The Underrepresentation of Canadian Women Inventors and Entrepreneurs in the IP Ecosystem – Taking Action to Bridge the Gap

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Land Acknowledgment

We respectfully acknowledge that the University of Windsor sits on the traditional territory of the Three Fires Confederacy of First Nations, comprised of the Ojibway, the Odawa, and the Potawatomie. We acknowledge and respect the longstanding relationships with First Nations people in this place in the 100-mile Windsor-Essex peninsula and the straits – les détroits – of Detroit. We offer our gratitude for all First Nations people throughout Turtle Island for their care of, and teachings about, our earth and our relations, may we all honour those teachings. Miigwech.

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Outline of Presentation

- Introduction of study
- IAC Study – Summer 2021
- Findings
- Recommendations
- IAC Implementation
- What's Missing

Introduction of Study

- Approached from a woman's entrepreneurship perspective
- Recognize that women have been facing barriers in creating new ventures
  - These barriers also extend to protecting women's IP
- The Canadian federal government has identified underrepresentation of women entrepreneurs within the IP system as an area of policy concern in their national IP Strategy
- Our research question was to identify if there were structural or systemic barriers to women in the IP system that were consistent with those barriers faced in new venture creation/entrepreneurship

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Literature/Grounding of Study

- Range of social and economic dimensions that limit women from participating in the IP system
- Studies in the US demonstrate that women are underrepresented in terms of IP ownership
- Factors identified in literature include:
    - Societal norms and expectations
    - Fear of the process
    - Lack of financial resources to obtain professional help
    - Less access to network and mentors
    - Absence of clear, easy to understand documentation
- Very limited literature in Canada to support this gap - that inspired our study

IAC Study - Process

- 21 participants ranging from early-stage start-ups, established/scale-up companies and intermediaries who support the IP system
- Interviewees were drawn from the data-driven clean tech sector
- We asked 7 open-ended questions
- The study was approved by the University of Windsor's Research Ethics Board
- Interviews were recorded, transcribed and results were anonymized and coded to support the preparation of the final report
- Final report provided to IAC November 2021
  https://www.ipcollective.ca/wp-content/uploads/2022/03/Study-on-Women-in-IP-ENG.pdf

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IAC Study – Findings

- Findings of the IAC Study:
  - Lack of IP Networks and Mentors
  - Financing Challenges
  - Corporate Culture and Governance
  - Systemic Biases within the IP Environment
  - Other considerations included:
    - Limited resources within the Incubation/Accelerator support system
    - IP education and curriculum missing from post-secondary programs
  - Findings were consistent the challenges identified in the literature

IAC Study - Recommendations

Our final recommendations to the IAC for the study were as follows:

1. Promote an Equity, Diversity and Inclusion (EDI) culture at IAC
2. Improve IAC service offerings
3. IAC education offerings to raise the visibility of women in the IP system
4. Build a community of champions, mentors and coaches
5. Develop a community of practice pilot program
6. Develop metrics to measure progress and success

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Quotes of Interest

"You don't know who to talk to. You don't know where to look for advice. There's no one really there where you can casually approach and just talk to, have a coffee chat about it, just talk to people about it. There are not many women. And then even with the men and other people in the company, the connection is just not there. For mentoring, I've just had very few people who would actually talk to me and advise me on something, very few people who did that all along the way."

"I would say that women are less often asked questions like you know, "are you going to patent it?" I think of women, Tech – women entrepreneurs, they aren't asked that question. I think women are potentially less likely to patent something."

"... dealing with lawyers I feel is always a strange process."

"... it is really tough to get your voice heard… It is really, really tough."

"Well, I mean cost is the number one barrier."

"I think I've become quite jaded, because I think I view it as the ability to actually talk the male talk to actually get funded."

"even when I go to a conference, I am often pigeon-holed as a life sciences person, whereas I'm a computer electrical person"

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The Consultation Period

CWIP: Pillars of Engagement

Program 1 – Community & Funding (2022):

- Access to IAC funding (Twice-annual Grant Program)
- Establishing a community of practice

Program 2 – Networking & Events (2022):

- Community-driven public educational events twice a year
- Networking events (local chapters in Toronto, Calgary, Ottawa)

Program 3 – Policy & Advocacy (2023):

- EDI Training for IAC
- EDI policy at IAC with implementation roadmap for member companies

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Year 1 Results

Program 1 – Community & Funding

- IAC WIP grant has awarded $300K for IP activities like patenting, TM searching and filing, and others
  - All successful applicants demonstrate that the IP activity will support an IP Strategy
- Building a COP is difficult
  - If you build it... they won't necessarily come
  - Slow engagement but steady growth of the list (+86% in six months)

Program 2 – Networking & Events

- Two in-person events thus far (Oct./22 in Toronto, Feb./23 in Vancouver)
- Monthly virtual meeting led by different participants in the group

What's Next:

- Formalizing the program scope, and how involved IAC is in the day-to-day
- Building alliances with other like programs
- Planning a fall in-person event in Calgary

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What's Missing? What's Next….

- Recommendations were meant to empower women, but have we burdened women? (Equity Tax)

- How do we get more women to the table? But are we trying to get women to build their own table versus enabling them to use existing table(s).

- Must be a space for women to be comfortable for them to engage

- Must be effective and measurable changes in the culture

- We can only go so far without tackling the systemic barriers
  - Make space for women (and equity deserving groups) and their voices
  - Recognize the challenges

- Needs to be a deliberate and intentional effort, continuous effort of inclusion

- All voices need to be heard meaningfully!

- Sustained and scaled, inclusive innovation ecosystem for all.

- Further research is needed and collaboration opportunities are welcomed

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Thank-you!

