View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by Simon Fraser University Institutional Repository

Addendum
to

Technology Transfer at Canadian Universities: Fiscal Year 2001 Update

---

A Report for the Canada Foundation for Innovation

July 31, 2003

Bruce P. Clayman
1002 Saddle Street
Coquitlam, B.C. V3C 3N1
Canada
(604) 942-7600
clayma2@attglobal.net

Completion of this addendum, based on the Fiscal Years 1991 - 2001 Licensing Surveys by the Association of University Technology Managers (AUTM), would not have been possible without the help of Ms. Janet E. Scholz, Past-President of AUTM and Senior Technology Development Manager at the University of Manitoba. The permission of AUTM to use the results of their annual Licensing Surveys is gratefully acknowledged.

Summary

This report is an extension of the author's original May 29, 2003 report entitled *Technology Transfer at Canadian Universities: Fiscal Year 2001 Update*. It incorporates and analyzes data from Licensing Surveys by the Association of University Technology Managers (AUTM) on performance indicators of technology transfer in Fiscal Years (FY) 1991 through 2001.

Virtually all North American universities with high levels of research funding respond to the AUTM Licensing Survey. Included herein are elaborated analyses and comparisons of five key indicators:

Invention Disclosures Received
U.S. Patents Issued
Start-Up Companies Formed
Licenses and Options Executed
License Income Received

As in previous reports, most analysis is performed by considering the "commercialization productivity" – i.e. these output measures normalized by the institution's research expenditures.

In this report, normalized results for the five indicators are each tracked, by means of graphical presentations, on the following bases:

- Aggregated for Canadian respondents over the 11-year period
- Aggregated for the nine recurrent Canadian respondents over the 11-year period
- Disaggregated for the nine recurrent Canadian respondents over the 11-year period
- Disaggregated for the four recurrent Québec respondents over the last five years

In addition, non-normalized results for the five indicators are tracked and comparisons with U.S. results are made where appropriate, to provide further context.

Regional analysis of the results for the five indicators is presented as follows:

- Aggregated for the nine recurrent Canadian respondents, totaled over the 11-year period
- Aggregated, totaled for nineteen FY 2001 Canadian respondents
- Aggregated, normalized, averaged for nineteen FY 2001 Canadian respondents
- Aggregated, averaged for nineteen FY 2001 Canadian respondents

Finally the five normalized indicators are shown individually for FY 2001 Canadian respondents

- Ranked and compared with the Canadian average, cumulative and median values
- Ranked and compared with the Canadian average, cumulative and median values but omitting the highest and lowest ranking respondents.

The key findings of the previous studies are reinforced by these longer term results: the amount of technology measurably transferred from universities to the private sector is roughly a linear function of research expenditures, in Canada as in the U.S., and "commercialization productivity" in Canada is comparable to that in the U.S. with respect to most of the measures used.

In addition, very significant differences among institutions and among regions are found to exist within Canada, both in the long-term and the FY 2001 results.

I. Introduction

This report comprises sets of figures presenting in graphical form the results of AUTM Licensing Surveys from FY 1991 to FY 2001 and further analyses performed by the author. The emphasis remains on Canadian universities, with comparisons with U.S. data where appropriate. Each set of figures is annotated with respect to the approach used and some observations made about the results. Asterisks denote members of the "G-10" group of Canadian universities.

As in the previous reports, normalization is performed by dividing each output measure by the institution's total research expenditure for that year. The use of the terms "average" and "cumulative" in the plots of normalized results requires some explanation. Linear "averages" are taken over the set of measures under examination, weighting each institution's value equally. "Cumulative" results for the normalized measures are obtained by summing the measure itself over all the institutions and dividing that result by the sum of all institutions' research expenditures. The latter process produces a normalized measure that is more strongly influenced by the institutions with larger research expenditures.

All financial amounts are in current U.S. dollars. As in previous reports, results for U.S. universities are presented both as reported and "corrected" for the presence of indirect cost payments in the U.S. with an average value of 52.3% of total direct costs, as cited in an AUCC study.[1]

II. Aggregated Results for All Canadian Respondents over the 11-year Period - Figures 1a – 1e

These plots comprise the normalized results for responding universities in Canada and the U.S. in each of the reporting years. The numbers and make-up of the respondents were different in each year as shown here (for the numbers of respondents) and, in some years, some respondents did not provide all items of information. In the first years of the AUTM Licensing Survey, information on U.S. Patents Issued and Start-Up Companies Formed was not collected; this is reflected in the plots. For FY 1995, Queen's University and Concordia University did not report their research expenditures; their 1996 values were used in the normalization. As in the author's previous reports, reference is not made to those institutions whose research expenditures are much less than the others (by more than a factor of three). In the author's FY2001 report and herein, Malaspina University College, Lakehead University and École de technologie supérieure were thus omitted.

FY	Canadian Respondents	U.S. Respondents
1991	8	98
1992	8	98
1993	10	117
1994	10	120
1995	15	127
1996	13	131
1997	14	132
1998	16	128
1999	15	139
2000	15	169
2001	19	168

[1] *Indirect Costs Reimbursement in the U.S.A.: Facts and Fiction,* AUCC Research File, June 2000. http://www.aucc.ca/_pdf/english/publications/researchfile/2000/vol4n2_e.pdf

The observation that Canadian cumulative measures are almost always less than the average measures provides additional confirmation of the conclusion in earlier reports that the institutions with lower levels of research expenditures outperform those with higher levels. No similar pattern is found in the U.S. data.

It is clear from the plots that for, three of the five measures, there is remarkably close agreement between the Canadian and "corrected" U.S. results. The exceptions are in U.S. Patents Issued and Start-Up Companies Formed, where differences of about a factor of two exist between the cumulative results, with more U.S. Patents Issued in the U.S. and more Start-Up Companies Formed in Canada.. There is, as observed in previous reports, much more year-to-year variability in the Canadian results due both to the much smaller sample and to the change in the "population" of institutions responding.

Of particular interest is the recent increase in Canadian License Income Received per $1M and the consistently higher Canadian Start-Up Companies Formed per $1M. The latter has been noted and commented on in previous reports – with lower receptor capacity in Canada suggested as the underlying cause.

The recent large increase in average License Income Received per $1M (Fig. 1c) is noteworthy, coming at a time when the data go in the opposite direction in the U.S. As we shall see below, examination of the data from individual institutions reveals that much of the increase is due to "big hits" at a few institutions, rather than necessarily a large general trend. Confirmation of this is seen in Fig. 1c where the median License Income Received per $1M increases only slightly in this period. The median is consistently less than the average in all cases (much more so in recent years), again confirming that a few institutions with a few big hits dominate the average – both in the U.S. and in Canada. The large peak in U.S. License Income Received per $1M is likely due to the sale of equity in "dot.com" firms, since that is included in AUTM's definition of License Income and this period coincided with the peak in the "dot.com" boom.

III. Aggregated Results for Recurrent Canadian Respondents over the 11-year Period - Figures 2a – 2e

In order to eliminate the variability caused by changes to the composition of the sample, the nine Canadian institutions that responded most consistently over the 11-year period were selected. With the exception of the University of Manitoba and Simon Fraser University, each reported all or almost all of the performance measures in all eleven years; these two started reporting in 1993. The nine recurrent respondents are listed below.

We will see in Figures 3a – 3e below the detail of which institutions responded in each year. Most unfortunately, no Québec institution responded often enough for inclusion here; however Figures 4a – 4e discussed below will show results covering the last five years.

Comparing Figures 2a – 2e with their counterparts Figures 1a – 1e, we note that the overall similarity of Canadian with U.S. results and most other features remain. The high year-to-year variability remains, as expected from the small Canadian sample and the intrinsic variability of all the measures of technology commercialization.

Recurrent Respondents
Queen's University*
Simon Fraser University
University of Alberta*
University of British Columbia*
University of Calgary/UTI, Inc.
University of Manitoba
University of Toronto*
University of Waterloo*
University of Western Ontario*

Two significant differences can be noted between Figures 1c and 2c:

- The values of average, cumulative and median Canadian License Income Received per $1M are larger for the recurrent nine (Fig. 2c) than for all respondents in most years, and
- The large increase in average and cumulative Canadian License Income Received per $1M from FY 1998 to FY 2001, seen in Fig. 1c, is much attenuated in Fig. 2c and the difference between Canadian and U.S. results thus increased.

Examination of the source data reveals the lack of "big hits" at the nine recurrent institutions, which explains the latter point above, although it is clear from the steady increase in average, cumulative and median income that they too were having increasing successes.

IV. Disaggregated Results for Recurrent Canadian Respondents over the 11-year Period - Figures 3a – 3e

Closer examination of the individual results from the nine recurrent Canadian respondents reveals the expected high year-to-year variability plus some very significant differences among the institutions.

V. Disaggregated Results for Recurrent Québec Respondents over the 5-year Period - Figures 4a – 4e

As noted above, most Québec universities did not participate in the AUTM Surveys and none responded consistently until recently. To provide some comparisons of their performance over time with that of the rest of Canada, the four universities that responded over the last four or five years are presented here in Figures 4a – 4e on the same scales as used in Figures 3a – 3e, with the exception of Figure 4c where the vertical scale is a factor of four larger.

Québec Respondents
Concordia University
McGill University*
Université de Montréal*
Université de Sherbrooke

Comparison of these data with the last five years of the data from the 11-year recurrent Canadian respondents in Figs 3a – 3e shows that with respect to three of the measures, Québec universities' performance was mostly in the middle to low end of the range of those in the rest of Canada. However, License Income Received per $1M by Université

de Sherbrooke was by far the highest in the country (and fourth in North America) and their Licenses and Options Executed per $1M was highest in North America. As mentioned in the author's FY 2001 report, the lion's share of the income at Université de Sherbrooke is derived from one core technology - speech compression within wireless and internet applications - which has been adopted into hundreds of millions of devices world-wide - i.e. one very "big hit" – and it is clear that their strong result for Licenses and Options Executed is due mostly to the licensing of that technology.

VI. Non-normalized, Aggregated Results for Canadian and U.S. Respondents over the 11-year Period – Figures 5a – 5f

To provide some further context for these results, the annual results are plotted for each of the five indicators, as well as for total research expenditures, in Canada and the U.S. The scales on which the U.S. totals are plotted is an order of magnitude greater than the scales for the Canadian results, with the exception of Total License Income Received (Fig. 5c) where the scale change is by a factor of 100. The U.S. research expenditures (Fig. 5f) are corrected for overhead payment, as described above. The results for the nine recurrent Canadian universities are also plotted – these of course coincide with the results for all of Canada in the early years when they were usually the only respondents.

VII. Regional Distribution of Aggregated Results for Recurrent Canadian Respondents over the 11-year Period – Figure 6

The bar graphs in Figure 6 compare the cumulative performance of the nine recurrently responding Canadian institutions over the 11-year period, or shorter periods determined by the availability of data. Plotted are the averages of the annual measures over the whole period, weighting each institution's contribution equally. As seen from the list above, there are two institutions in each of BC and Alberta, one on the Prairies and four in Ontario. There were no recurrent respondents in Atlantic Canada or Québec.

As was noted above and as can also be seen in Figures 3a – 3e, data on U.S. Patents Issued and Start-Up Companies Formed were collected over a slightly shorter period and not every institution reported in all categories in every year, although most did. From the graphs, some very large differences can be noted among the regions.

VIII. Regional Distribution of Aggregated Results for FY 2001 Canadian Respondents – Figures 7 - 9

The bar graphs in Figures 7 – 9 compare the performance of nineteen FY 2001 Canadian respondents according to their regions, where the "West" (6 institutions) is taken to be everything west of Ontario. Québec and Atlantic Canada are represented by five and two institutions respectively.

Figure 7 presents the totals of the five measures in each region, in addition to the total research expenditures reported in each region. As noted above, the total License Income Received in Québec is dominated by the (*ca.* $10M) received at Université de Sherbrooke.

Figure 8 presents the averages of the five measures in each region, weighting each institution equally, and Figure 9 presents the averages of the five normalized measures in each region, again weighting each institution equally. The same comments about Université de Sherbrooke as above apply in these cases as well.

IX. Disaggregated Results for FY 2001 Canadian Respondents Figures 10a – 10e and 11a – 11e

Figures 10 and 11 present the individual performance of each of nineteen Canadian respondents in FY 2001, compared with the Canadian average, cumulative and median values. Université de Sherbrooke and Simon Fraser University dominate three of the plots in Figure 10; Simon Fraser University was first in North America in Start-Up Companies Formed per $1M. To improve the clarity of the display for the remaining institutions, another set of plots was generated, excluding the highest and lowest ranked respondents for each measure– these are presented as Figures 11a – 11e. Note that the statistical measures – average, median and cumulative – refer to the whole distribution, not just those universities shown in Figures 11a – 11e. In both sets of results, tremendous variability is seen among the respondents in each of the measures.

X. Conclusion

There are a large number of other possible combinations and permutations of the AUTM data than presented here, but it is hoped that the time sequences and regional distributions of the results will provide further context in which to consider the findings of the original FY 2001 report and its predecessors. Of course, it is possible that these plots will raise as many questions as they answer and the author will be happy to consider requests for further analyses.

XI. Acknowledgements and Copyright Notice

The assistance of AUTM is gratefully acknowledged. Special recognition is made of the assistance provided by Ms. Janet Scholz of the University of Manitoba and Dr. Ashley J. Stevens of Boston University.

The data on which this report is based are used with the permission of AUTM and AUTM remains their owner. No part of their Licensing Survey Report may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval systems, without permission in writing from AUTM. Association of University Technology Managers and AUTM are trademarks of the Association of University Technology Managers, Inc.

Fig. 1 a Invention Disclosures Received per $1M Research Expenditure All Respondents

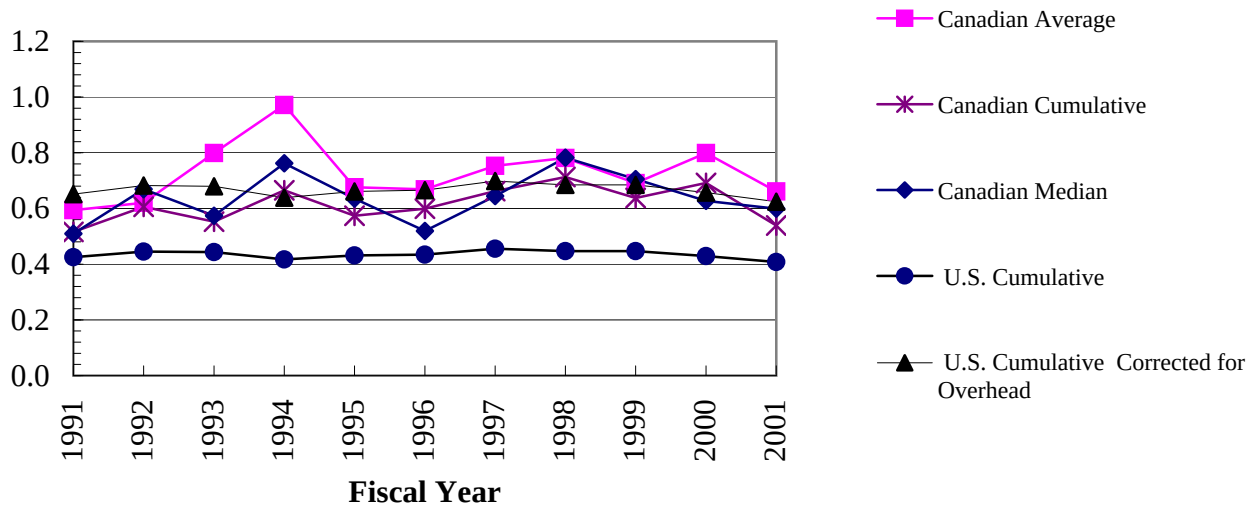
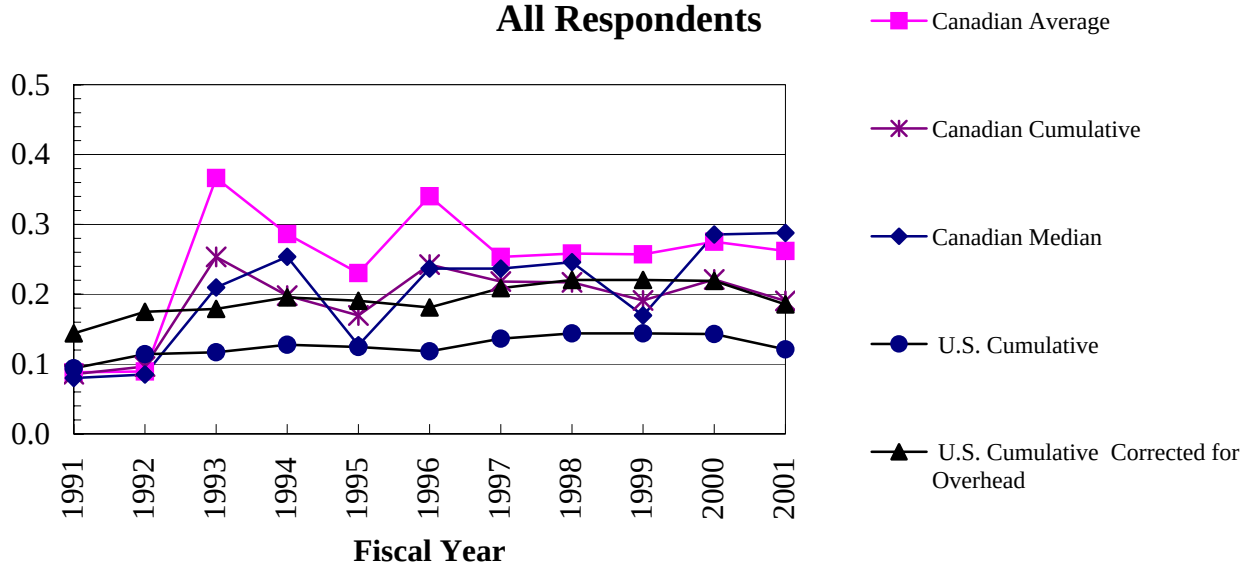


Fig. 1b Licenses and Options Executed per $1M Research Expenditure All Respondents



