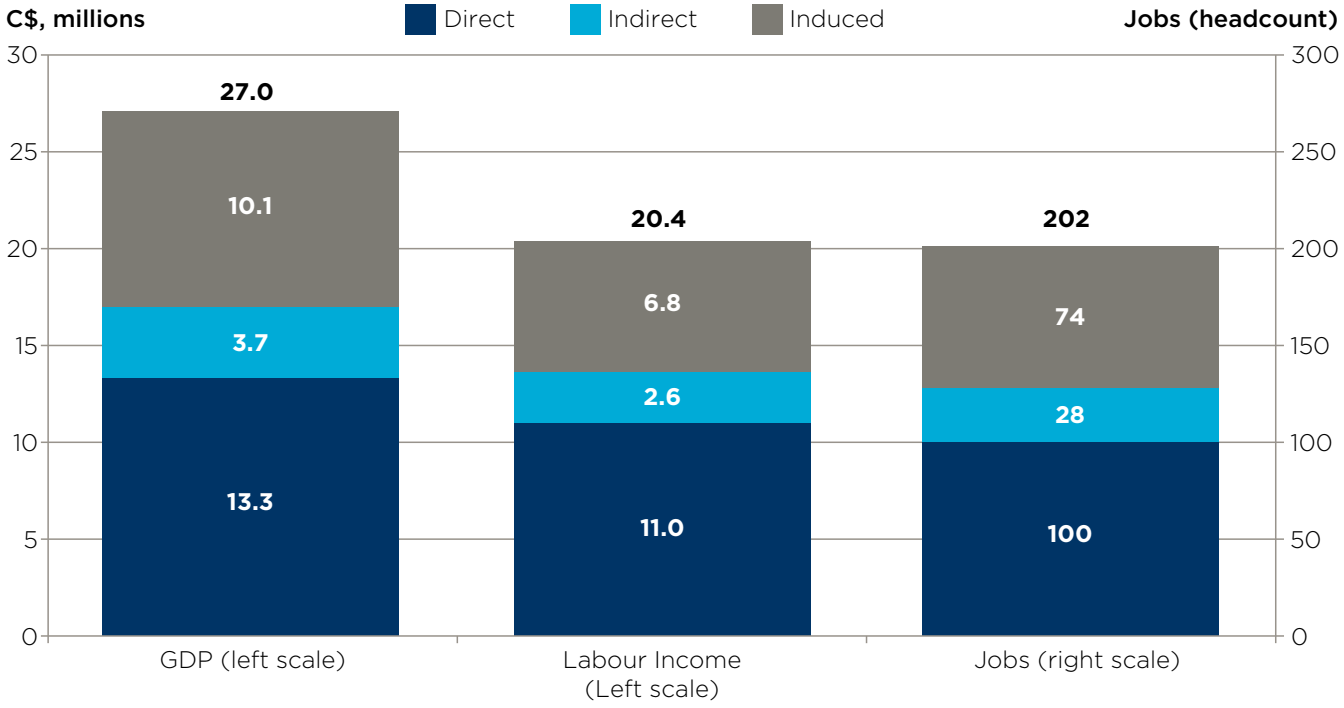
GDP impacts

In 2023, activities at Recursion Pharmaceuticals' newest Canadian facility are expected to contribute C$13.3 million in GDP to the Canadian economy. Supply chain spending (indirect impact) is estimated to support another C$3.7 million contribution to the country's GDP while wage induced spending (induced impact) is estimated to support a C$10.1 million contribution. In total, this amounts to a C$27.0 million estimated contribution to Canada's GDP. The difference in GDP impact between Canada and Ontario represents the impact of the activity that occurs within Canada outside of Ontario, with a minor caveat (refer to footnote 10).

Labour income and employment impacts

In 2023, 100 workers are to be employed at Recursion Pharmaceuticals' newest Canadian facility, making up the direct employment impact. They are expected to receive approximately C$11.0 million in labour income. The activities across the company's supply chain (indirect impact) are estimated to support another 28 workers across the country receiving approximately C$2.6 million in labour income. The wage induced spending of the direct and indirect workers makes up the induced impact, which would support another 74 workers across Canada and C$6.8 million in labour income. In total, the activities at the facility, across its supply chain, and the wages of those employed at both are expected to support 202 workers across Canada receiving C$20.4 million in labour income.