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https://www.ipcollective.ca/wp-content/uploads/2022/03/Study-on-Women-in-IP-ENG.pdf

26 April 2023

Trends of female entrepreneurship and trademark filers in Singapore

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Motivation, background and aims of study

Motivation

- Women everywhere are driving scientific breakthroughs, setting new creative trends, building businesses and transforming our world.[1]

- When innovation, creativity and business are inclusive and embrace new ideas and perspectives, we all benefit.[1]

- Understanding trends in gender and IP can help encourage women participation and diversity.

Background

- In the U.S., women make up growing share of U.S. entrepreneurs (Williams-Baron, et al., 2018) and between 1997 and 2007, the number of women-owned businesses grew by 44%, twice as fast as men-owned firms (U.S. Department of Commerce, 2010).

- In Singapore, women entrepreneurs have succeeded in a wide range of industries across Singapore's economy. Notable standouts include Claire Chiang of Banyan Tree (hospitality), Nichol Ng (food and beverage), Susan Chong of Greenpac (sustainability), Tan Hooi Ling of Grab (transportation) and Rachel Lim of Love, Bonito (fashion), among many.[2]

Aims of Study

- Understand the entrepreneurial and trademark[3] filing landscape of local women in Singapore.

- Obtain insights by examining the male and female shares of local entrepreneurs and trademark filers in Singapore.

[1] Extracted from WIPO's website, https://www.wipo.int/ip-outreach/en/ipday/2023/story.html. The theme of this year's World Intellectual Property Day (WIPD) is Women and IP: Accelerating innovation and creativity.
[2] Accenture's report (2018), "Businesswomen Grow Economies: Singapore Is Next", pp. 2.
[3] A trademark is a sign that you use to distinguish your business' goods or services from those of other traders. Once a business name is trademarked, others are prohibited from using it. Since entrepreneurs frequently use trademarks to protect their businesses' products and brand names, this study also examines the trends of women trademark filings in Singapore.

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[International studies] Findings on women and entrepreneurship[4]

Understanding women-owned businesses (OECD study, Halabisky, D., 2018)

- Women entrepreneurs tend to operate **smaller businesses** (pp. 6, also found in U.S. Department of Commerce, 2010, pp. 1).
- Women entrepreneurs and often operate in **different sectors** than men entrepreneurs (pp. 7).
- The businesses created by women entrepreneurs tend to have **less growth potential** (pp.7).
- The businesses created by women entrepreneurs have **similar survival rates** in many countries (pp. 8).
- Self-employed women **work fewer hours** per week, on average (pp. 9).
- Self-employed women and tend to **earn less** than self employed men (pp. 10, U.S. Department of Commerce, 2010, pp. 1).

Statistics on female entrepreneurship in Singapore and internationally

- Women-owned businesses constitute 27% of all businesses, and 13% of sales in Singapore (Accenture, 2018).
- In the U.S., women-owned businesses accounted for 11% of sales and 13% of employment among privately-held companies (U.S. Department of Commerce, 2010, pp. 1) and the percentage of women-owned firms was 29.6% in 2007 among equally-owned, men-owned and women-owned firms (pp. 6).
- In another U.S. study (Williams-Baron, et al., 2018), the percentage of women-owned firms was 20.8% in 2015.
- In Europe (OECD study, Halabisky, D., 2018), women were half as likely as men in the European Union to be self-employed (9.9% vs. 17.8%) in 2015.

[4] For literature on women and trademark filings, refer to Williams-Baron, et al. (2018), Alvaro González L. (2022), National Women's Business Council (2012).

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Data and methodology

Data

- This study utilises business owners and trademark filings data to understand the trends and landscape of females entrepreneurship and trademark filings in Singapore.
- **Trademark Filings Data**: Trademark filing records from the IPOS' registry.
- **Business Owners Data**: Government administrative records collected via filings from businesses when they register a new business entity or update their business information.

Methodology

- **Gender classification**: This study utilizes a 'names-genders' database (Genderize.io) to ascribe genders to the names of business owners and individual trademark filers.

- 'Genderize.io' (Kamil Wais, 2016) is one of several application programming interface (API) gender inference services available online. The data were collected from social networks across 79 countries and 89 languages.

- In particular, the database consists of 337,002 names from Singapore, and it was chosen for this study as most of the names to be classified were local.

- **Framework for analysis**: The framework takes reference from other international studies (Williams-Baron, et al., 2018, Halabisky, D., 2018, U.S. Department of Commerce, 2010, National Women's Business Council, 2012) and is tailored according to data availability and the aims of this study.

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Definitions and scopes of the roles analysed in this study

Local Individual

- **Definition**: Refers to Permanent Residents (PRs) and citizens in Singapore.

Entrepreneur

- **Definition**: Refers to a person who started and registered a business[5], and <u>has not filed</u>[6] for trademark(s) before. It excludes those who work in the Gig economy.

Trademark Filer

- **Definition**: Refers to an individual or 'entrepreneur' who has filed for trademark(s) before.

[5] Based on OECD study, self-employment is one of the measures used in economic analysis to proxy entrepreneurial activity. In labour force surveys, self-employed are defined as those persons who <u>**own and work**</u> in their own business, as employers or own-account workers, unless they are also in paid employment which is their main activity, in that case they are considered to be employees (Halabisky, D., 2018). For further discussion, refer to **Annex.**
[6] Since entrepreneurs who have filed for trademark(s) before are included in group 'Trademark Filer', in order not for the entities in the two groups to overlap, in this study, we compare entrepreneurs who have not filed trademark(s) before with trademark filers.

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Definitions of other terms used in this study

Type of Business

- **Definition**: Each type of business corresponds to a 5-digit code which is based on the Singapore Standard Industrial Classification (SSIC7). The SSIC is the national standard for classifying economic activities undertaken by economic units.

Industry/Sector

- **Definition**: 5-digit SSIC codes are aggregated into sectors / industries based on the 'SSIC Codes-Industry' mapping from the Department of Statistics (DOS) Singapore.
- There are 21 industries in total.