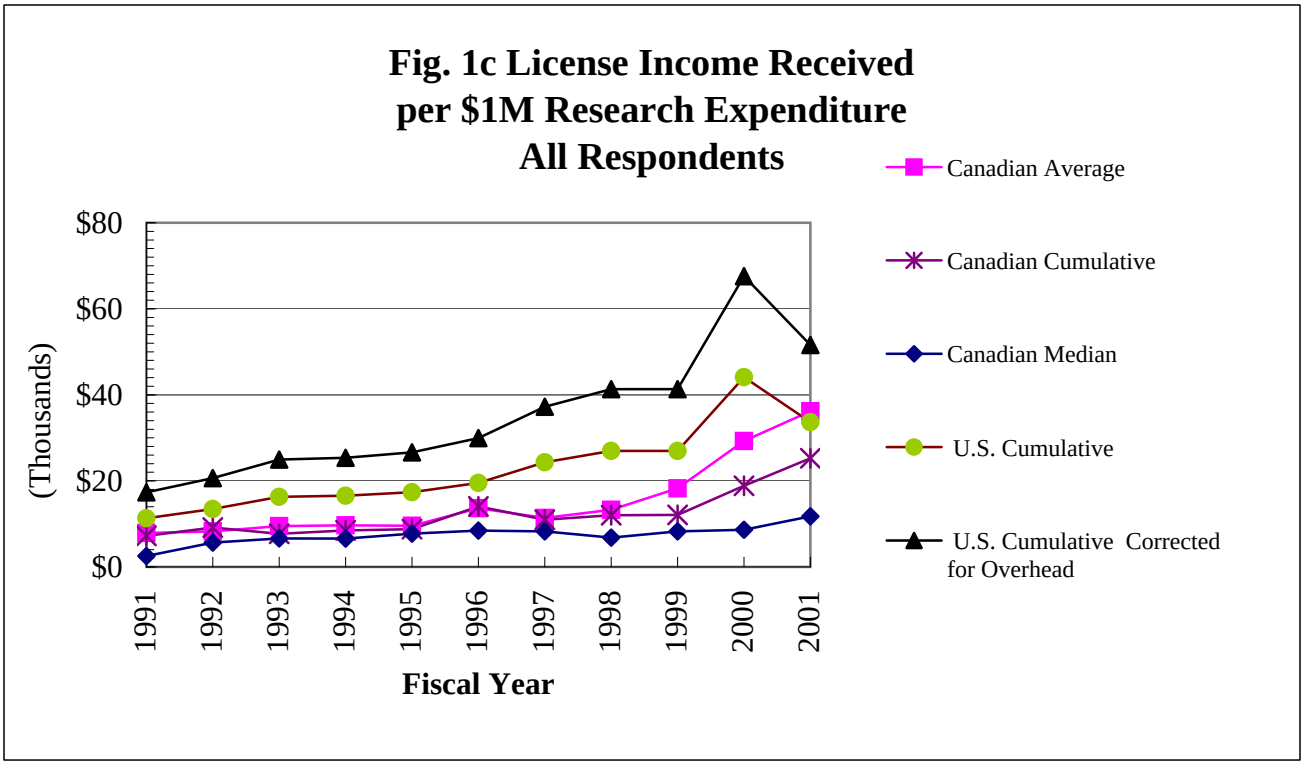


Fig. 1c License Income Received
per $1M Research Expenditure
All Respondents
(Thousands)
$80
$60
$40
$20
$0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Canadian Average
Canadian Cumulative
Canadian Median
U.S. Cumulative
U.S. Cumulative Corrected for Overhead

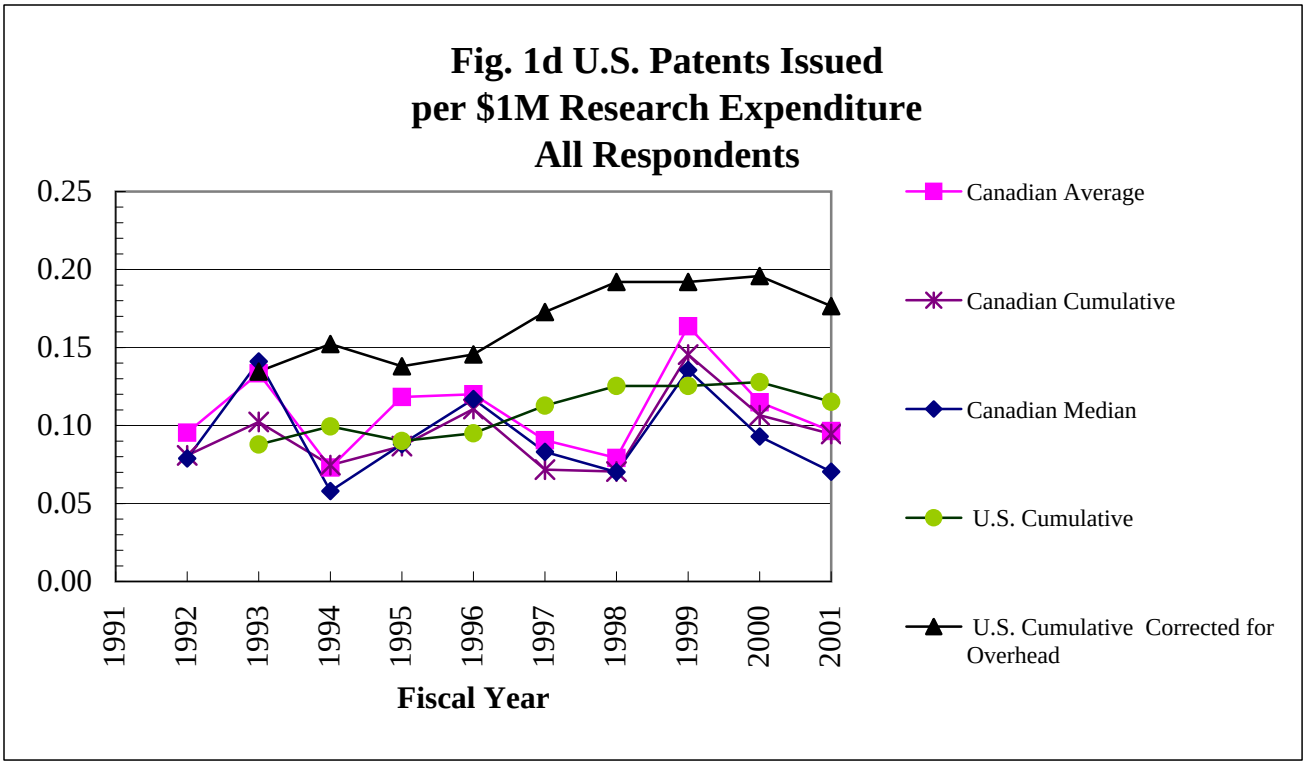


Fig. 1d U.S. Patents Issued
per $1M Research Expenditure
All Respondents
0.25
0.20
0.15
0.10
0.05
0.00
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Canadian Average
Canadian Cumulative
Canadian Median
U.S. Cumulative
U.S. Cumulative Corrected for Overhead

Fig. 1eStart-Up Companies Formed per $1M Research Expenditure All Respondents

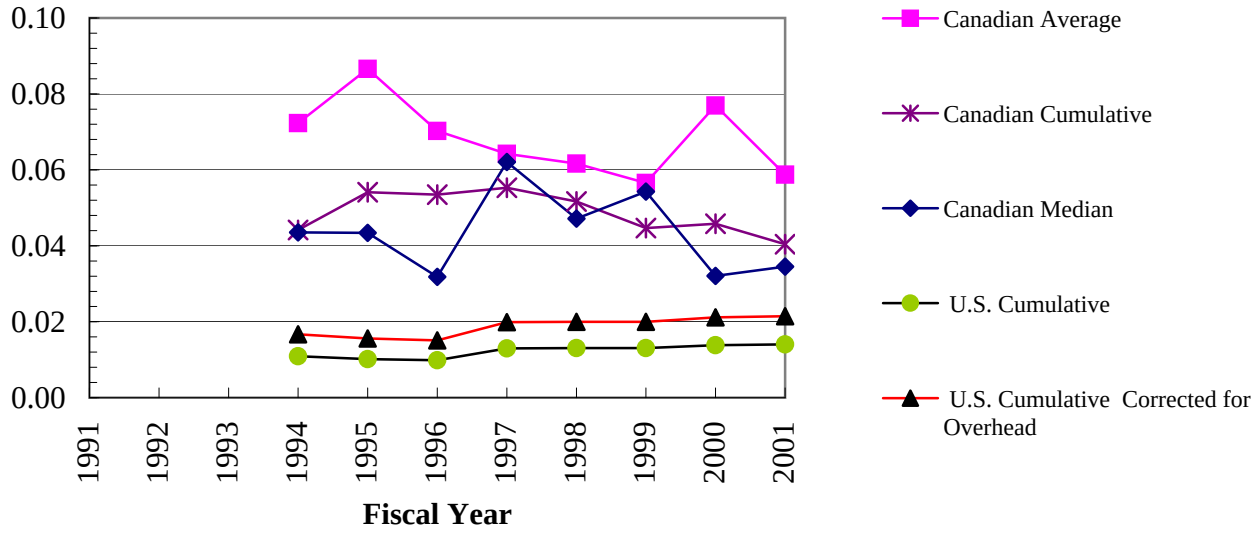


Fig. 2a Invention Disclosures Received per $1M Research Expendi[illegible] Recurrent Canadian Respon

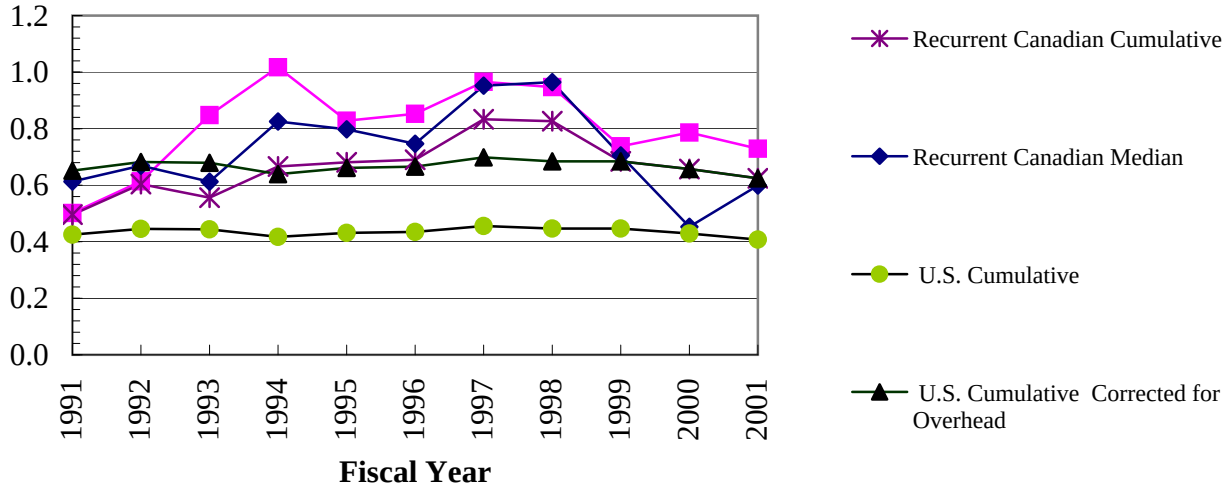
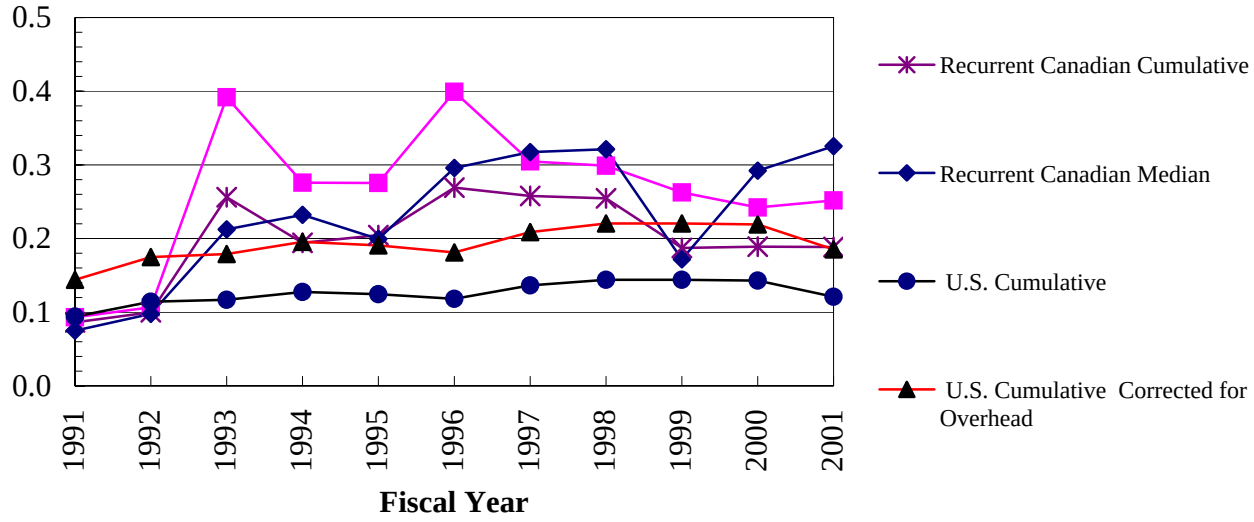


Fig. 2bLicenses and Options Executed per $1M Research Expenditure Recurrent Canadian Responden



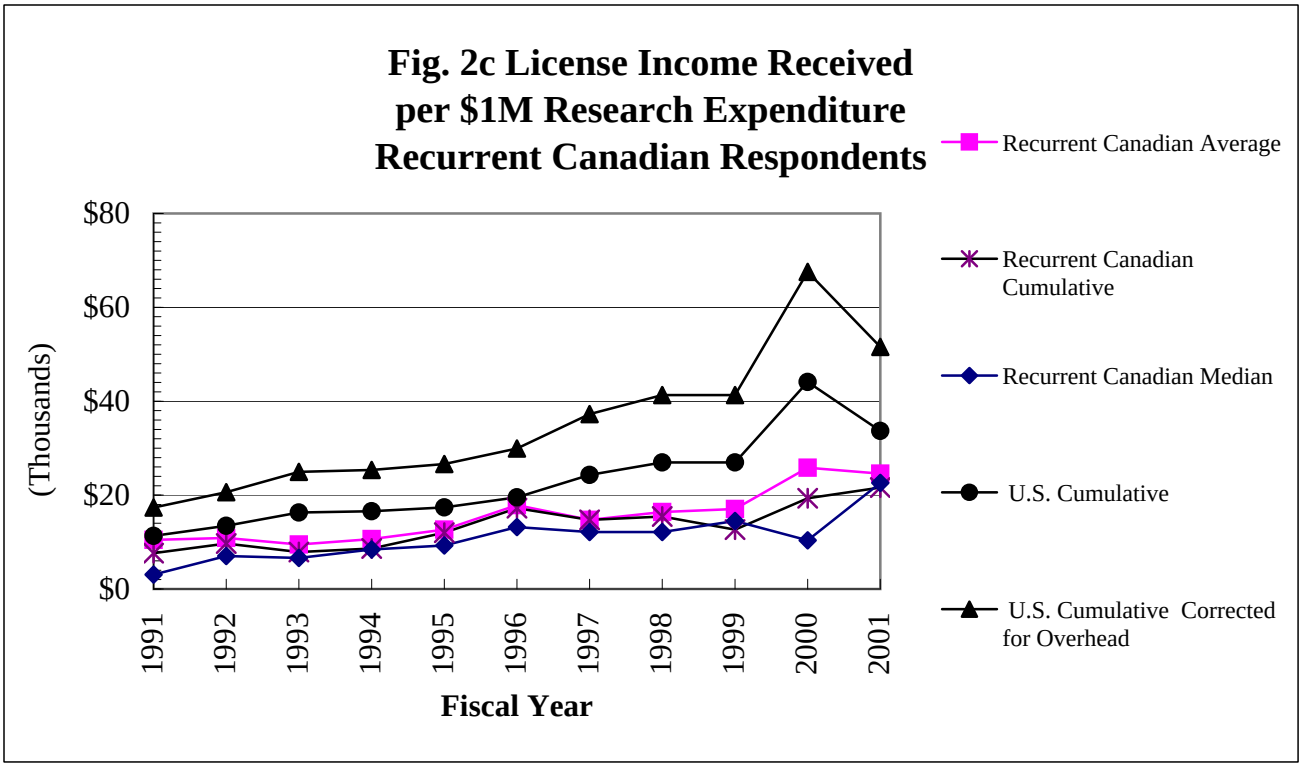


Fig. 2c License Income Received per $1M Research Expenditure Recurrent Canadian Respondents
(Thousands)
$80
$60
$40
$20
$0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Recurrent Canadian Average
Recurrent Canadian Cumulative
Recurrent Canadian Median
U.S. Cumulative
U.S. Cumulative Corrected for Overhead

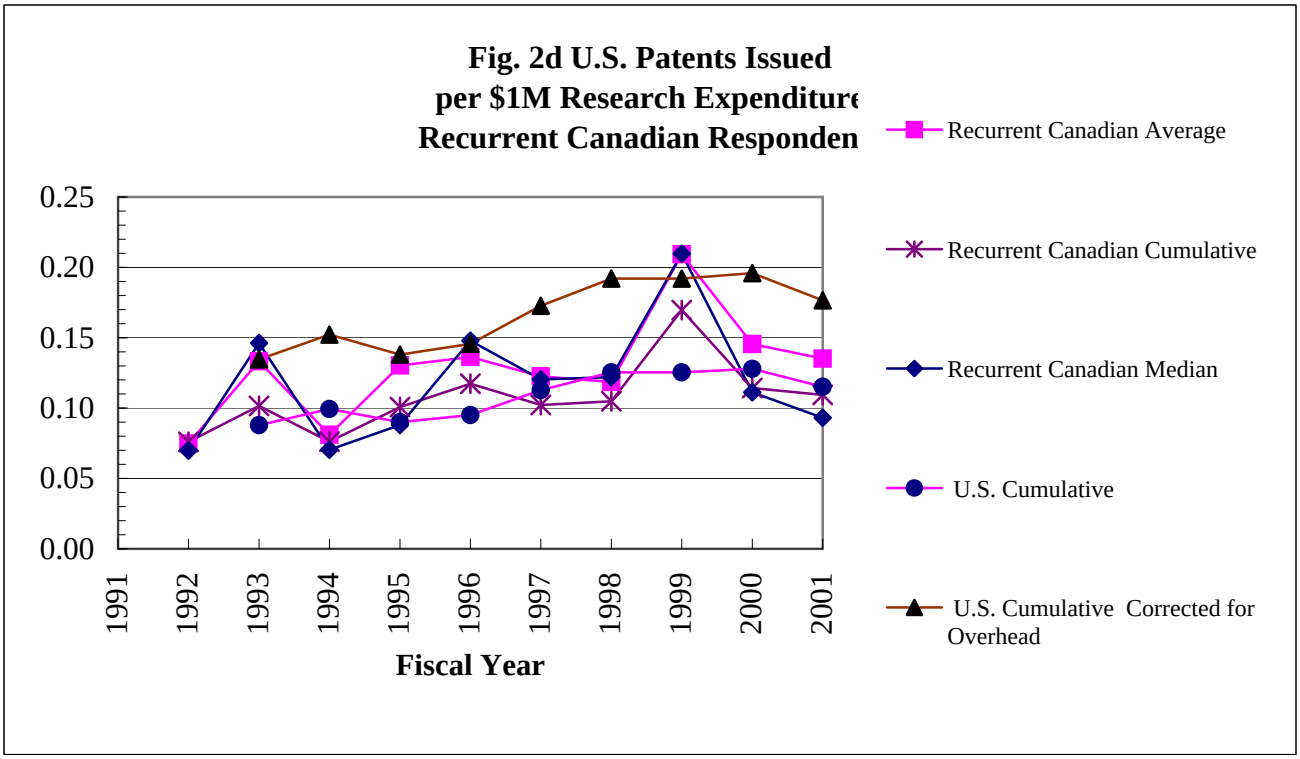


Fig. 2d U.S. Patents Issued
per $1M Research Expenditure
Recurrent Canadian Responden
0.25
0.20
0.15
0.10
0.05
0.00
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Recurrent Canadian Average
Recurrent Canadian Cumulative
Recurrent Canadian Median
U.S. Cumulative
U.S. Cumulative Corrected for Overhead