Fig. 10: National economic impacts of Recursion Pharmaceuticals' newest Canadian facility, 2023



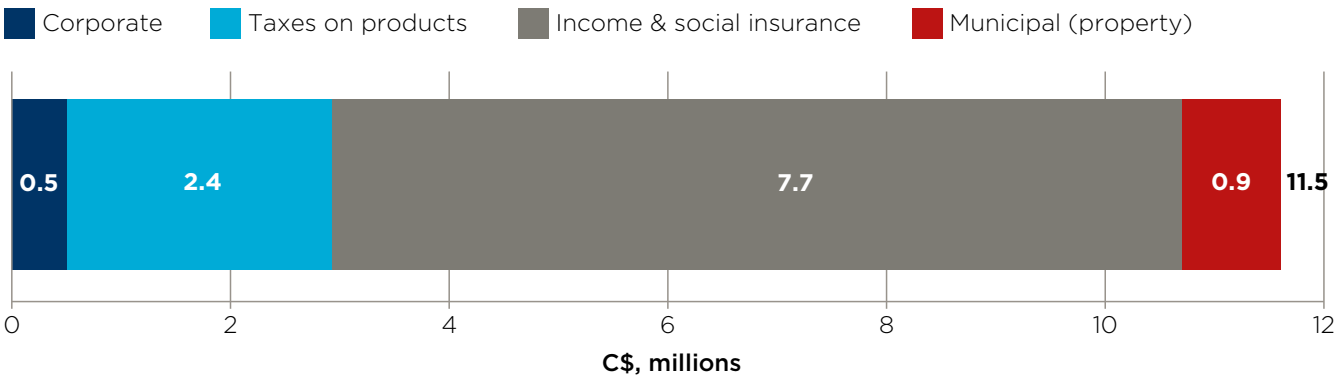
Source: Oxford Economics

Totals may not add due to rounding

Tax Impacts

Recursion Pharmaceuticals' newest Canadian facility is expected to result in a total of C$11.5 million in tax revenues across the country with C$0.5 million in corporate taxes (federal and provincial revenue), C$2.4 million in taxes on products (federal and provincial revenue), C$7.7 million towards income tax and social insurance (federal and provincial revenue), and C$0.9 towards municipal taxes. These tax impacts are calculated based on effective tax rates derived from Statistics Canada data and applied to the above economic impact results—see tax impact notes at the start of chapter 3.

Fig. 11: National tax impacts of Recursion Pharmaceuticals' newest Canadian facility, 2023



Source: Oxford Economics

Totals may not add due to rounding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Toronto Global

4. CONCLUSION

The Toronto Region, Canada's business hub, is home to a vibrant and robust economy and attracts a diverse workforce across a range of industries, including technology and the life sciences. While the City of Toronto has been referenced as having "the densest cluster of AI startups in the world" by a recent report from the University of Toronto, the region is especially known for its companies that operate at the intersection of AI and the life sciences, focusing specifically on pharmaceutical research.[16]

Toronto Global plays an important role in facilitating the expansion of a range of companies into the Canadian marketplace via the Toronto Region. One of Toronto Global's clients, Recursion Pharmaceuticals, is growing its Canadian presence through multiple acquisitions and strategic investments. Based in Salt Lake City, Utah, Recursion Pharmaceuticals is a rapidly growing biotechnology company, investing in and creating economic opportunities through its expansion. As stated by the Government of Canada's Minister of Immigration, Refugees and Citizenship, Sean Fraser: "The world is placing big bets on Canada and we are open for business! Recursion is a leading drug discovery company in the U.S. and the launch of their new center in Toronto is a significant development for the region's tech sector that will create good jobs for Canadians."[17]

Recursion Pharmaceuticals' newest facility in the City of Toronto, which will serve as the organization's Canadian headquarters, closely follows its recent acquisition of two key Canadian players in the drug discovery and machine learning marketplace, Cyclica and Valence. The new Canadian facility brings 100 jobs along with capital investments that multiply into broader impacts for the City of Toronto, Toronto Region, the province of Ontario, and Canada as a whole. Oxford Economics estimates that procurement spending of C$5.1 million in Canada in 2023 would contribute C$27.0 million towards GDP, support 202 jobs with C$20.4 million in labour income, and generate C$11.5 million in tax revenues nationally. At a more local level, the activities of Recursion Pharmaceuticals are estimated to contribute C$18.6 million towards GDP, while supporting 144 workers, C$14.8 million in labour income, and C$8.2 million in tax revenues within the City of Toronto.