GDP Sector

- **Definition**: Industry sectors are aggregated into gross domestic product (GDP) sectors using 'SSIC industries-Output based GDP' mapping from DOS.
- There are 13 GDP sectors in total.

Product & Service

- **Definition**: Each product or service is a named category that corresponds to a trademark class number.
- There are 45 classes in total.

7 The SSIC is based on the basic framework of the International Standard Industrial Classification of All Economic Activities Revision 4 (ISIC Rev. 4) developed by the United Nations Statistics Division (UNSD).

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Definitions of computed statistics

Formulas

- 3 metrics are computed for this study. They are given by the formulas as follows:
  - **Share of females**: Defined as the (total number of females) / (total number of females and males) *100
  - **Distribution[8] of females for particular industry**: Defined as the (total number of females in particular industry) / (total number of females in all industries) *100
  - **Distribution[8] of males for particular industry**: Defined as the (total number of males in particular industry) / (total number of males in all industries) *100
- The shares of females in this study represent the <u>number of females in relation to the number of males</u>.
- The share of females in different industries and the distribution of the number of females and males for the different industries are related to each other since the shares of females in the different industries are determined by:
  - the overall share of females across all industries,
  - the distribution of the number of females for the different industries,
  - the distribution of the number of males for the different industries.

- Mathematically, it can be expressed as:

$$Share\ of\ females\ in\ industry\ i = \frac{tot\ no.\ female\ *\ \%\ female_i}{tot\ no.\ female\ *\ \%\ female_i + tot\ no.\ male\ *\ \%\ male_i} * 100\%$$

where
  - $tot\ no.\ female$ – total number of females in all industries,
  - $tot\ no.\ male$ – total number of males in all industries,
  - $\%\ female_i$ - distribution of females for industry i,
  - $\%\ male_i$ - distribution of males for industry i.

[8] The term 'distribution' is used in order to distinguish itself from 'Share of females' which specifically refers to the share in relation to total number of males and females.

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Analytical framework of the types of analysis performed in study

Overall trends

A. Show the overall trends of the shares of females[9] for entrepreneurs and trademark filers over time.

Gender distribution and female shares by Industries and GDP Sectors

B. Show the gender distributions[9] of entrepreneurs and trademark filers across industries.

C. Show the shares of female trademark filers and entrepreneurs by different industries and GDP sectors.

Further breakdown by Types of Businesses

D. Show the types of businesses owned by female entrepreneurs within selected industries.

Further breakdown by Products & Services[10]

D. Show the types of products & services offered and filed for trademarks by trademark filers within selected industries.

[9] *Definitions of the computed statistics for gender distributions of males and females for various industries and shares of females are in the previous slide.*
[10] *The analysis for the breakdowns by products and services offered and filed for trademarks by trademark filers can be found the **Annex** section.*

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A. Overview of the trends of shares of female entrepreneurs and trademark filers

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Steady increase in local female entrepreneurship, with a similar increase in local female trademark filers in Singapore

- Between 2016 and 2022[11], the overall proportion of female entrepreneurs has increased by 5.7% y-o-y (compounding annual growth rate (CAGR)) from 17.9% to 24.9%.

- Between 2016 and 2022[11,12], the overall proportion of female trademark filers has increased by 4.8% y-o-y (CAGR) from 17.7% to 23.4%.

- For all years between 2016 and 2022, the overall shares of female entrepreneurs[13] and trademark filers[13] stand close to each other, at 22.8% and 23.2% respectively.

Figure 1: Shares of Female Entrepreneurs and Trademark Filers

— Share of female entrepreneurs — Share of female trademark filers
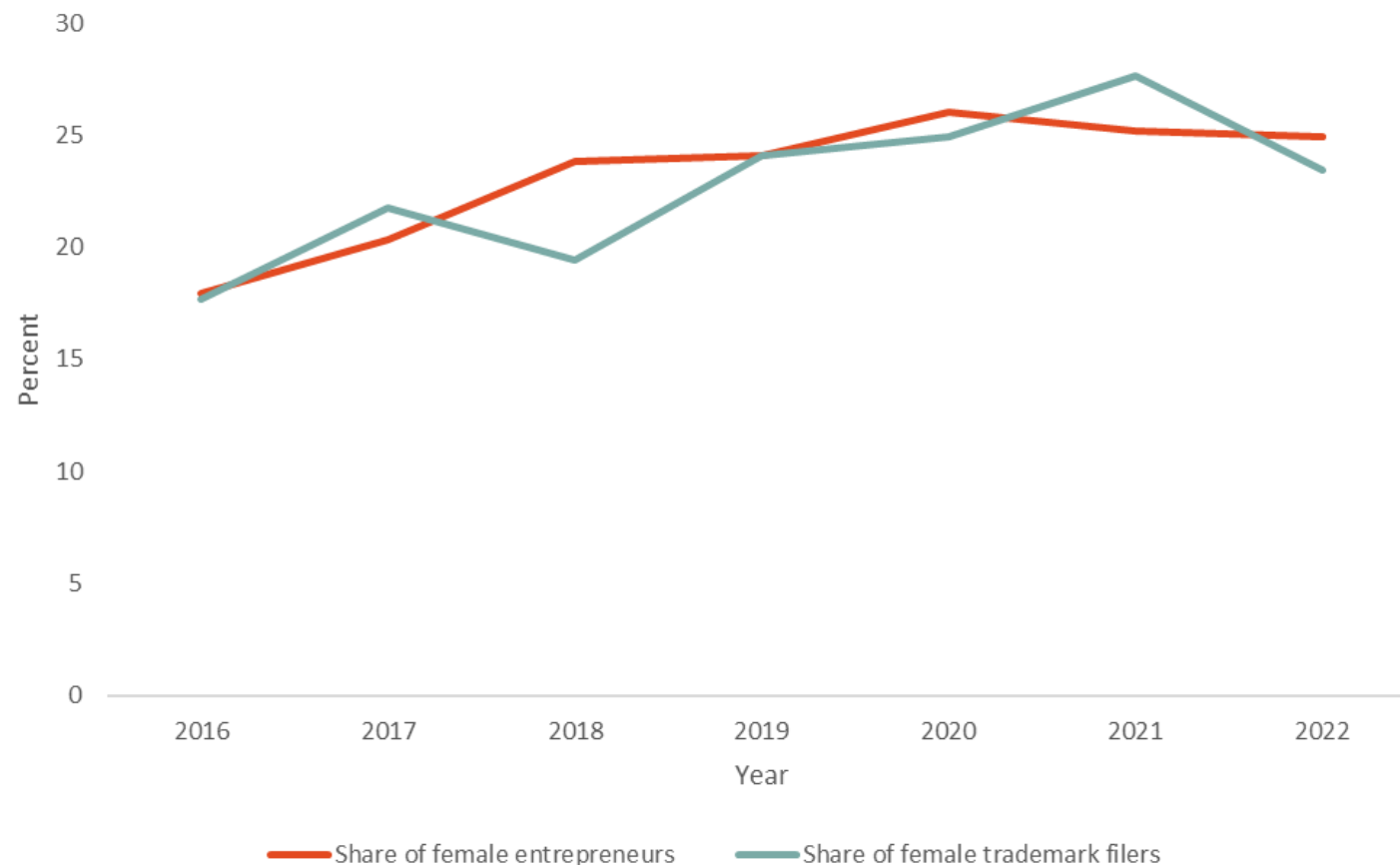
[11] Prior years of the share of female trademark filers were omitted from Figure 1 due to large fluctuations in data for individual female filers as a result of small sample size. Years 2016 – 2022 represent 74.8% of all data points between 2010 and 2022.
[12] This is based on the year of application of trademarks.
[13] Gender classification was performed on names in order to identify the genders of entrepreneurs and trademark filers.