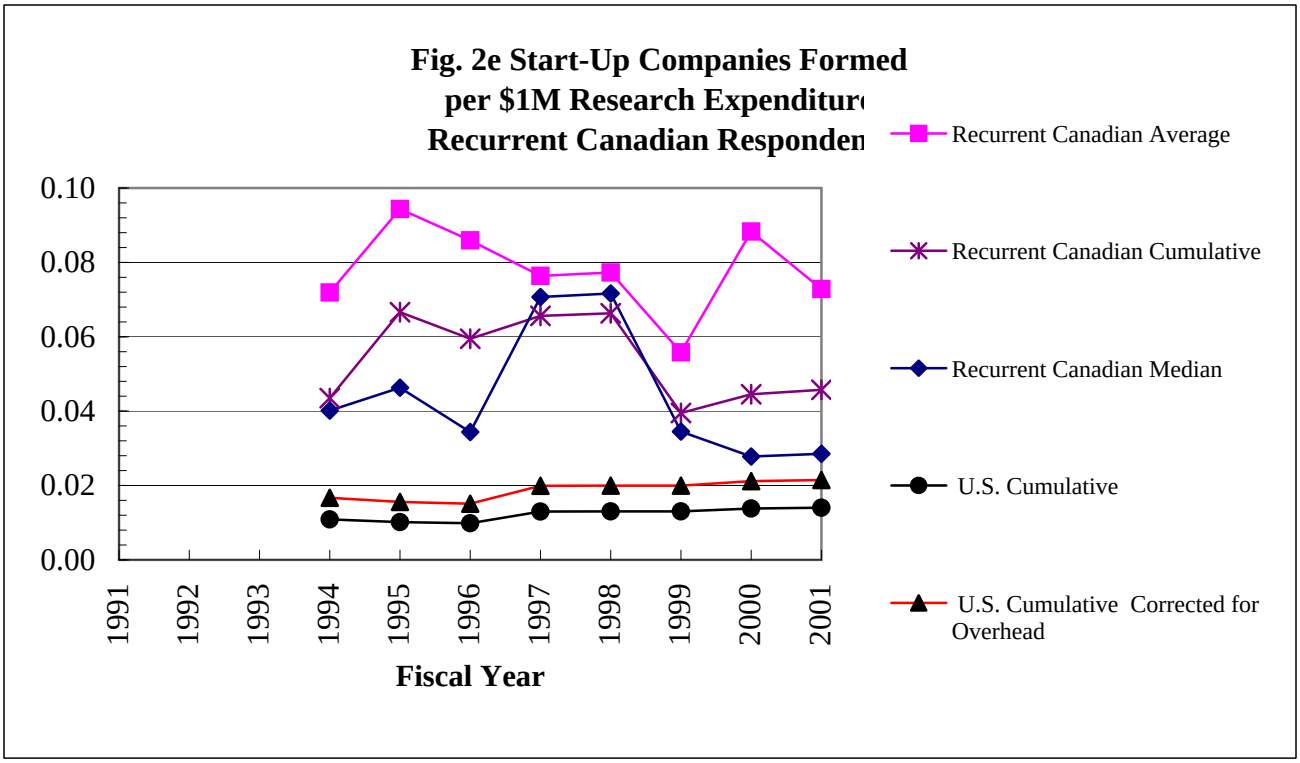


Fig. 2e Start-Up Companies Formed
per $1M Research Expenditur
Recurrent Canadian Responden
0.10
0.08
0.06
0.04
0.02
0.00
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Recurrent Canadian Average
Recurrent Canadian Cumulative
Recurrent Canadian Median
U.S. Cumulative
U.S. Cumulative Corrected for Overhead

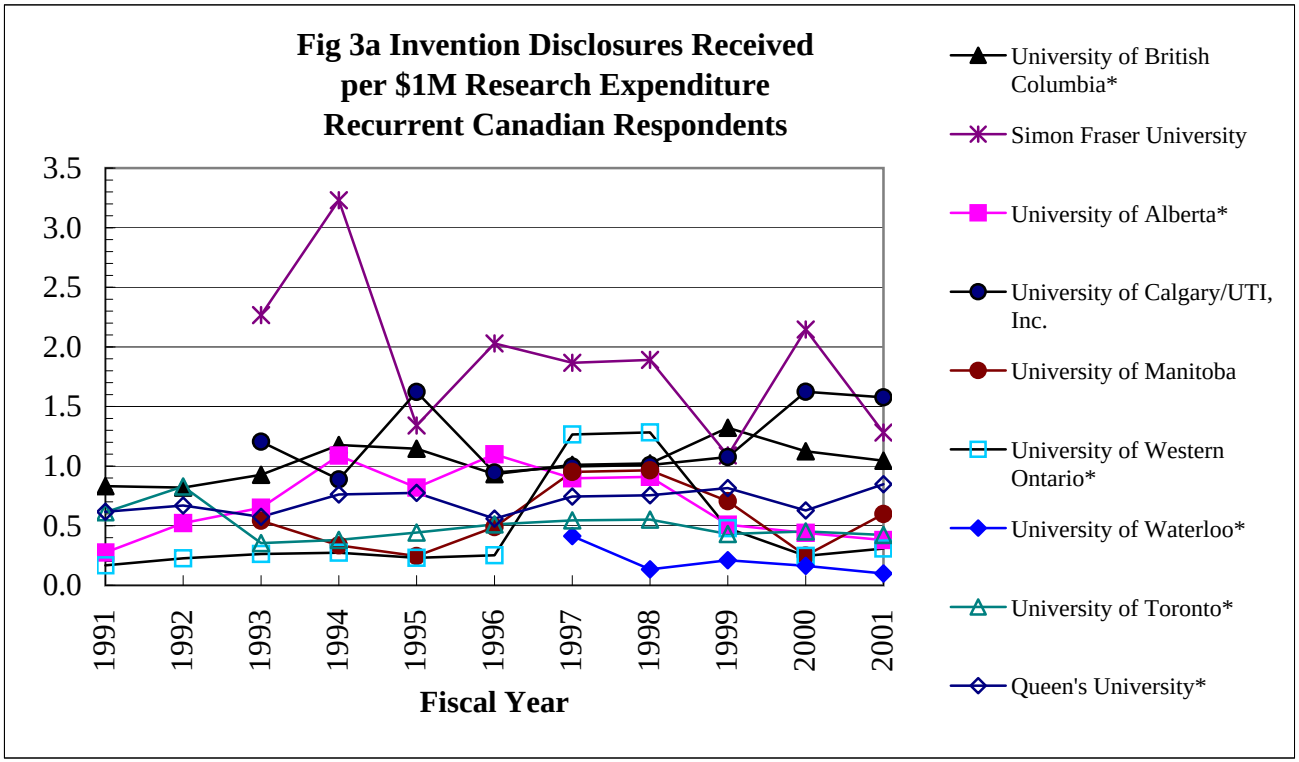


Fig 3a Invention Disclosures Received per $1M Research Expenditure Recurrent Canadian Respondents
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
University of British Columbia*
Simon Fraser University
University of Alberta*
University of Calgary/UTI, Inc.
University of Manitoba
University of Western Ontario*
University of Waterloo*
University of Toronto*
Queen's University*

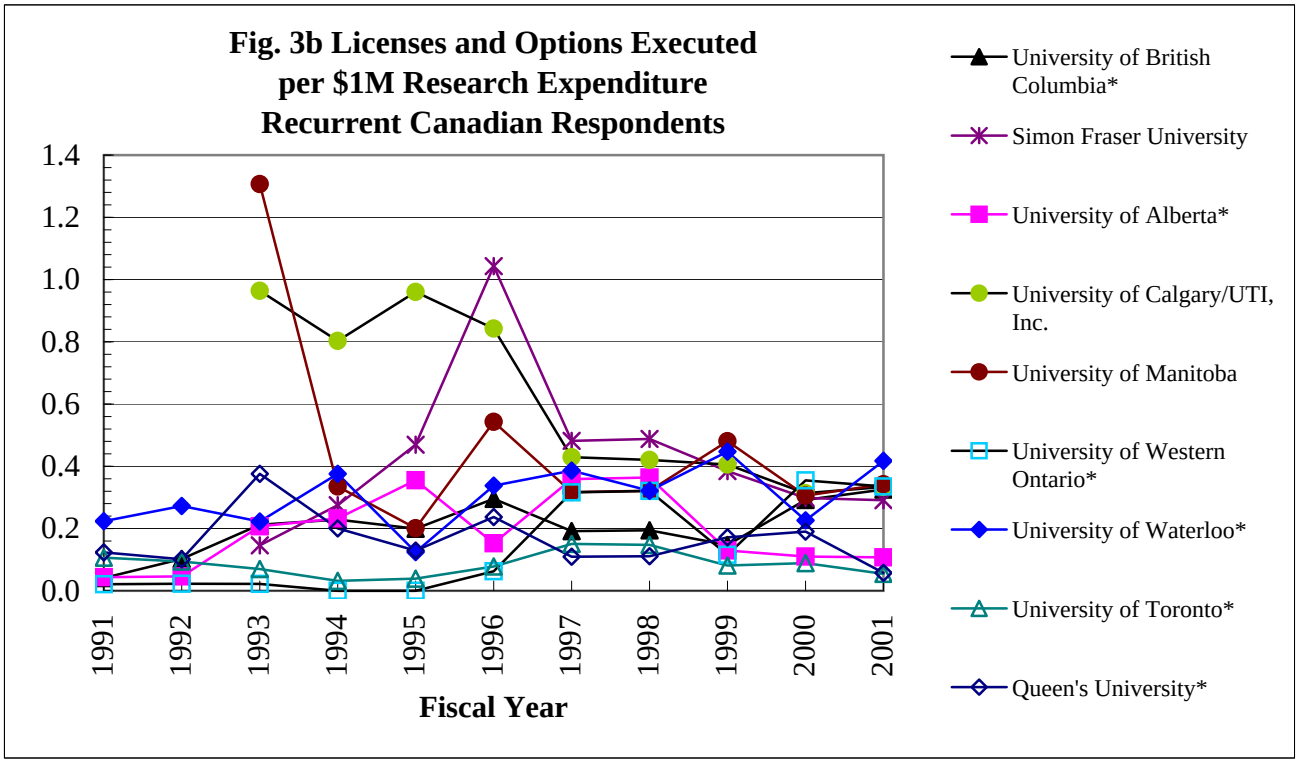


Fig. 3b Licenses and Options Executed per $1M Research Expenditure Recurrent Canadian Respondents
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
University of British Columbia*
Simon Fraser University
University of Alberta*
University of Calgary/UTI, Inc.
University of Manitoba
University of Western Ontario*
University of Waterloo*
University of Toronto*
Queen's University*

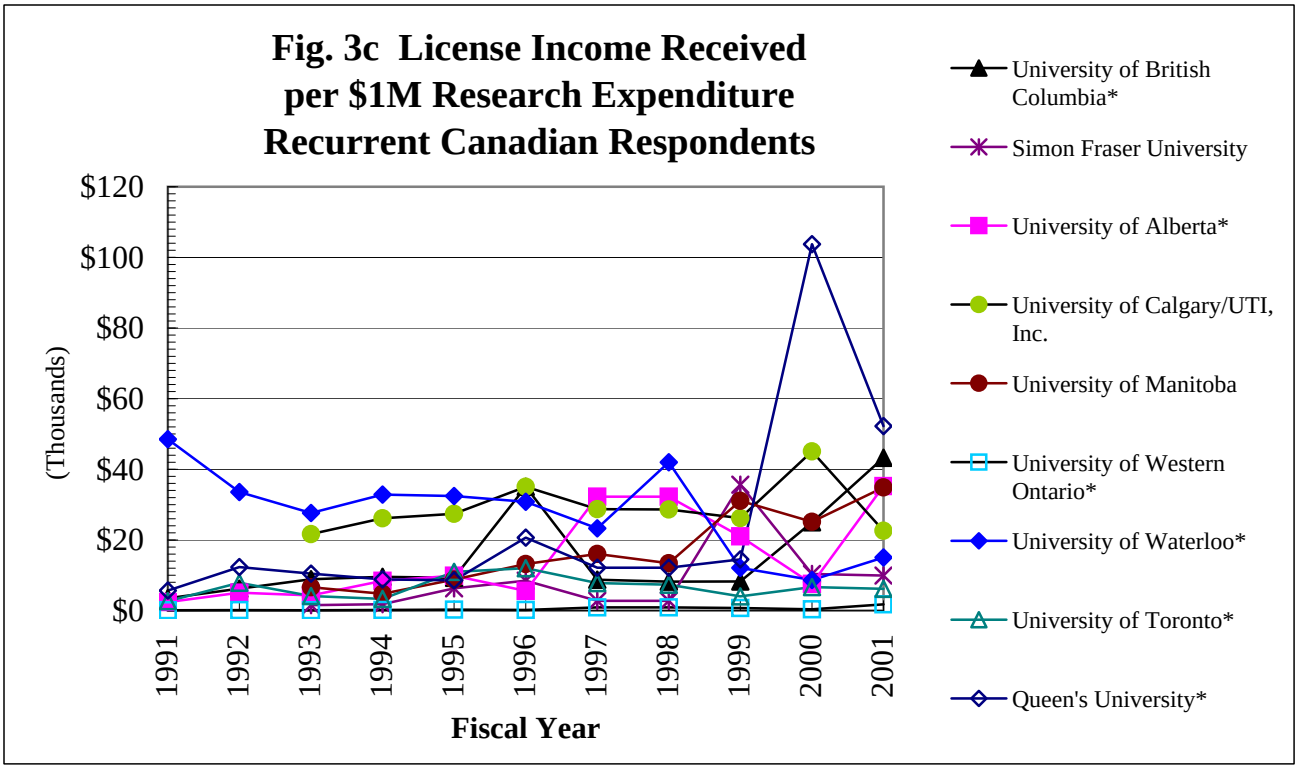


Fig. 3c License Income Received per $1M Research Expenditure Recurrent Canadian Respondents
$120
$100
$80
$60
$40
$20
$0
(Thousands)
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
University of British Columbia*
Simon Fraser University
University of Alberta*
University of Calgary/UTI, Inc.
University of Manitoba
University of Western Ontario*
University of Waterloo*
University of Toronto*
Queen's University*

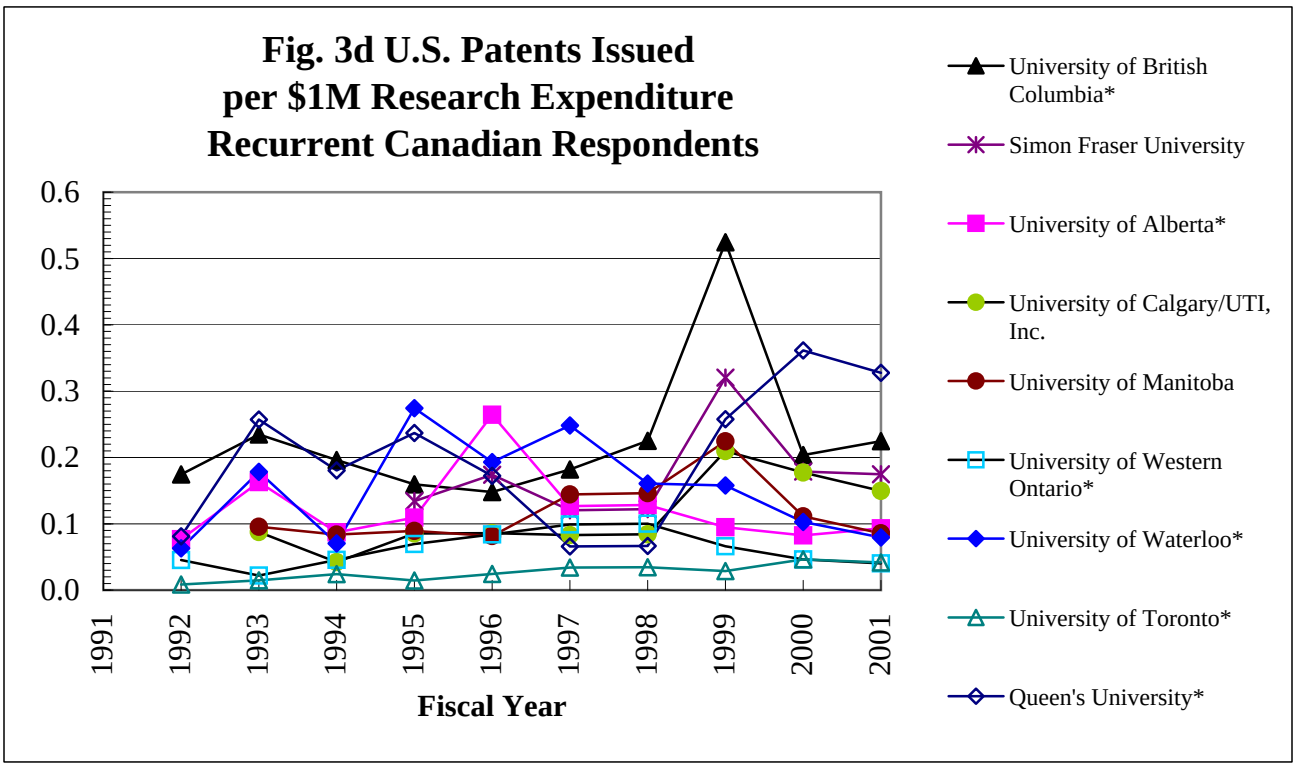


Fig. 3d U.S. Patents Issued
per $1M Research Expenditure
Recurrent Canadian Respondents
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
University of British Columbia*
Simon Fraser University
University of Alberta*
University of Calgary/UTI, Inc.
University of Manitoba
University of Western Ontario*
University of Waterloo*
University of Toronto*
Queen's University*