The company's interest and investment in the Canadian economy adds far more economic value than just the economic impacts of this facility. The expansion of companies as innovative as Recursion Pharmaceuticals attracts investment and top talent to the region, bringing additional benefits to the host economy and contributing spillover effects both within and across industries. Ongoing investments in the AI-enabled drug discovery space also encourage economic growth and attract competitors to the region, as they are eager to also reap the benefits of the growing pool of resources concentrated in the area. Furthermore, as a clinical-stage biotechnology company decoding biology by integrating technological innovations across biology, chemistry, automation, data science, and engineering, Recursion Pharmaceuticals will radically improve the lives of patients by industrializing drug discovery.

As Toronto Global continues to support expansion in the regional economy through their work with companies such as Recursion Pharmaceuticals, the impacts of the companies they introduce to the Canadian market not only enhance the existing business infrastructure and further innovative development, but also have economic effects that ripple across sectors and geographies.

[16] https://www.biopharmatrend.com/post/98-toronto-ai-startups-aim-high-in-drug-discovery-space/
[17] https://torontoglobal.ca/about-us/News/2023/Recursion-Celebrates-Opening-of-Its-Canadian-HQ

5. APPENDIX: METHODOLOGY

An overview of economic impact analysis, including a description of the three channels of impact (direct, indirect, and induced) and the measures of impact (GDP, labour income, employment, and taxes) is presented in the box in chapter 3. This methodology appendix presents additional technical notes on sources and methods.

INPUT-OUTPUT MODELING

The total economic impacts of Recursion Pharmaceuticals' newest Canadian facility were calculated using Oxford Economics' proprietary input-output (IO) models for Canada, Ontario, the Toronto Region, and the City of Toronto. An IO model shows the spending flows within an economy from "final demand" (i.e., consumer spending, government spending, investment, and exports to the rest of the world); intermediate spending patterns (i.e., what each sector buys from every other sector—the supply chain in other words); how much of that spending stays within the domestic economy; and the distribution of income between employment income and other income (mainly profits). In essence, an IO table shows who buys what from whom in the economy.

The Canadian and Ontario models were constructed based on national and provincial IO data from Statistics Canada. The Toronto Region and City of Toronto models were constructed from the Ontario data using techniques originally pioneered by Flegg et. al. (1995)[18] among others. These techniques allow one to construct an IO table for a region lacking IO data (e.g., the City of Toronto) by adjusting an existing table for a larger region that contains it (Ontario) using data on employment by industry for both regions. These employment data were obtained from Statistics Canada.

The IO data from Statistics Canada are from 2019, the most recent available year. They were augmented with spending/saving and employment/productivity patterns for 2023 and adjusted to reflect monetary results in 2023 Canadian dollars. As 2023 data are not yet available via Statistics Canada, we relied on employment and productivity projections from the Oxford Economics North American Cities databank.

MODELING INPUTS

As described in the text, the inputs to the model are based on a 100-employee establishment in the Scientific Research and Development Services industry (NAICS 5417). In addition to this direct employment, the inputs to the IO model include the direct labor income accruing to these workers, the direct capital income to Recursion Pharmaceuticals, and the intermediate input spending of the facility, which is profiled in Fig. 2. These are all based on the relevant values for the Scientific R&D Services industries in the Ontario IO table, scaled to an employment of 100 and weighted by industry.

The share of the intermediate input spending that is spent locally within each region, which is profiled in Fig. 3, is based on the relevant import shares in the IO table for each region. This means that, for the Toronto Region and City of Toronto models, these import shares are derived both from the underlying Ontario IO model and from the Flegg et. al. methodology referenced above.

[18] A. T. Flegg, C. D. Webber & M. V. Elliott (1995) On the Appropriate Use of Location Quotients in Generating Regional Input–Output Tables, *Regional Studies*, 29:6, 547-561

TAX IMPACTS

The tax figures in this report represent the sum of direct, indirect, and induced tax impacts at all levels of government. Specifically included within these tax impacts are federal and provincial level tax contributions to each region, whether the City of Toronto, Toronto Region, Ontario, or Canada.

Details for specific tax types are as follows: Taxes on products are based on tax data within the Statistics Canada IO data. Corporate taxes, and income and social insurance taxes, are calculated from the capital and labour income impacts respectively from the IO modelling using effective tax rates calculated from Statistics Canada data. Municipal tax estimates are based on Statistics Canada data on the ratio of municipal property tax receipts to GDP for the province of Ontario. This ratio is applied to the GDP impacts calculated in the model.

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January 2024

The modelling and results presented here are based on information provided by third parties, upon which Oxford Economics has relied in producing its report and forecasts in good faith. Any subsequent revision or update of those data will affect the assessments and projections shown.

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