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B. Gender distribution of entrepreneurs, trademark filers by industry

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Higher share of female entrepreneurs in 'Wholesale and Real Trade', and 'Other Service Activities'. Lower share of female entrepreneurs in 'Construction', and 'Transportation and Storage'
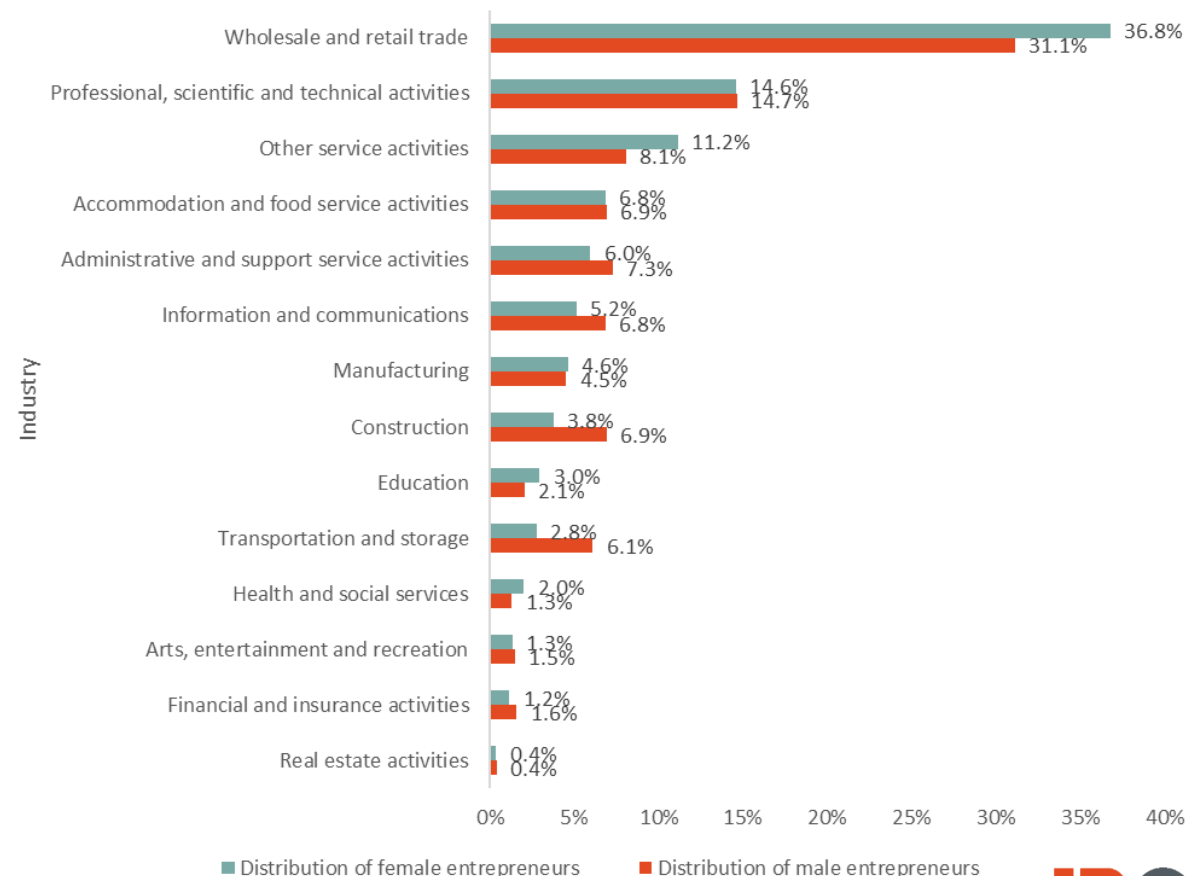
- The top 3 sectors[15] with the **most number of female entrepreneurs** are Wholesale and Retail Trade, Professional, Scientific and Technical Activates, and Other Service Activities, two of which have a higher percentage of female entrepreneurs than male entrepreneurs (i.e., Wholesale and Retail Trade, and Other Service Activities).