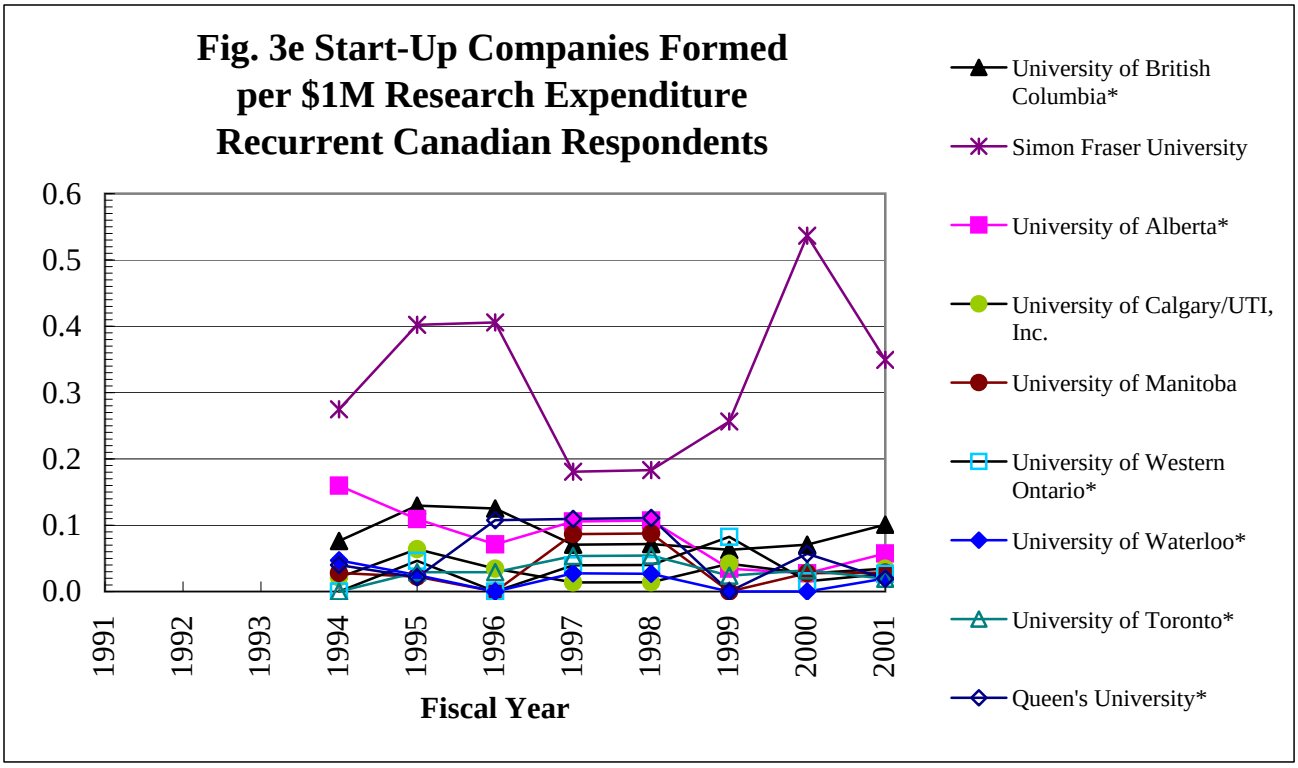


Fig. 3e Start-Up Companies Formed per $1M Research Expenditure Recurrent Canadian Respondents
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
University of British Columbia*
Simon Fraser University
University of Alberta*
University of Calgary/UTI, Inc.
University of Manitoba
University of Western Ontario*
University of Waterloo*
University of Toronto*
Queen's University*

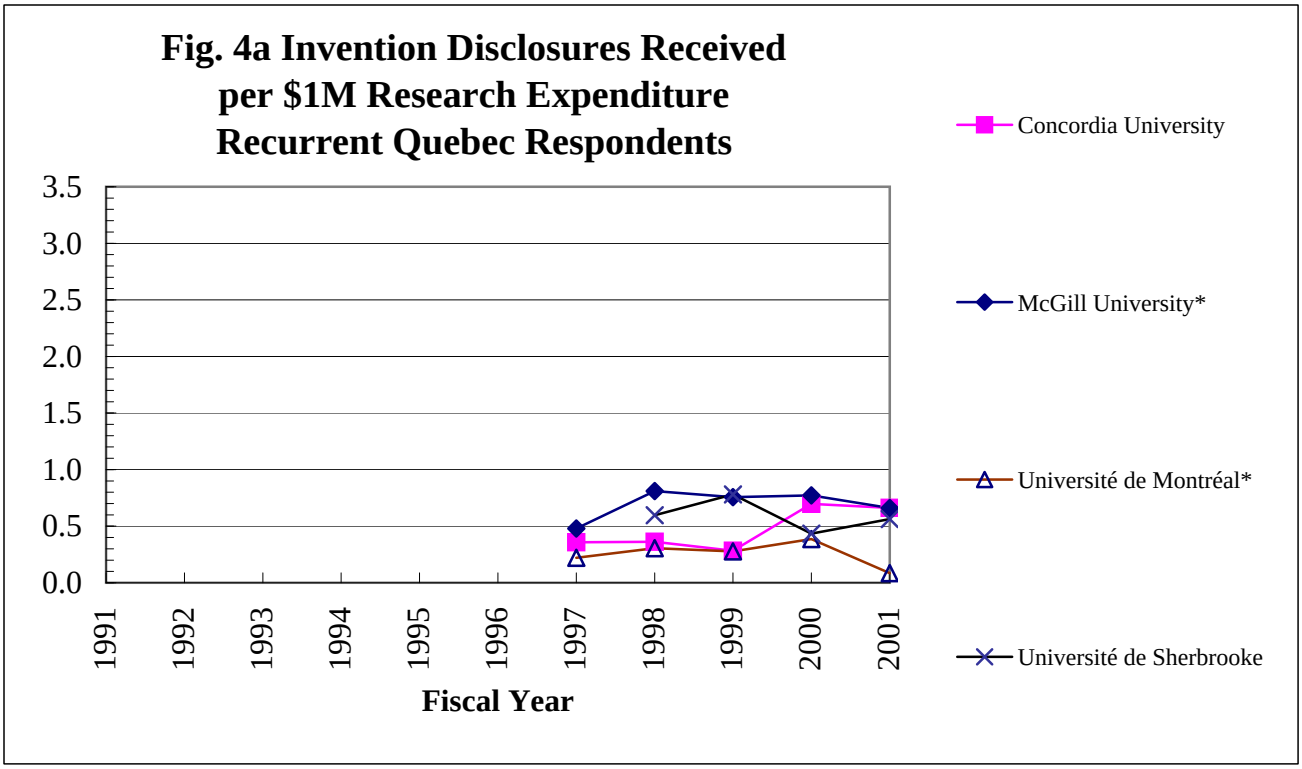


Fig. 4a Invention Disclosures Received per $1M Research Expenditure Recurrent Quebec Respondents
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Concordia University
McGill University*
Université de Montréal*
Université de Sherbrooke

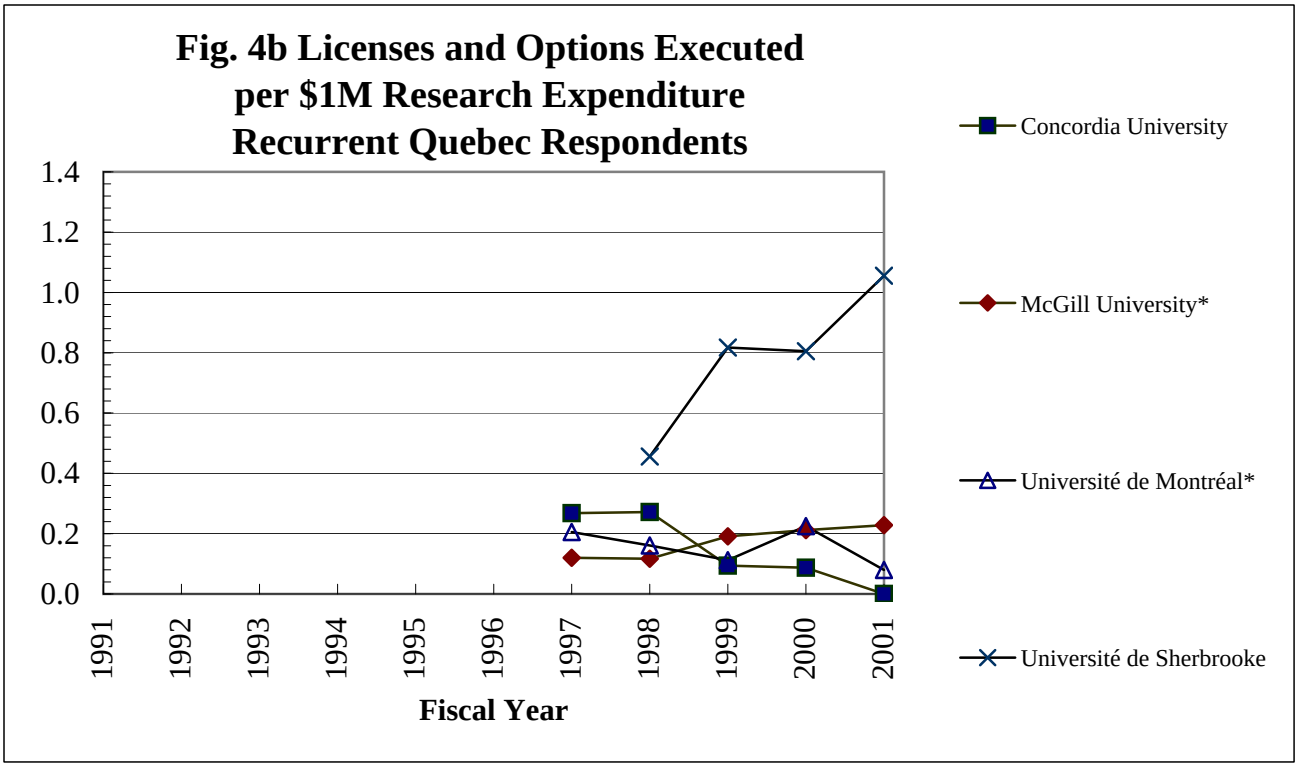


Fig. 4b Licenses and Options Executed per $1M Research Expenditure Recurrent Quebec Respondents
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Concordia University
McGill University*
Université de Montréal*
Université de Sherbrooke

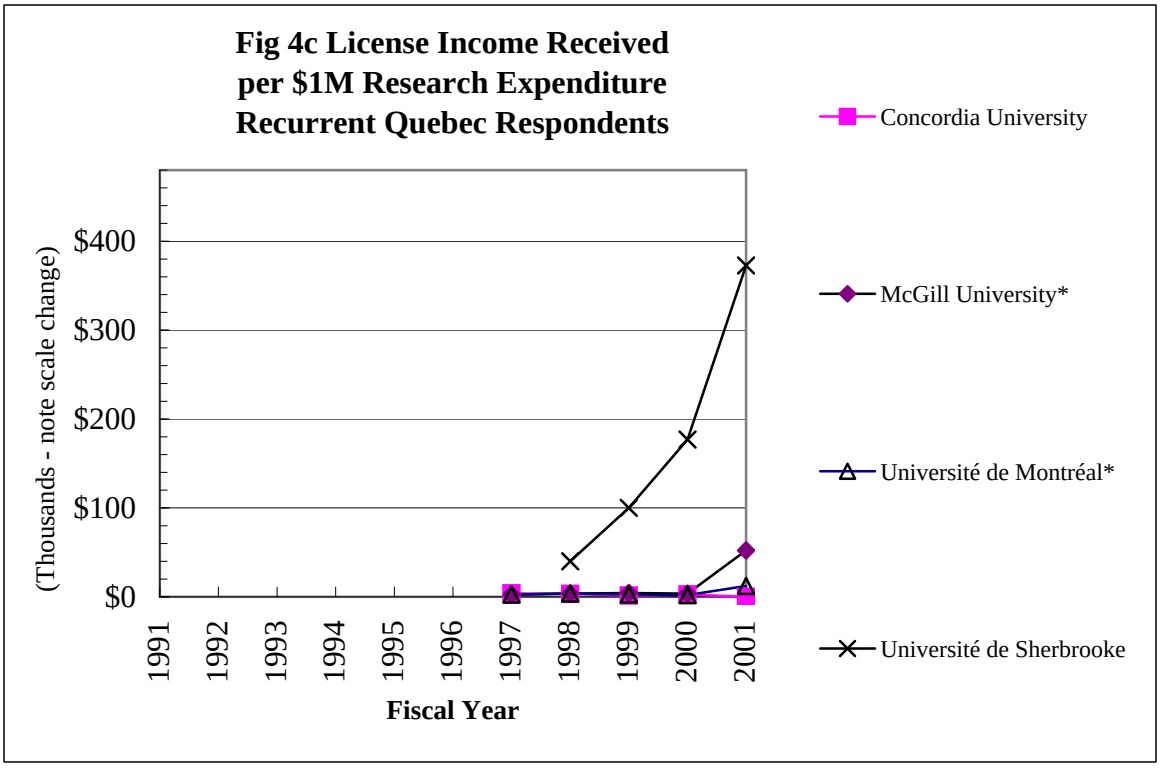


Fig 4c License Income Received per $1M Research Expenditure Recurrent Quebec Respondents
(Thousands - note scale change)
$400
$300
$200
$100
$0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Concordia University
McGill University*
Université de Montréal*
Université de Sherbrooke

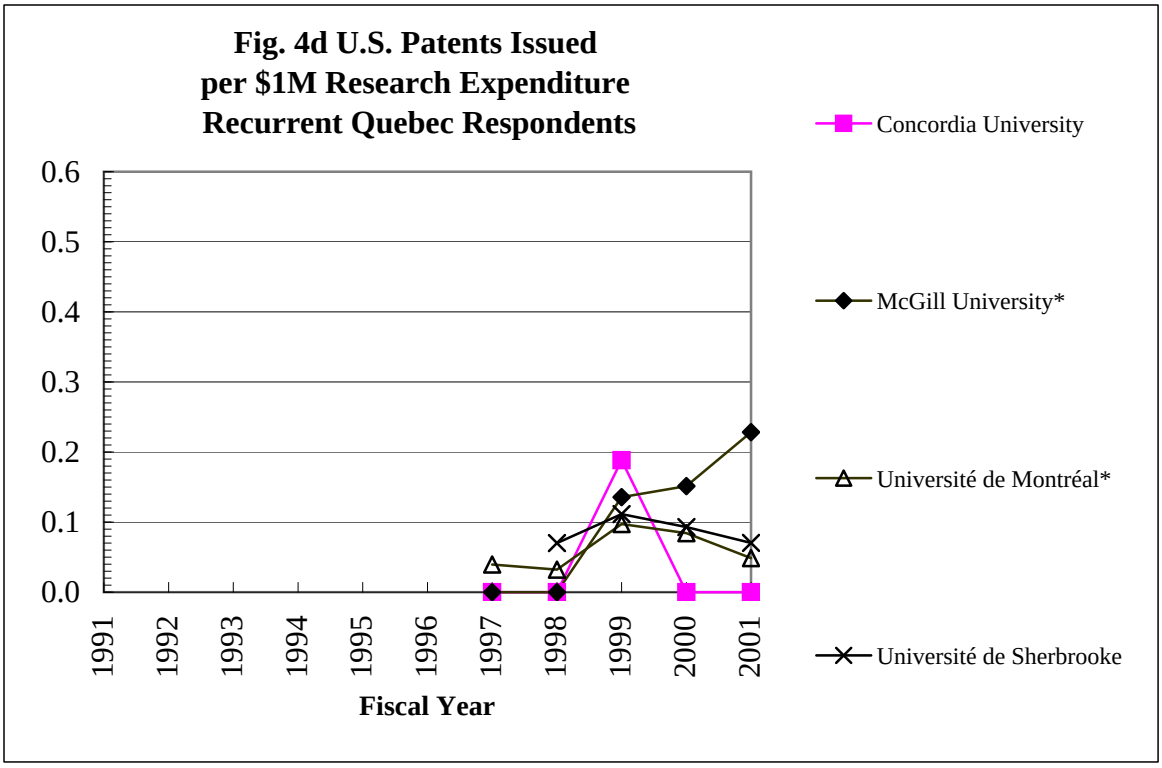


Fig. 4d U.S. Patents Issued
per $1M Research Expenditure
Recurrent Quebec Respondents
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Concordia University
McGill University*
Université de Montréal*
Université de Sherbrooke

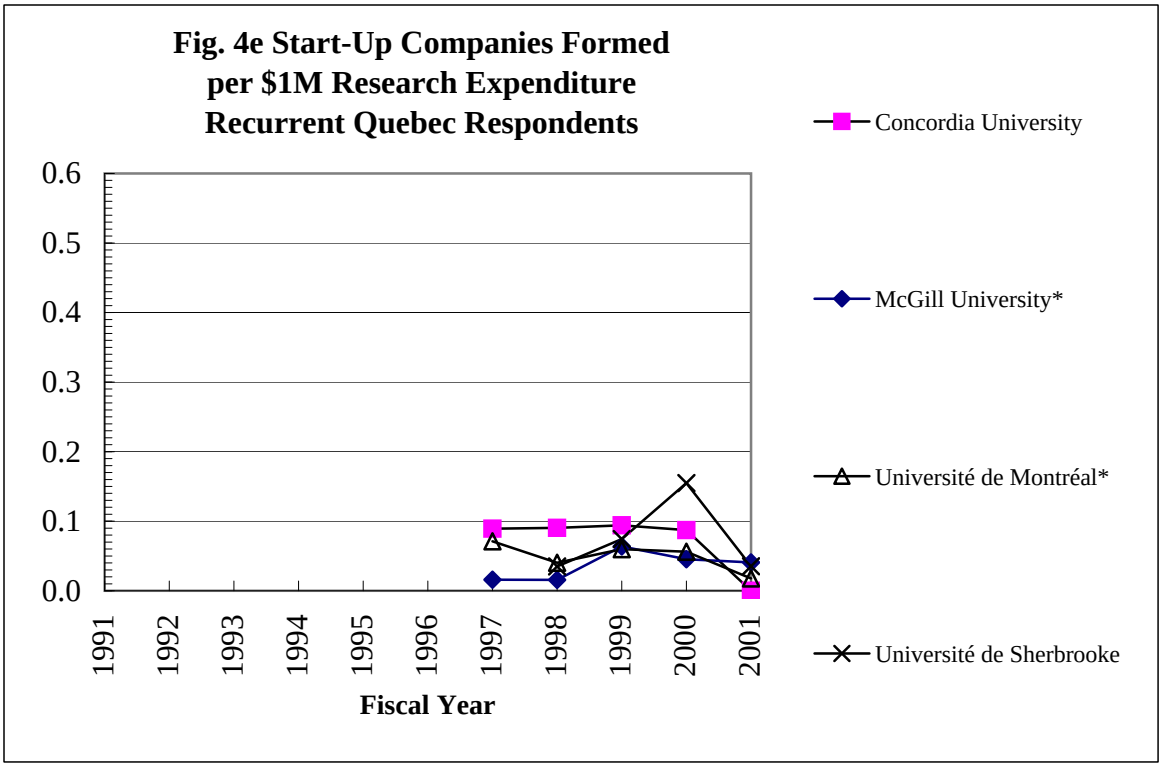


Fig. 4e Start-Up Companies Formed per $1M Research Expenditure Recurrent Quebec Respondents
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Concordia University
McGill University*
Université de Montréal*
Université de Sherbrooke