- The sectors with **largest percentage point differences** between male and female entrepreneurs with higher percentages for male entrepreneurs are Construction (3.1%) and Transportation and Storage (3.3%).[16]

[14] Due to small percentages and space constraints, **some sectors (and types of businesses) are omitted and not shown in this and subsequent charts**.

[15] This trend is similar to a U.S. study (Williams-Baron, et al., 2018) where the top 5 sectors for women-owned firms are Healthcare and Social Assistance, Professional, Scientific, and Technical Services, Retail Trade, Accommodation and Food Services, and Other Services.

[16] This is also similar to what Williams-Baron, et al. (2018) had found whereby the sector with the largest percentage point difference between men- and women-owned firms is Construction (2.8 times larger for men-owned firms).

Figure 2: Distributions of Female and Male Entrepreneurs by Industry[14] (2010 - 2022)

Industry	Distribution of female entrepreneurs	Distribution of male entrepreneurs
Wholesale and retail trade	36.8%	31.1%
Professional, scientific and technical activities	14.6%	14.7%
Other service activities	11.2%	8.1%
Accommodation and food service activities	6.8%	6.9%
Administrative and support service activities	6.0%	7.3%
Information and communications	5.2%	6.8%
Manufacturing	4.6%	4.5%
Construction	3.8%	6.9%
Education	3.0%	2.1%
Transportation and storage	2.8%	6.1%
Health and social services	2.0%	1.3%
Arts, entertainment and recreation	1.3%	1.5%
Financial and insurance activities	1.2%	1.6%
Real estate activities	0.4%	0.4%

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Close to 60% of all trademarks filed by females are in the 'Wholesale and Retail Trade' sector

- The top 3 sectors with the **most number of female trademark filers** are Wholesale and Retail Trade, Manufacturing, and Professional, Scientific and Technical Activities. In the Wholesale and Retail Trade sector, female trademark filers represent close to 60% of the trademarks filed.

- The top 2 sectors with higher percentages of female filers than male filers are Wholesale and Retail Trade, and Health and Social Services.

- The sector Financial and Insurance Activities has higher percentage of male filers than female filers (**largest percentage point difference** - 4 times larger for male filers than female filers).

Figure 3: Distributions of Female and Male Trademark Filers by Industry (All Years[17])
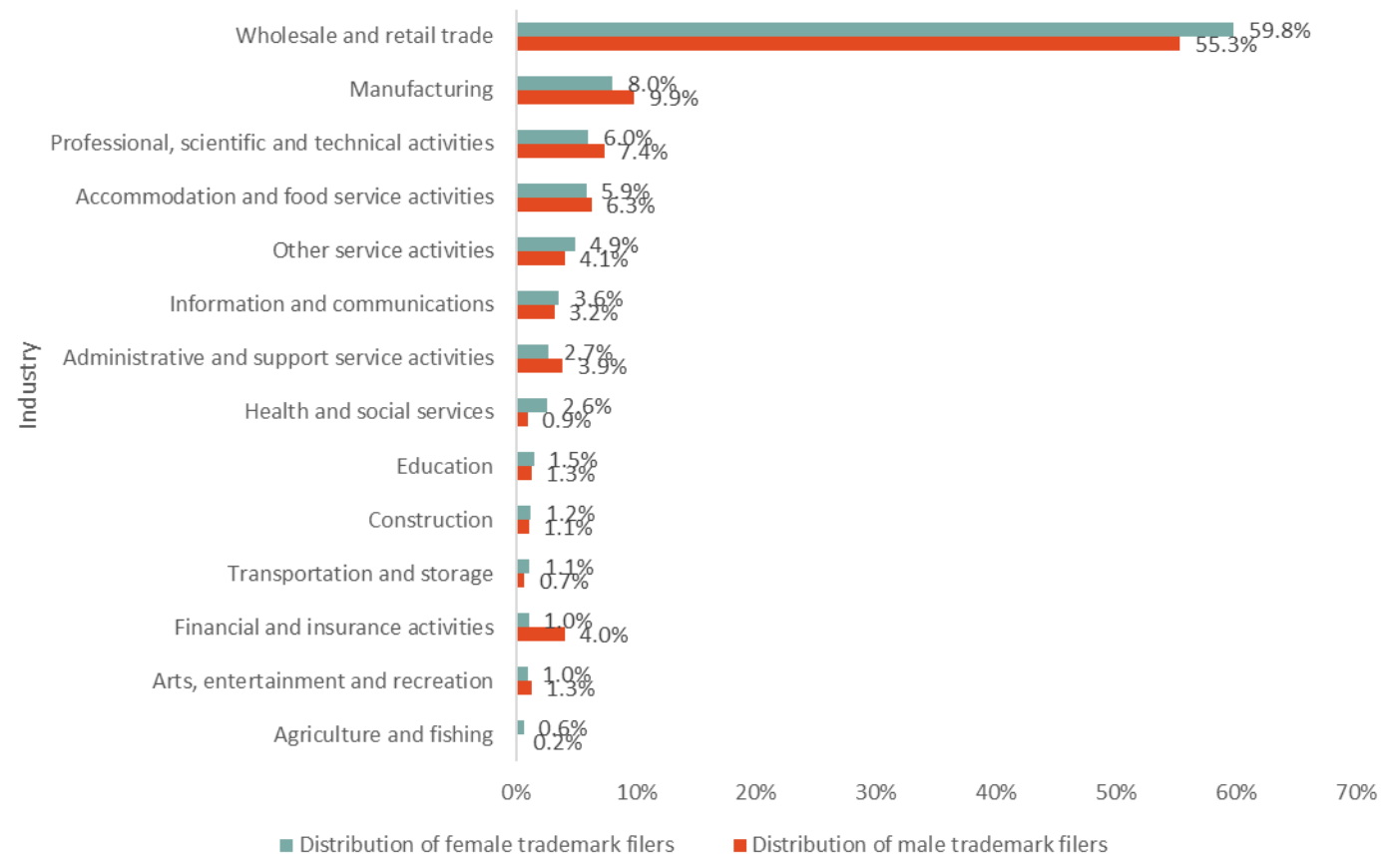
[17] Due to a much smaller dataset, we used the full dataset of trademark filings by individuals and entrepreneurs from years 1939 – 2022 to analyse the various splits by industries, types of businesses, and products & services.