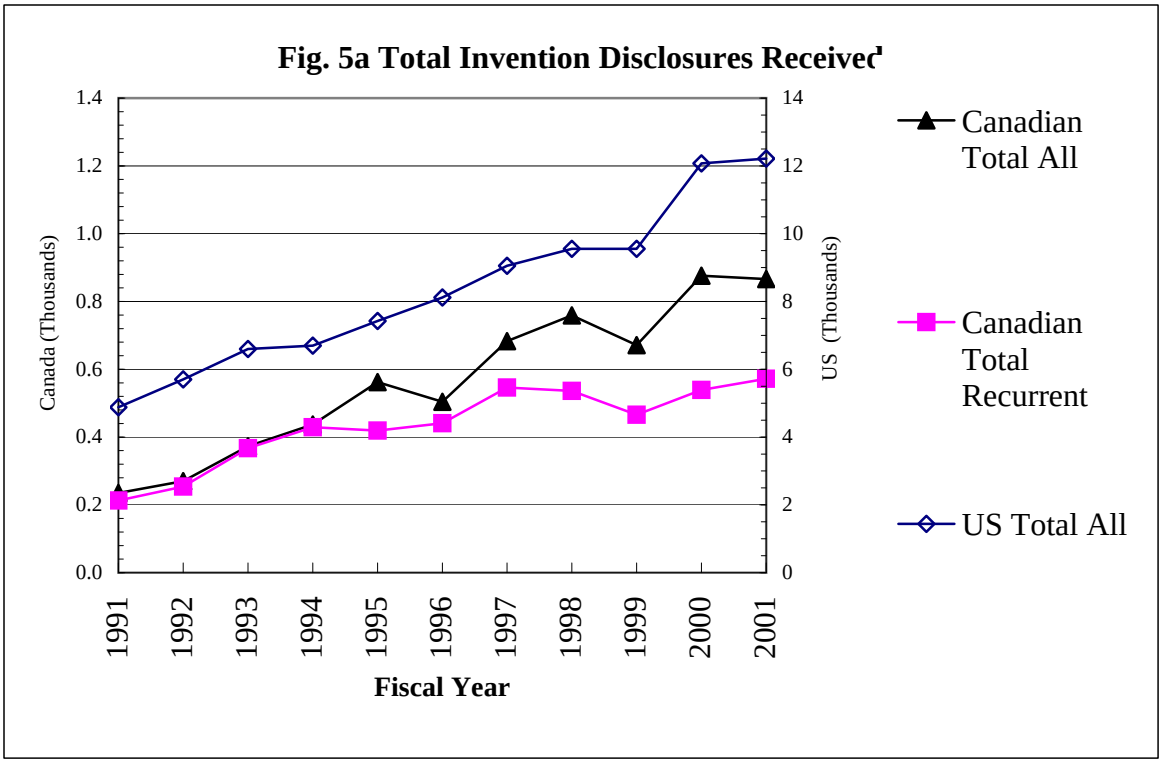


Fig. 5a Total Invention Disclosures Received
Canada (Thousands)
US (Thousands)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
14
12
10
8
6
4
2
0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Canadian Total All
Canadian Total Recurrent
US Total All

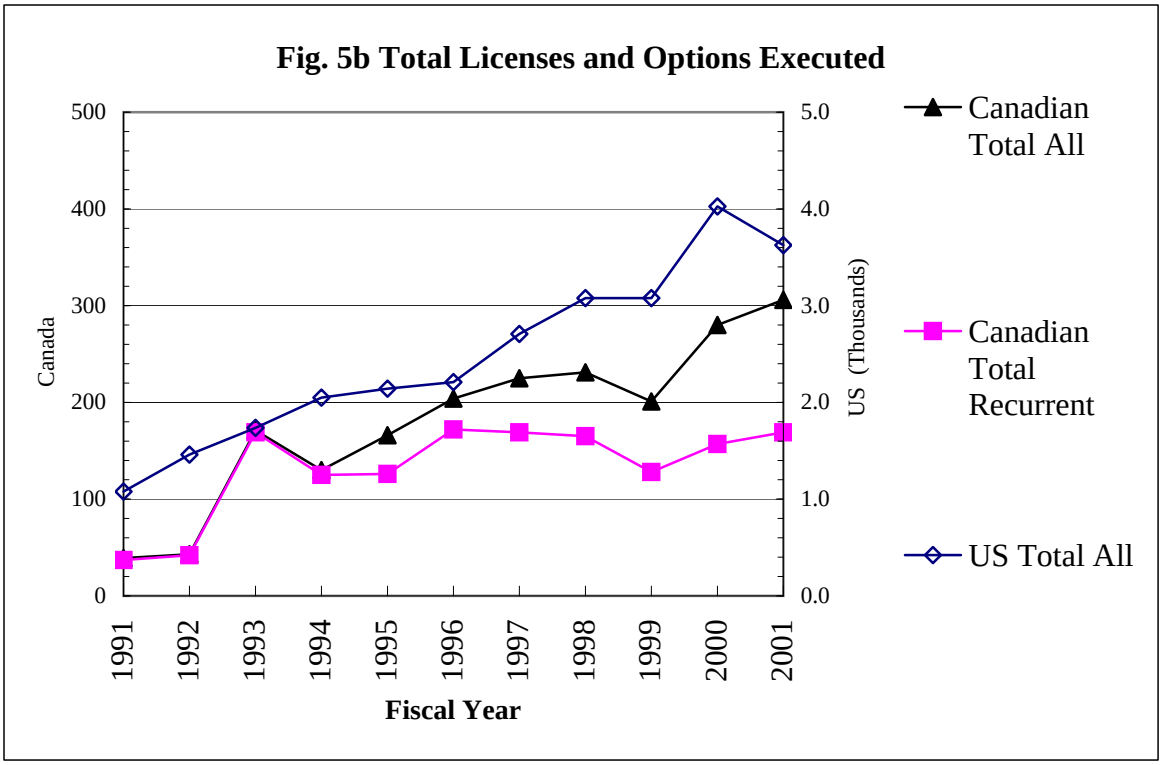


Fig. 5b Total Licenses and Options Executed
Canada
US (Thousands)
500
400
300
200
100
0
5.0
4.0
3.0
2.0
1.0
0.0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Canadian Total All
Canadian Total Recurrent
US Total All

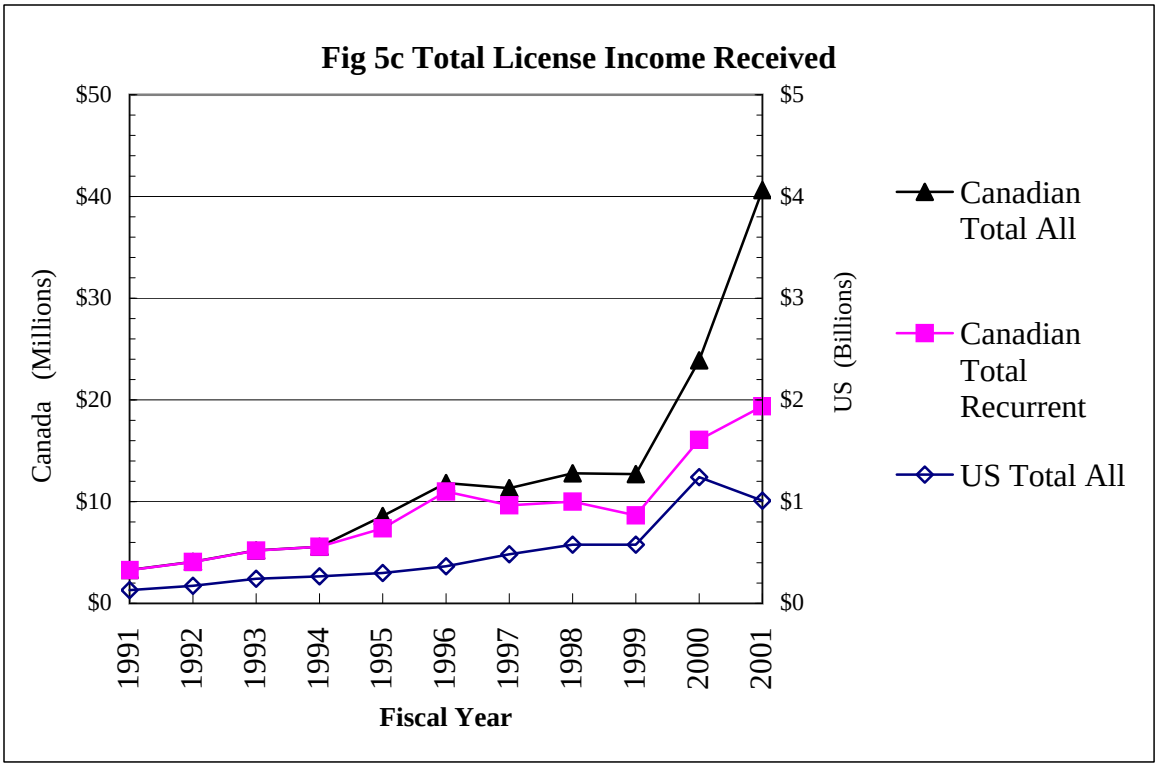


Fig 5c Total License Income Received
$50
$40
$30
$20
$10
$0
$5
$4
$3
$2
$1
$0
Canada (Millions)
US (Billions)
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Canadian Total All
Canadian Total Recurrent
US Total All

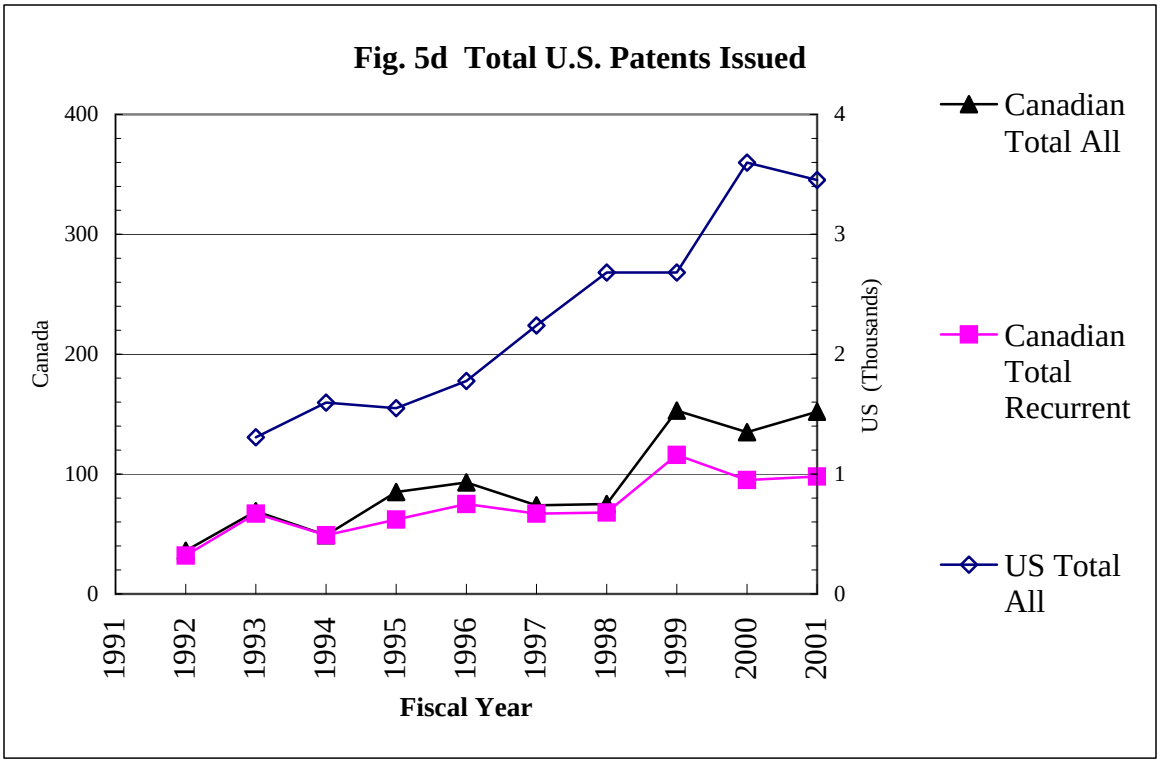


Fig. 5d Total U.S. Patents Issued
400
300
200
100
0
Canada
4
3
2
1
0
US (Thousands)
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Canadian Total All
Canadian Total Recurrent
US Total All

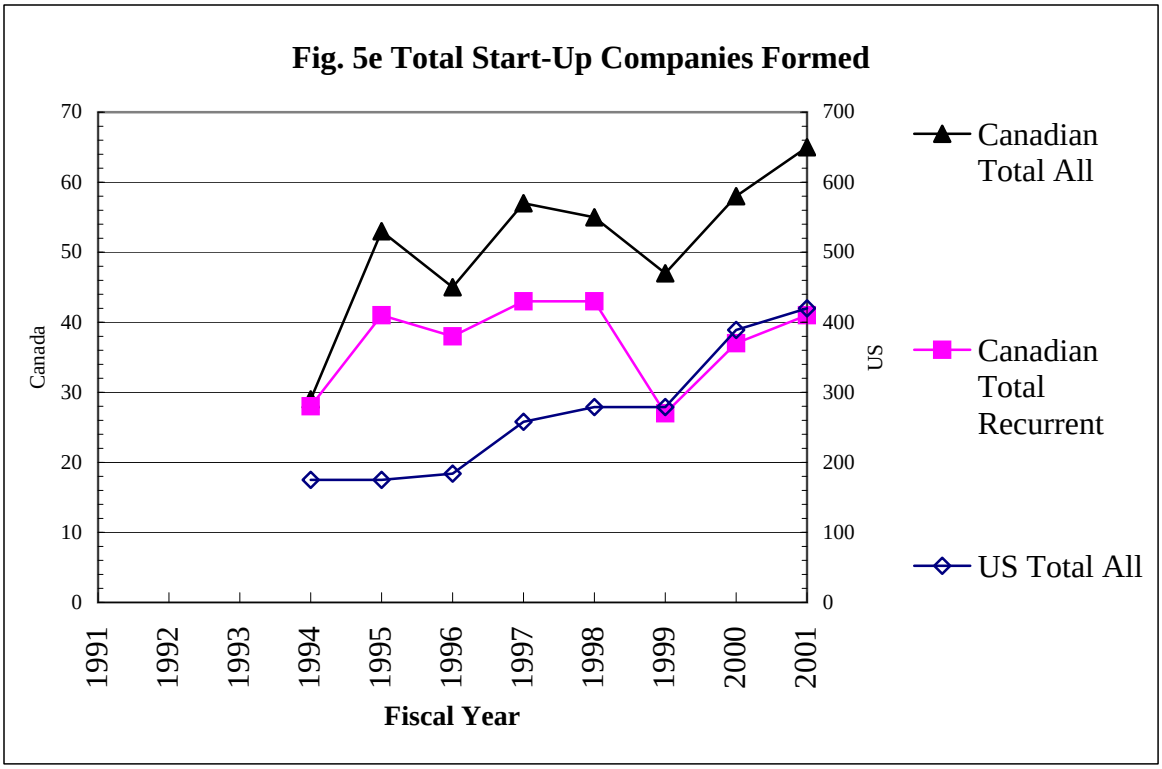


Fig. 5e Total Start-Up Companies Formed
Canada
US
70
60
50
40
30
20
10
0
700
600
500
400
300
200
100
0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Canadian Total All
Canadian Total Recurrent
US Total All

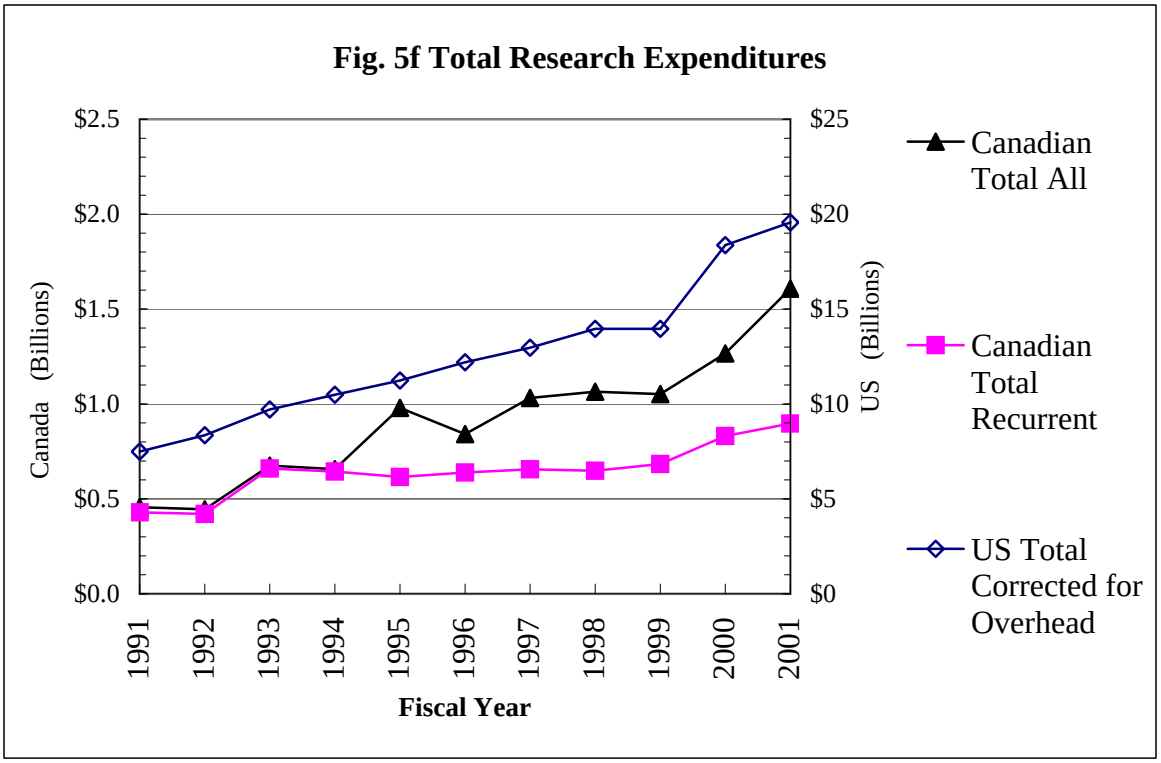
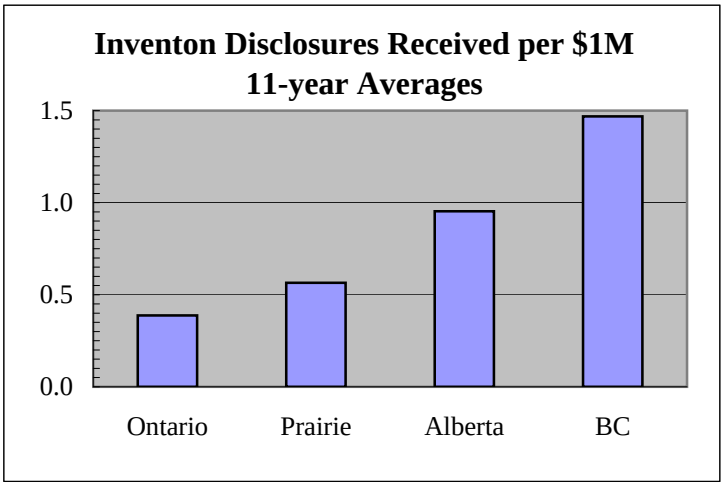
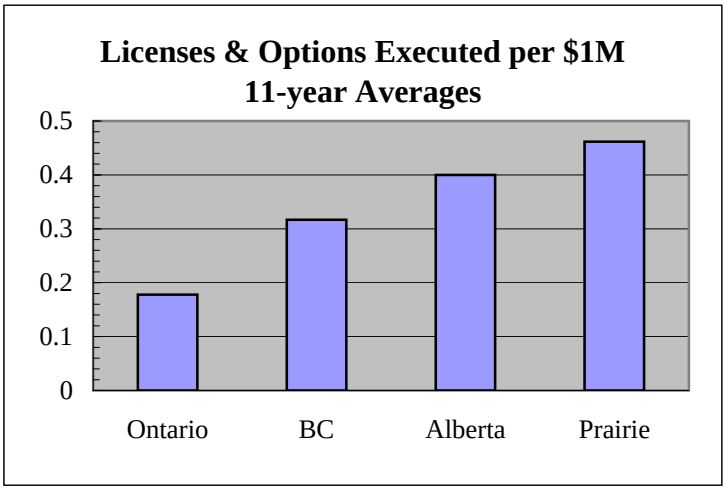
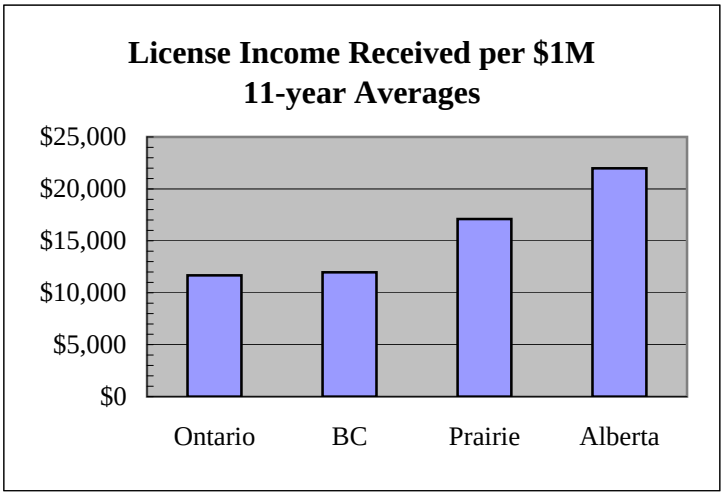


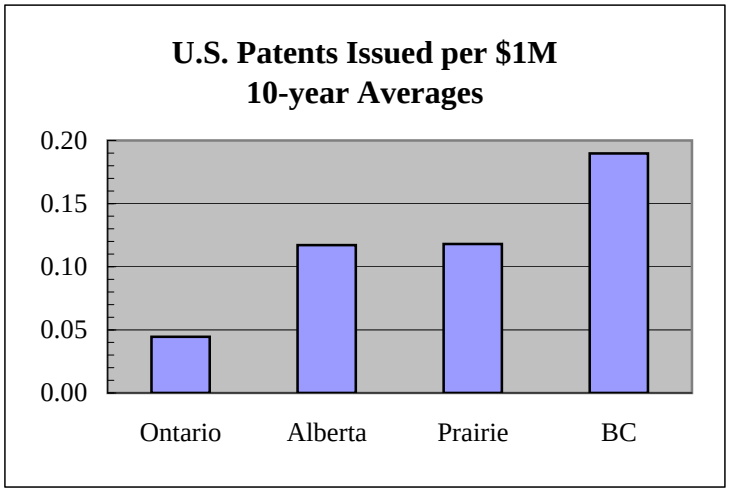
Fig. 5f Total Research Expenditures
$2.5
$2.0
$1.5
$1.0
$0.5
$0.0
Canada (Billions)
$25
$20
$15
$10
$5
$0
US (Billions)
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Fiscal Year
Canadian Total All
Canadian Total Recurrent
US Total Corrected for Overhead

Figure 6









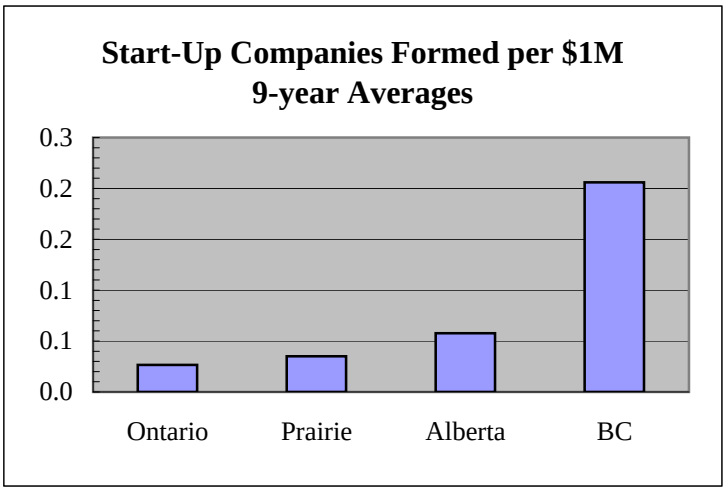


Figure 6

Figure 7

Figure 7

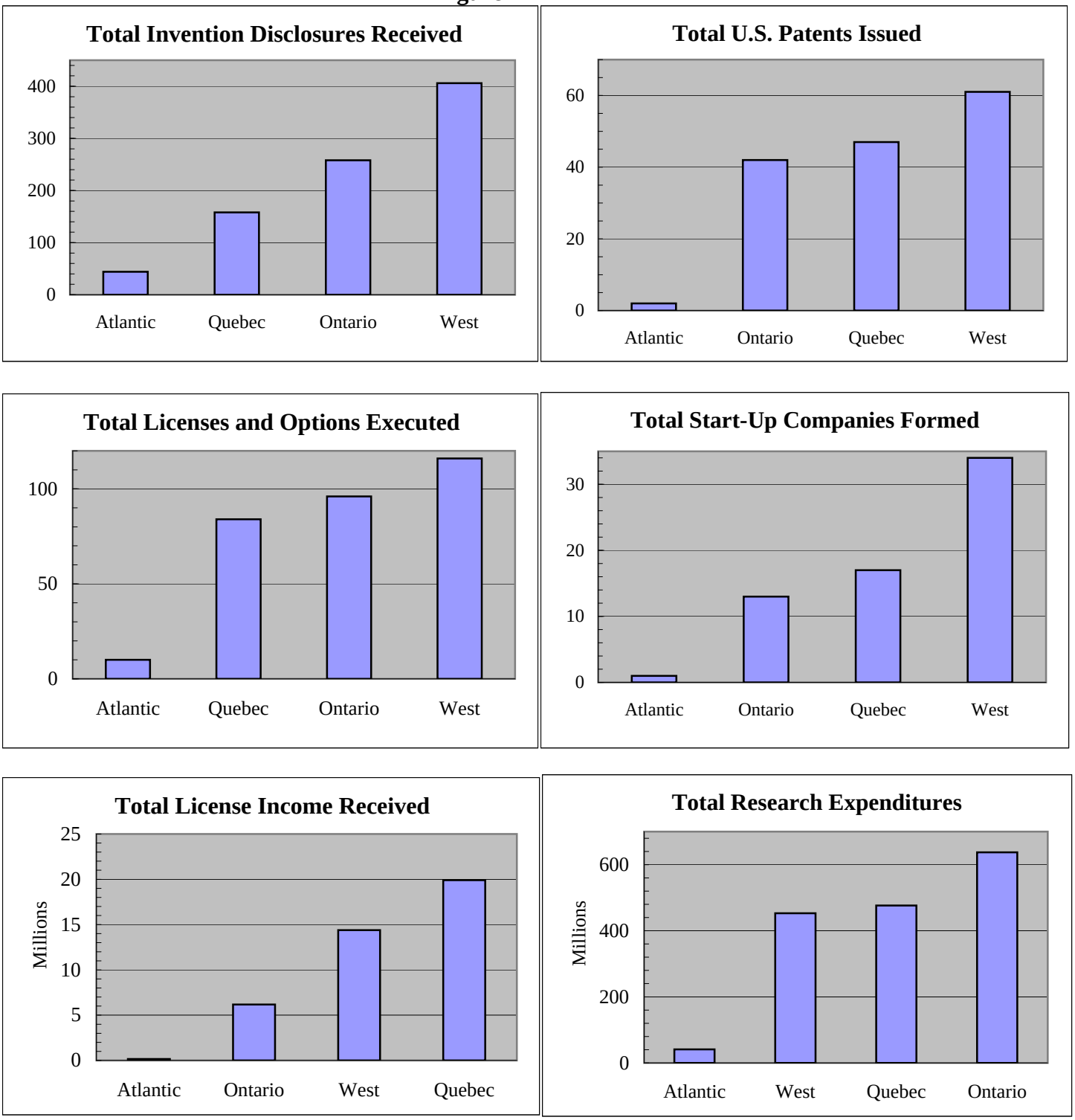
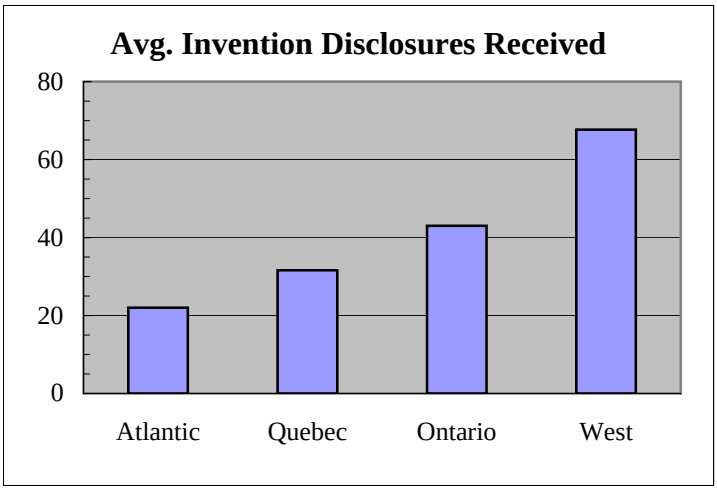
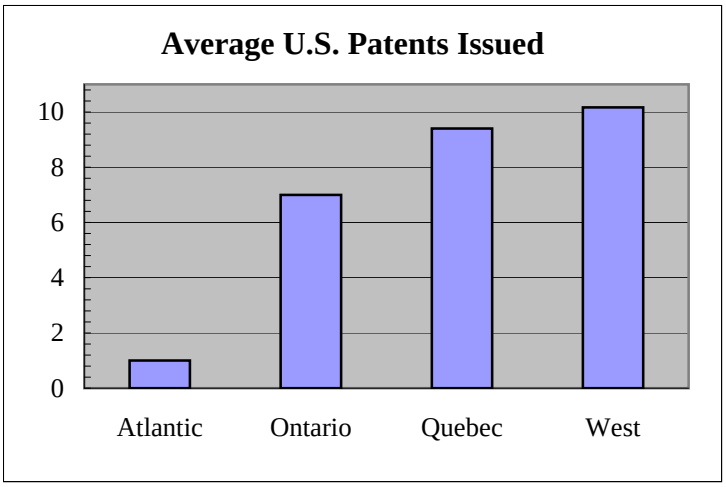
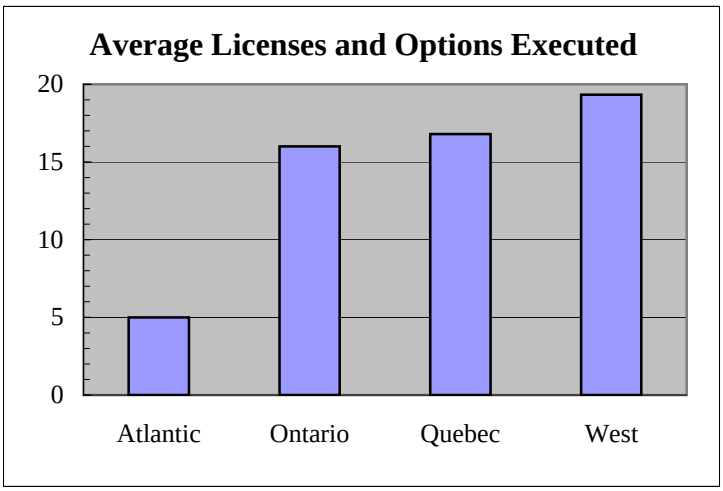
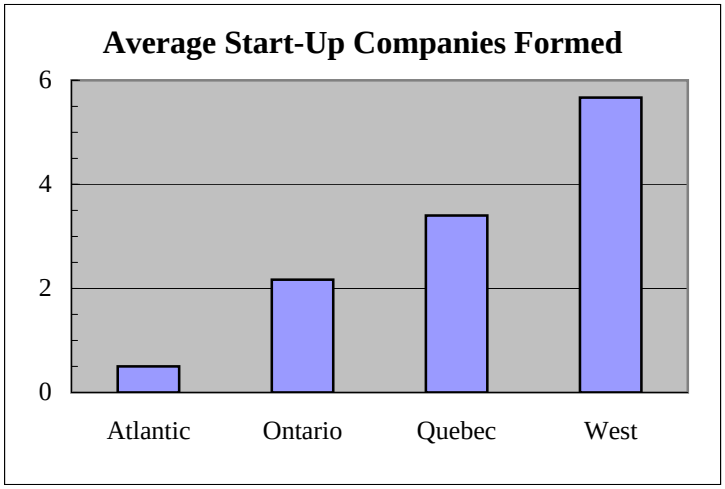


Figure 8









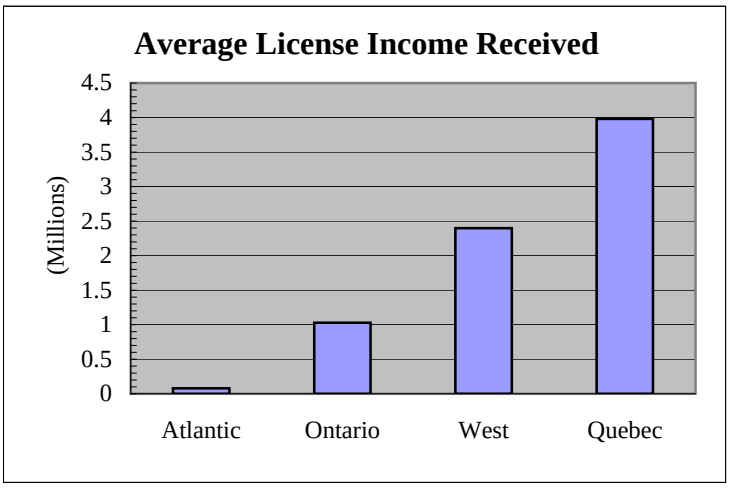
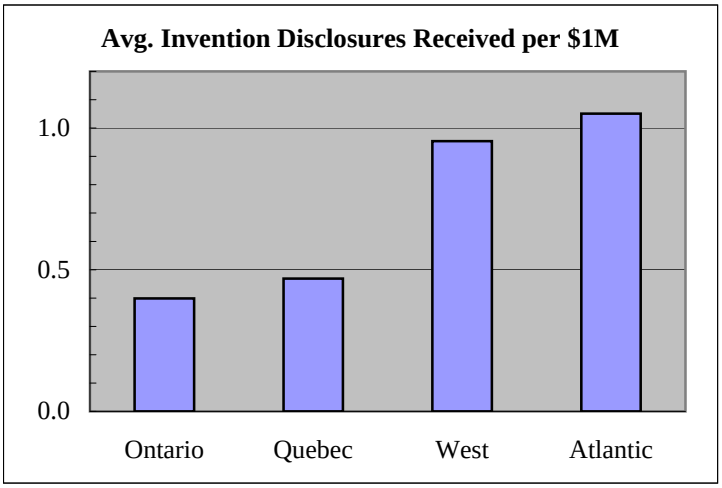
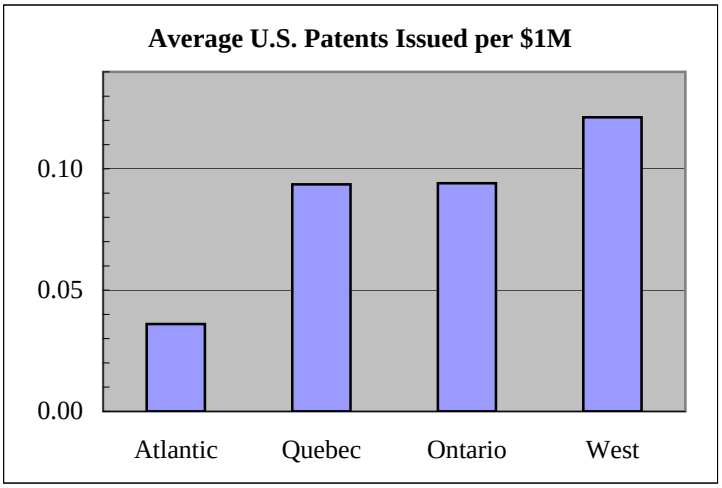
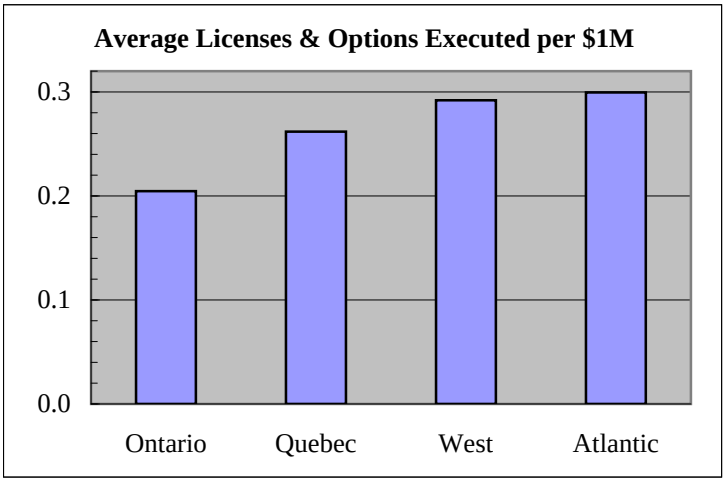