C. Shares of female trademark filers and entrepreneurs by industry and GDP sectors

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Top 3 industries with largest shares of female trademark filers and entrepreneurs are 'Health and Social Services', 'Other Service Activities', and 'Education'

- The top 3 industries (**blue box**) for the female shares of **entrepreneurs** are Health and Social Services, Education, and Other Service Activities.[18]

- The top 3 industries (**orange box**) for the female shares of **trademark filers** are Health and Social Services, Other Service Activities, and Education.

[18] For the U.S. study (Williams-Baron, et al., 2018, pp. 6), the top 3 sectors are Education Services, Healthcare and Social Assistance and Other Services.

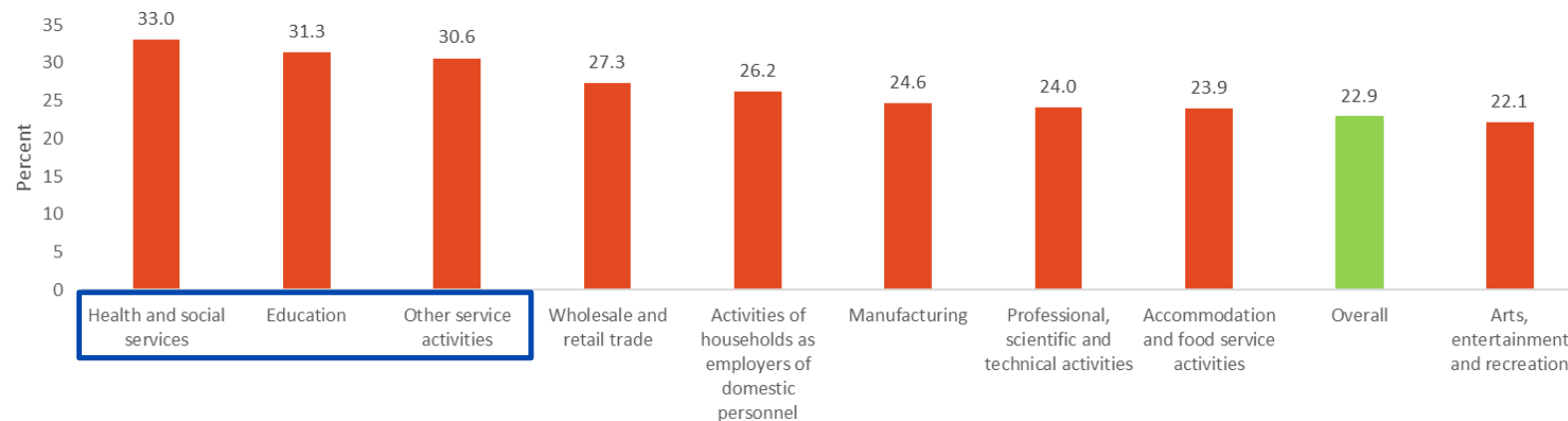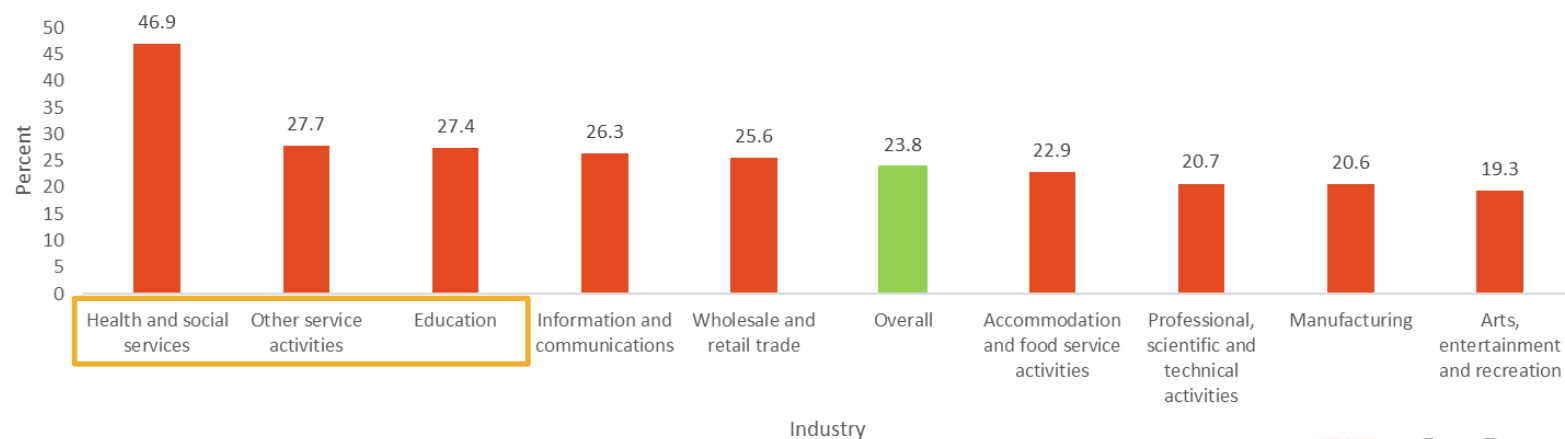Figure 4: Share of Female **Entrepreneurs** (Largest to Smallest, Left to Right)

Figure 5: Share of Female **Trademark Filers** (Largest to Smallest, Left to Right)

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Overall, the 'Wholesale & Retail Trade', 'Manufacturing' and 'Other Services Industries' sectors have the highest "Average Female Share"[19,20,21]

Figure 6: Shares of Female Entrepreneurs and Trademark Filers by GDP Sector Ranked by GDP Share (Largest to Smallest, Left to Right)

Legend: Share of female trademark filers | Share of entrepreneurs | Average female share | Share of Singapore's GDP
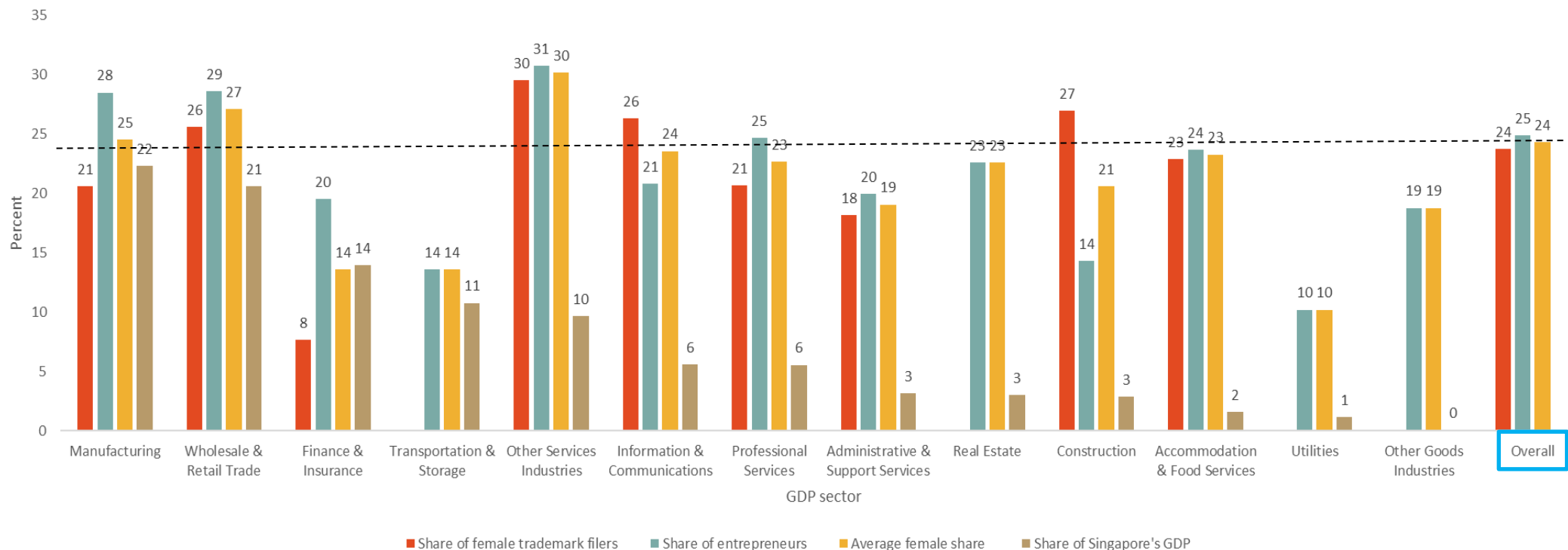
- The 3 GDP sectors[22] with higher than overall average female share (i.e., above the **black dotted line** and indicated by the **blue** box and **orange** bar) are Manufacturing, Wholesale & Retail Trade, and Other Services Industries.

[19]The **average female share** is given by the average of the shares of female entrepreneurs, female trademark filers.
[20]The shares of female trademark filers for some sectors are omitted due to low count in numbers. The sectors excluded are Utilities, Real Estate, Other Goods Industries, and Transportation & Storage.
[21]The shares of the indicators are computed based on years 2018 – 2022 with the exception of female trademark filers (for all years).
[22]Calculation of the shares of the different GDP sectors contributing to the overall GDP of Singapore is based on year 2022's GDP figures and does not include taxes on products and ownership of dwellings.

D.1. Types of businesses owned by female entrepreneurs for the <u>top 3 sectors</u> in terms of female shares of trademark filers / entrepreneurs, namely – (I) Health and Other Social Services, (II) Education and (III) Other Service Activities

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(I) In the "Health and Social Services" sector, the largest % point difference between females and male entrepreneurs is in 'Other Health Services Not Elsewhere Classified'

- For the business with the highest percentage of females **('Other Health Services Not Elsewhere classified')**, it has the largest percentage point difference (7.9%) between female and male entrepreneurs (**green** box).

- This business type includes services such as fertility consultation, physiotherapy, dieting, rehabilitation, etc.

Figure 7: Distributions of Female and Male Entrepreneurs by Type of Business in **Health and Social Services** Sector

Type of business in Health and Social Services sector	Female	Male
Other health services n.e.c. (excluding online marketplaces)	35.7%	27.8%
Clinics and other general medical services (Non-Western)	19.2%	18.1%
Home healthcare services	8.5%	8.7%
Clinics and other general medical services (Western)	6.1%	10.5%
Other social services without accommodation n.e.c.	5.7%	6.3%
Child/Student care services for school-going children (e.g. before and after-school care centres, student care centres)	4.9%	3.8%
Job training and vocational rehabilitation services	4.5%	5.4%
Child care services for pre-school children (including infant care services)	2.9%	2.7%
Dental services	2.5%	3.9%
Social services without accommodation for children, youth and families n.e.c.	2.2%	1.8%
Specialised medical services (including day surgical centres)	1.4%	2.5%
Social services for children and youths (e.g. youth outreach services, adoption services)	1.3%	1.0%

■ Distribution of female entrepreneurs   ■ Distribution of male entrepreneurs

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(II) In the "Education" sector, almost 70% of all females entrepreneurs are in 'Educational Support Services Not Elsewhere Classified'

- A large percentage of female entrepreneurs in the Education sector own businesses under '**Education Support Services Not Elsewhere Classified**' (**green box**).