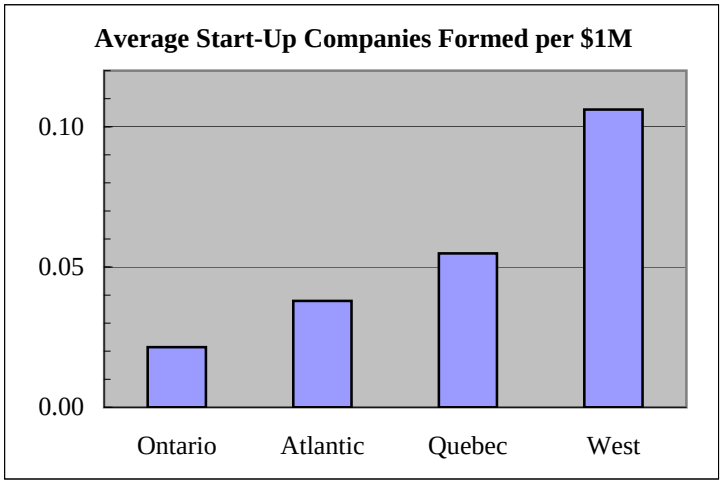
Figure 8

Figure 9









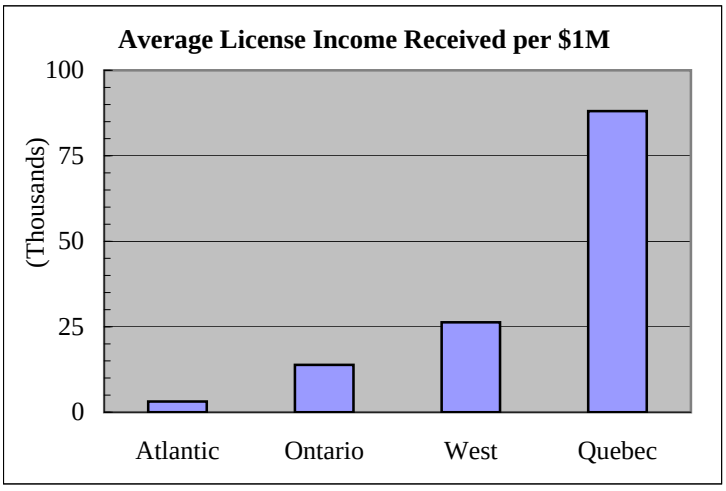


Figure 9

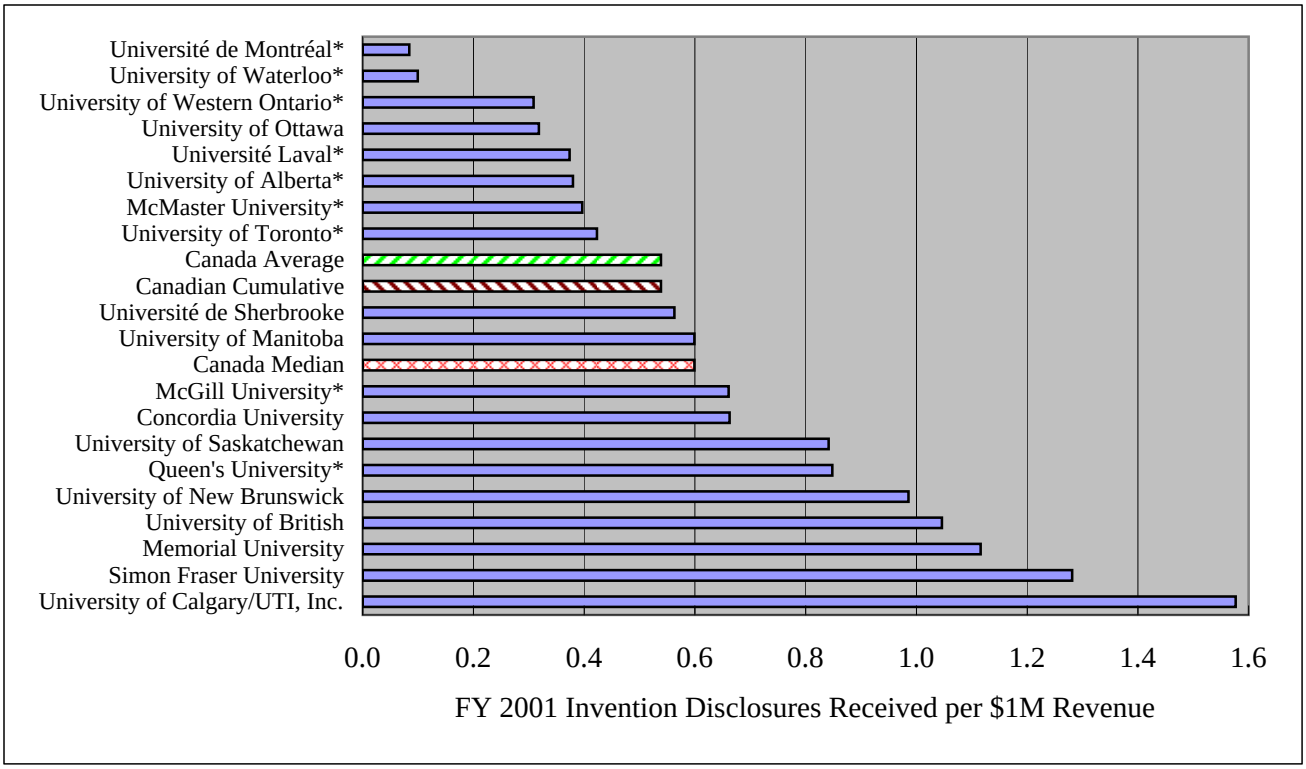

Université de Montréal*
University of Waterloo*
University of Western Ontario*
University of Ottawa
Université Laval*
University of Alberta*
McMaster University*
University of Toronto*
Canada Average
Canadian Cumulative
Université de Sherbrooke
University of Manitoba
Canada Median
McGill University*
Concordia University
University of Saskatchewan
Queen's University*
University of New Brunswick
University of British
Memorial University
Simon Fraser University
University of Calgary/UTI, Inc.
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
FY 2001 Invention Disclosures Received per $1M Revenue

Figure 10a

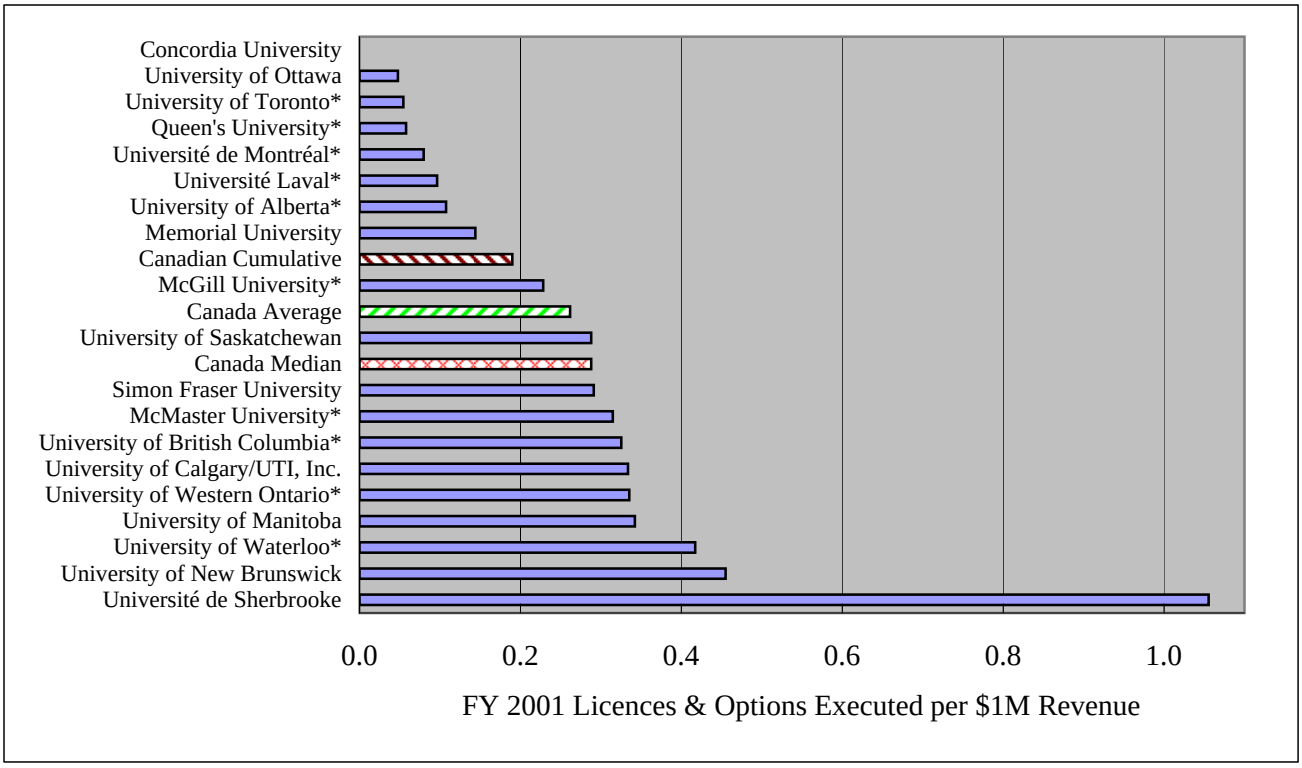

Concordia University
University of Ottawa
University of Toronto*
Queen's University*
Université de Montréal*
Université Laval*
University of Alberta*
Memorial University
Canadian Cumulative
McGill University*
Canada Average
University of Saskatchewan
Canada Median
Simon Fraser University
McMaster University*
University of British Columbia*
University of Calgary/UTI, Inc.
University of Western Ontario*
University of Manitoba
University of Waterloo*
University of New Brunswick
Université de Sherbrooke
0.0
0.2
0.4
0.6
0.8
1.0
FY 2001 Licences & Options Executed per $1M Revenue

Figure 10b

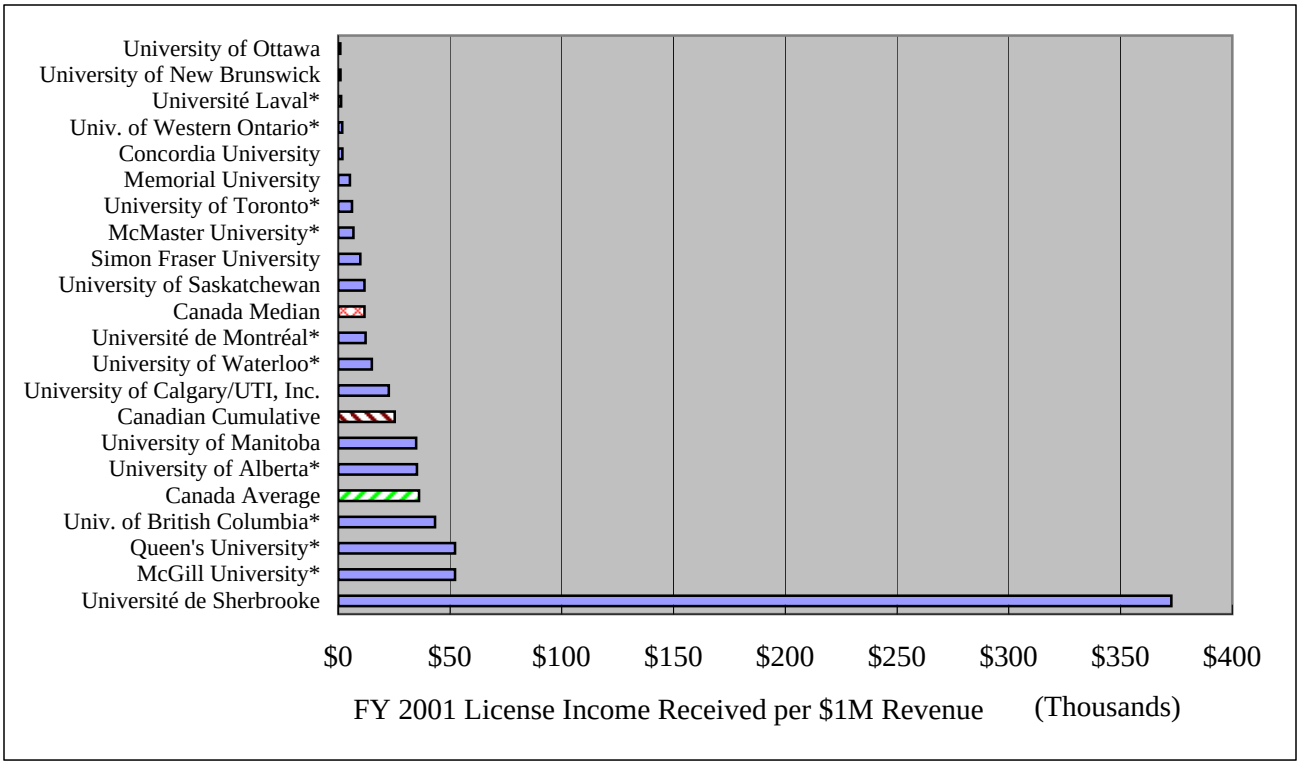

University of Ottawa
University of New Brunswick
Université Laval*
Univ. of Western Ontario*
Concordia University
Memorial University
University of Toronto*
McMaster University*
Simon Fraser University
University of Saskatchewan
Canada Median
Université de Montréal*
University of Waterloo*
University of Calgary/UTI, Inc.
Canadian Cumulative
University of Manitoba
University of Alberta*
Canada Average
Univ. of British Columbia*
Queen's University*
McGill University*
Université de Sherbrooke
$0
$50
$100
$150
$200
$250
$300
$350
$400
FY 2001 License Income Received per $1M Revenue
(Thousands)

Figure 10c

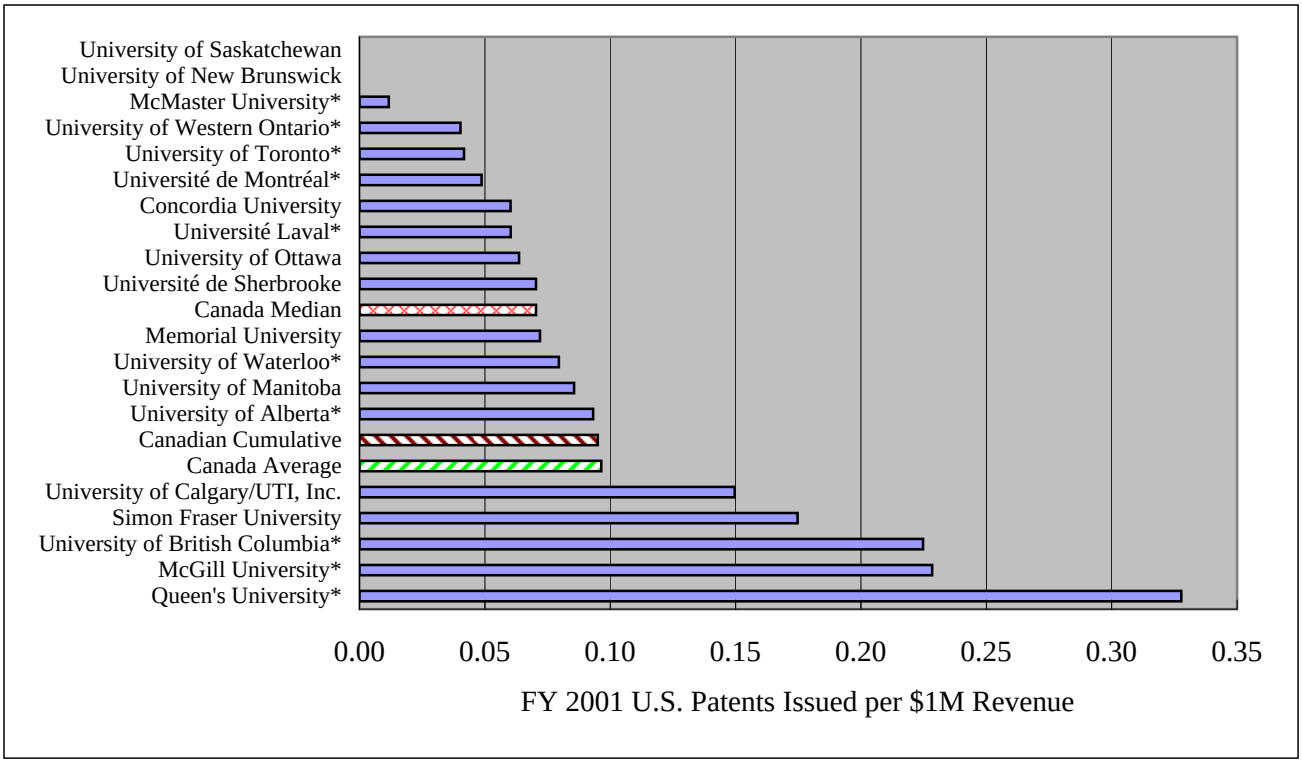

University of Saskatchewan
University of New Brunswick
McMaster University*
University of Western Ontario*
University of Toronto*
Université de Montréal*
Concordia University
Université Laval*
University of Ottawa
Université de Sherbrooke
Canada Median
Memorial University
University of Waterloo*
University of Manitoba
University of Alberta*
Canadian Cumulative
Canada Average
University of Calgary/UTI, Inc.
Simon Fraser University
University of British Columbia*
McGill University*
Queen's University*
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
FY 2001 U.S. Patents Issued per $1M Revenue

Figure 10d

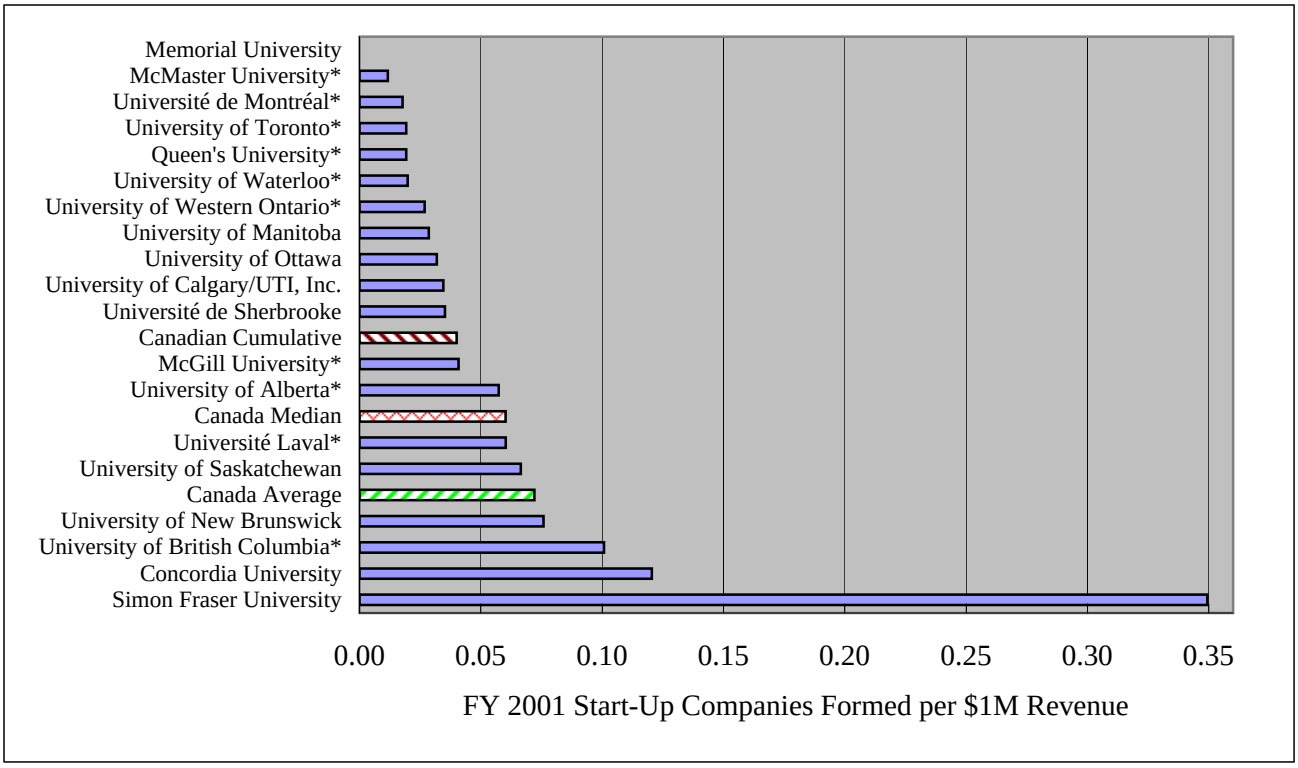

Memorial University
McMaster University*
Université de Montréal*
University of Toronto*
Queen's University*
University of Waterloo*
University of Western Ontario*
University of Manitoba
University of Ottawa
University of Calgary/UTI, Inc.
Université de Sherbrooke
Canadian Cumulative
McGill University*
University of Alberta*
Canada Median
Université Laval*
University of Saskatchewan
Canada Average
University of New Brunswick
University of British Columbia*
Concordia University
Simon Fraser University
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
FY 2001 Start-Up Companies Formed per $1M Revenue

Figure 10e

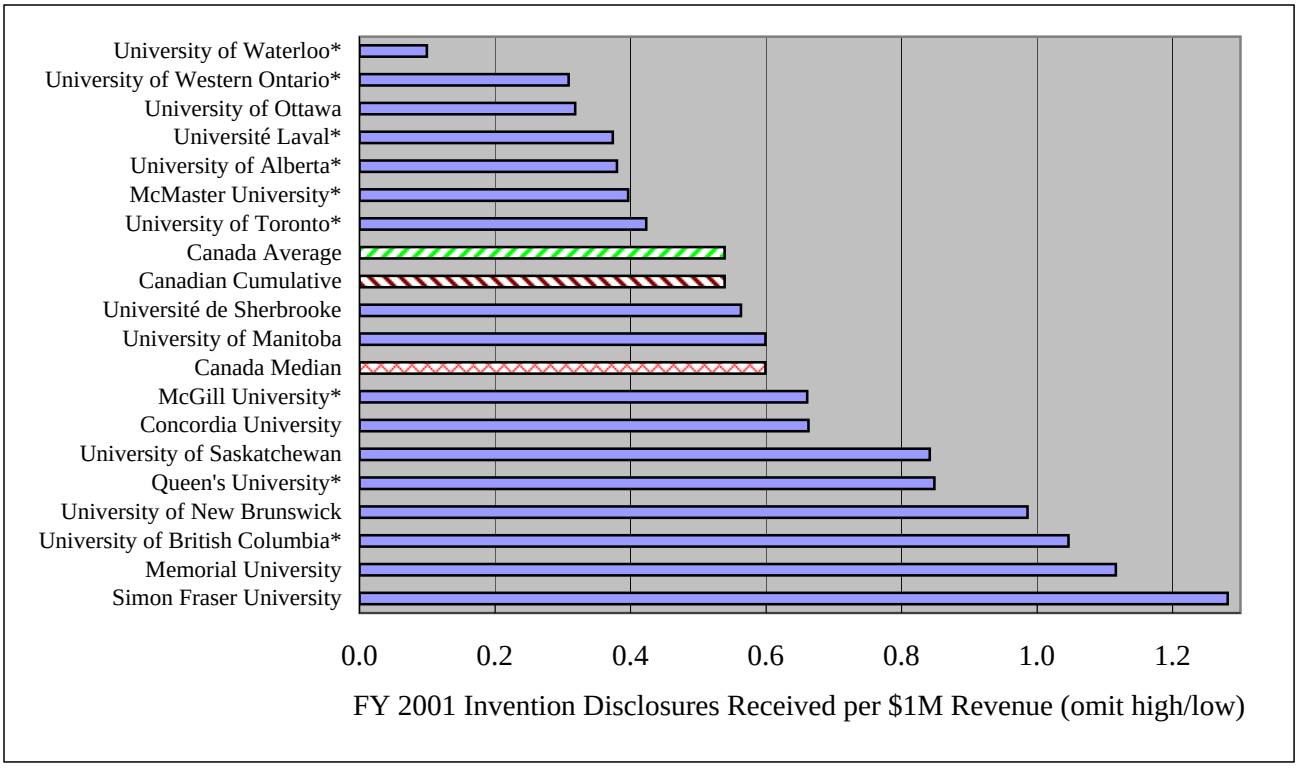

University of Waterloo*
University of Western Ontario*
University of Ottawa
Université Laval*
University of Alberta*
McMaster University*
University of Toronto*
Canada Average
Canadian Cumulative
Université de Sherbrooke
University of Manitoba
Canada Median
McGill University*
Concordia University
University of Saskatchewan
Queen's University*
University of New Brunswick
University of British Columbia*
Memorial University
Simon Fraser University
0.0
0.2
0.4
0.6
0.8
1.0
1.2
FY 2001 Invention Disclosures Received per $1M Revenue (omit high/low)

Figure 11a

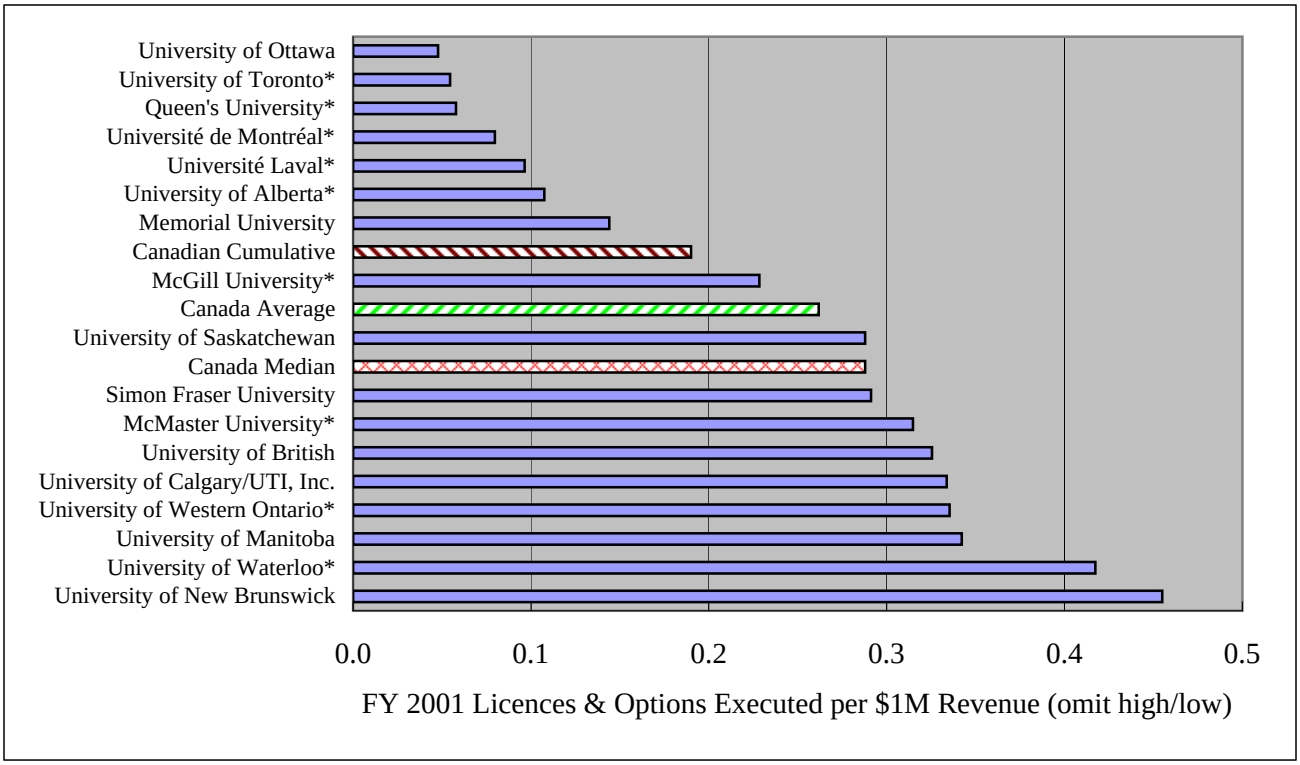

University of Ottawa
University of Toronto*
Queen's University*
Université de Montréal*
Université Laval*
University of Alberta*
Memorial University
Canadian Cumulative
McGill University*
Canada Average
University of Saskatchewan
Canada Median
Simon Fraser University
McMaster University*
University of British
University of Calgary/UTI, Inc.
University of Western Ontario*
University of Manitoba
University of Waterloo*
University of New Brunswick
0.0
0.1
0.2
0.3
0.4
0.5
FY 2001 Licences & Options Executed per $1M Revenue (omit high/low)

Figure 11B

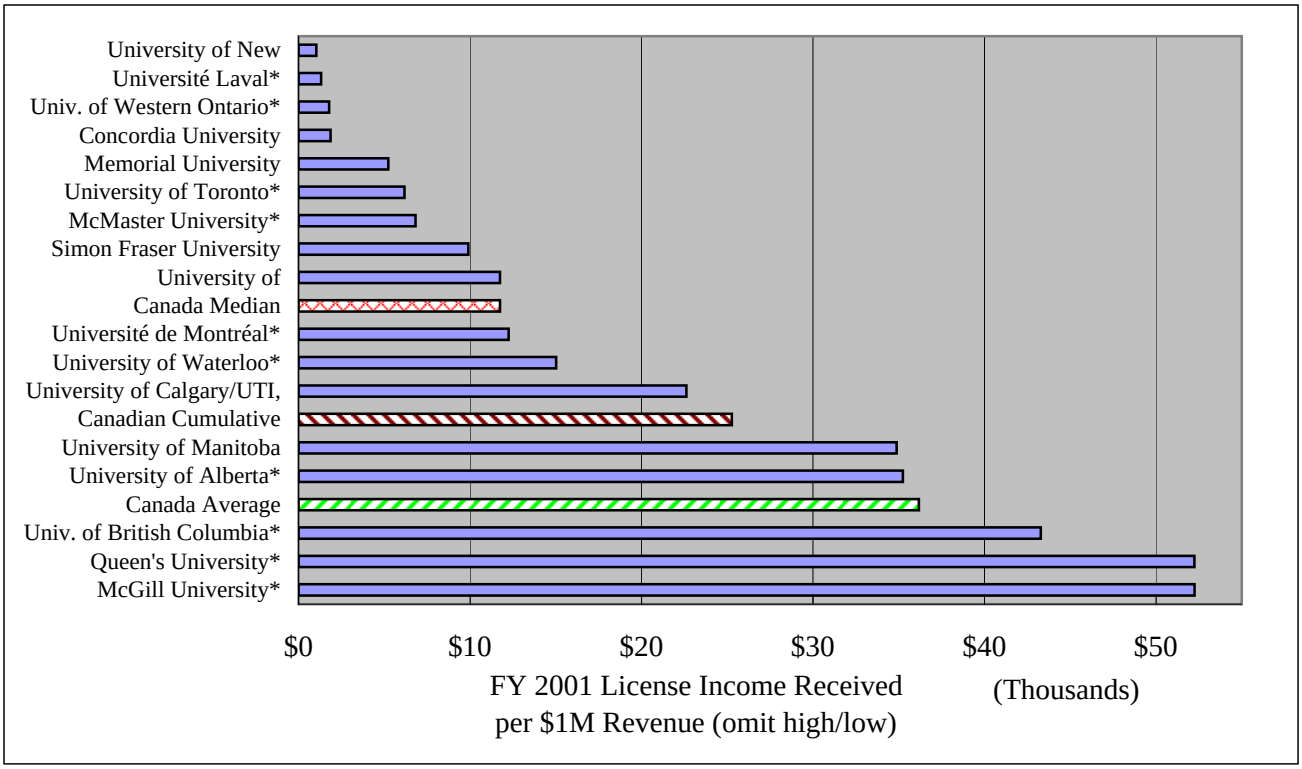

University of New
Université Laval*
Univ. of Western Ontario*
Concordia University
Memorial University
University of Toronto*
McMaster University*
Simon Fraser University
University of
Canada Median
Université de Montréal*
University of Waterloo*
University of Calgary/UTI,
Canadian Cumulative
University of Manitoba
University of Alberta*
Canada Average
Univ. of British Columbia*
Queen's University*
McGill University*
$0
$10
$20
$30
$40
$50
FY 2001 License Income Received
per $1M Revenue (omit high/low)
(Thousands)

Figure 11c

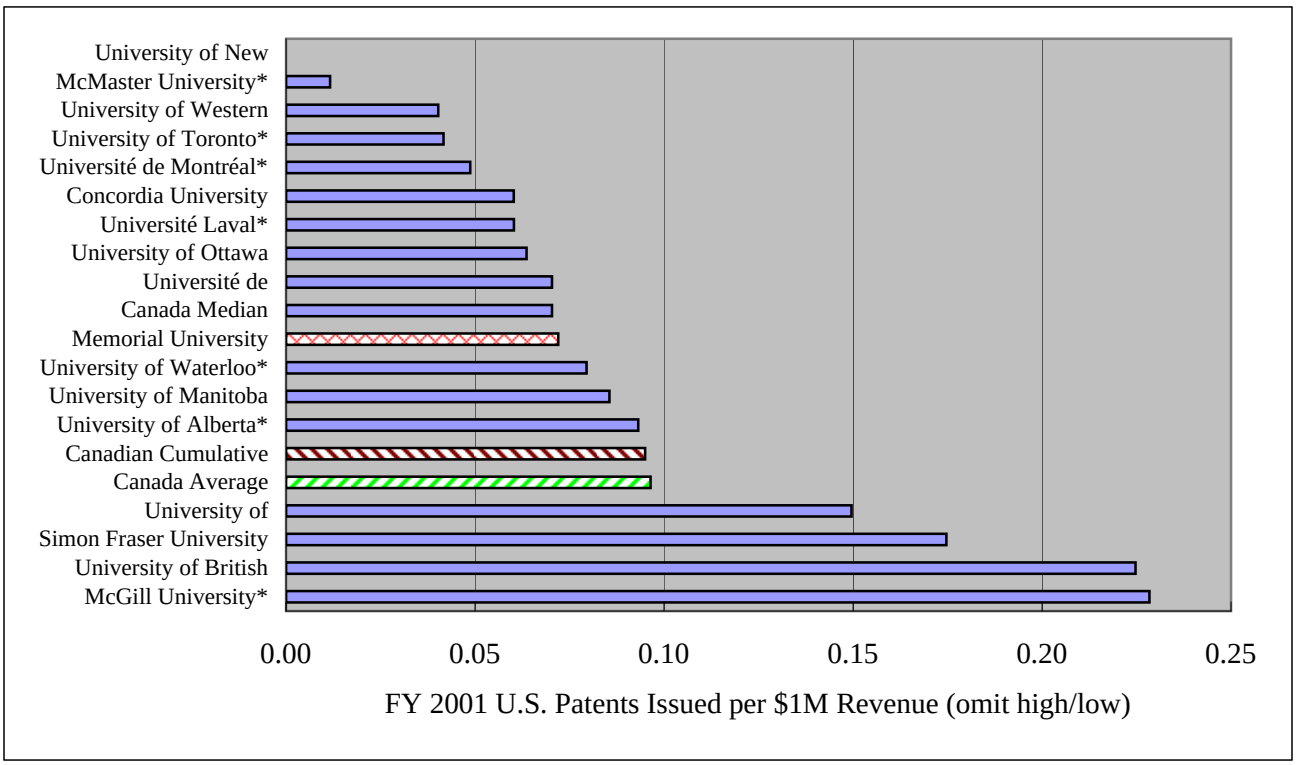

University of New
McMaster University*
University of Western
University of Toronto*
Université de Montréal*
Concordia University
Université Laval*
University of Ottawa
Université de
Canada Median
Memorial University
University of Waterloo*
University of Manitoba
University of Alberta*
Canadian Cumulative
Canada Average
University of
Simon Fraser University
University of British
McGill University*
0.00
0.05
0.10
0.15
0.20
0.25
FY 2001 U.S. Patents Issued per $1M Revenue (omit high/low)

Figure 11d

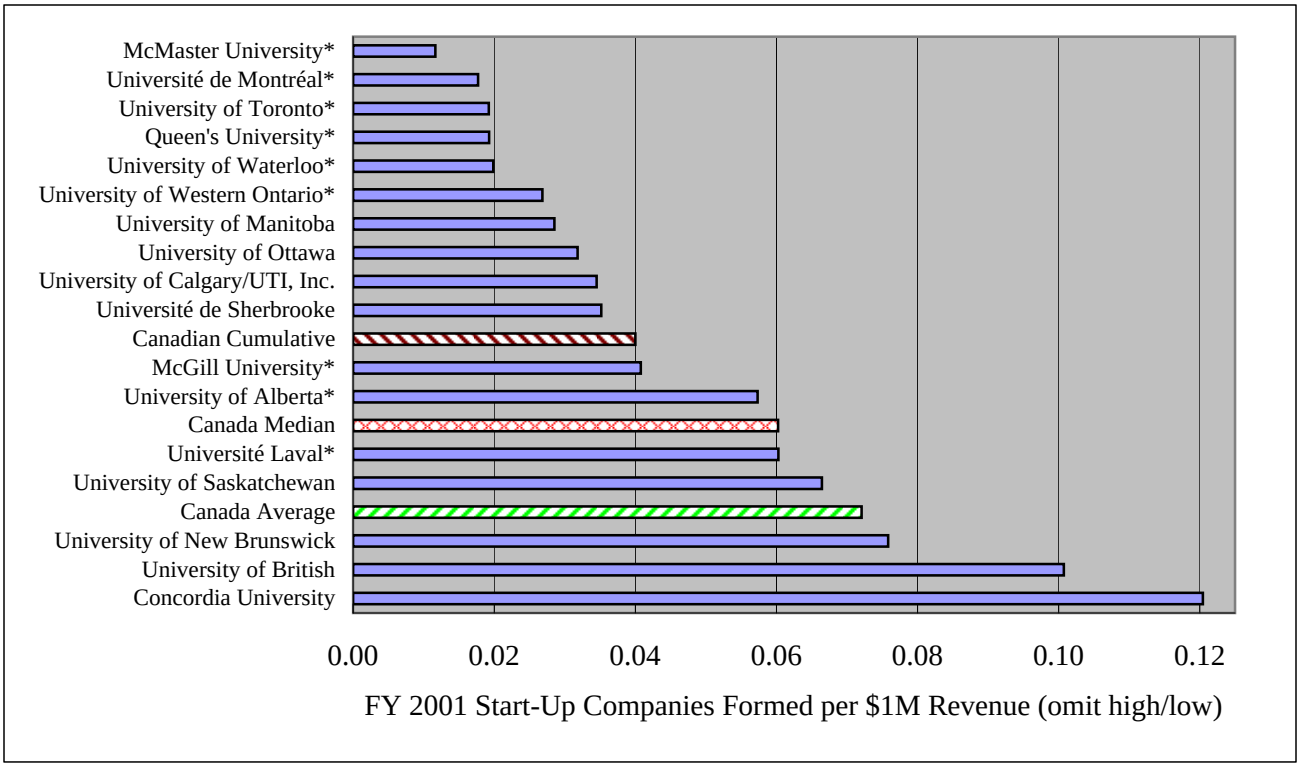

McMaster University*
Université de Montréal*
University of Toronto*
Queen's University*
University of Waterloo*
University of Western Ontario*
University of Manitoba
University of Ottawa
University of Calgary/UTI, Inc.
Université de Sherbrooke
Canadian Cumulative
McGill University*
University of Alberta*
Canada Median
Université Laval*
University of Saskatchewan
Canada Average
University of New Brunswick
University of British
Concordia University
0.00
0.02
0.04
0.06
0.08
0.10
0.12
FY 2001 Start-Up Companies Formed per $1M Revenue (omit high/low)

Figure 11e