- This business type comprises mainly of enrichment and tuition businesses.

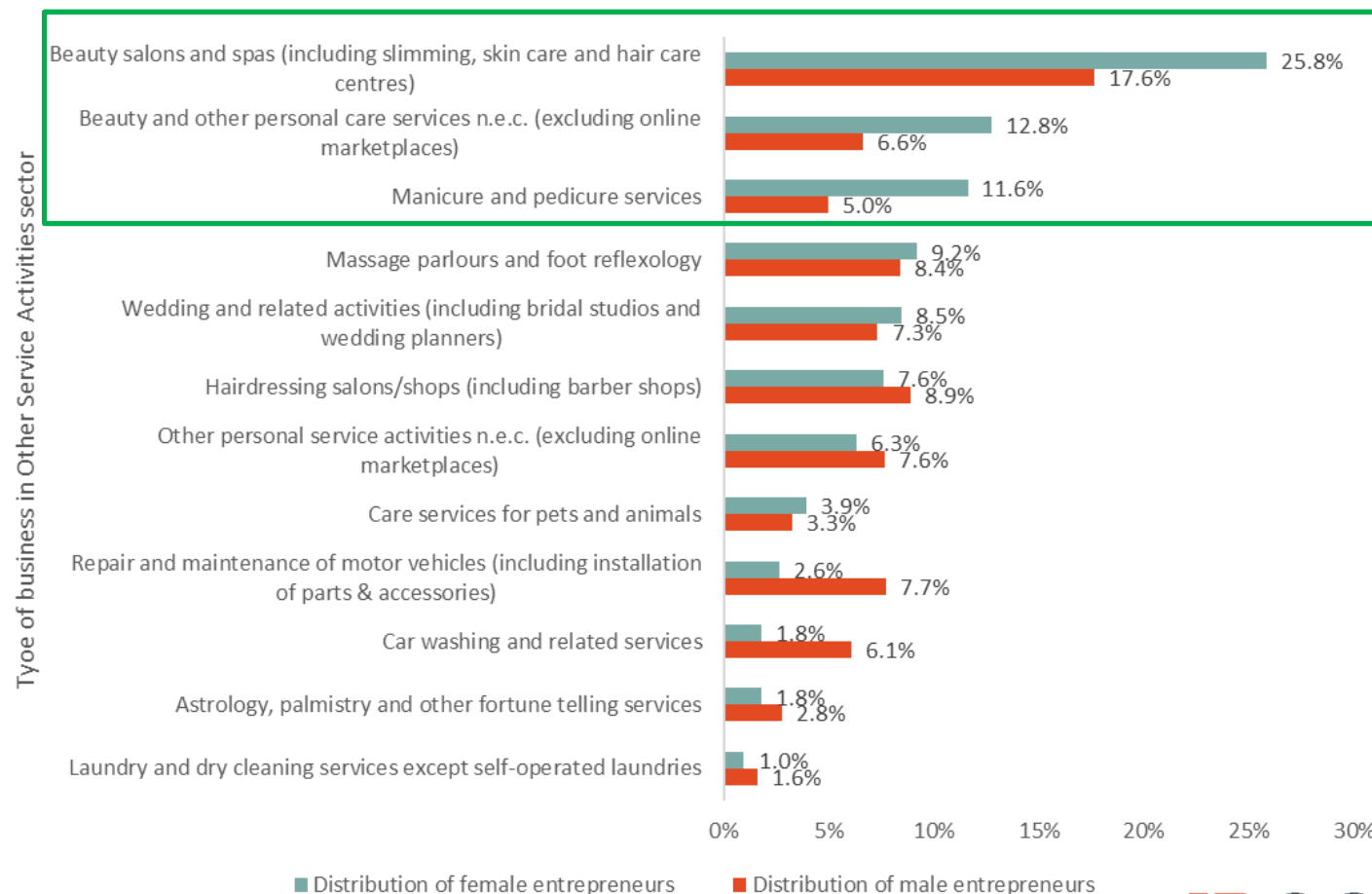

Figure 8: Distributions of Female and Male Entrepeneurs by Type of Business in **Education** Sector

Type of business in Education sector

Type of business	Female	Male
Educational support services n.e.c. (excluding online marketplaces)	69.6%	61.8%
Training courses n.e.c.	11.6%	14.2%
Student recruitment agencies	5.0%	4.8%
Commercial schools offering general secondary and post-secondary non-tertiary education programmes	2.8%	2.9%
Training courses for sports and games	2.5%	4.5%
Training courses for music, dancing, art, speech and drama	2.3%	3.0%
Training courses for healthcare, education, community and social services	1.9%	2.0%
Technical and vocational secondary and post-secondary non-tertiary education	1.0%	1.5%
Nurseries and kindergartens	0.6%	0.9%
Examination and accreditation agencies for education services	0.6%	0.8%
Commercial schools offering higher education programmes	0.5%	0.6%
Training courses for information and communications, finance and professional services	0.4%	0.9%

■ Distribution of female entrepreneurs   ■ Distribution of male entrepreneurs

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(III) In the "Other Service Activities" sector, the top 3 types of businesses with most number of females are 'beauty salons and spas', 'beauty and personal care', and 'manicure and pedicure services'

- The top 3 types of business (green box) **with the most number of females** are also the businesses with the largest percentage point differences between male and female entrepreneurs.

Figure 9: Distributions of Female and Male Entrepreneurs in **Other Service Activties** Sector

Type of business in Other Service Activities sector

Type of business	Female	Male
Beauty salons and spas (including slimming, skin care and hair care centres)	25.8%	17.6%
Beauty and other personal care services n.e.c. (excluding online marketplaces)	12.8%	6.6%
Manicure and pedicure services	11.6%	5.0%
Massage parlours and foot reflexology	9.2%	8.4%
Wedding and related activities (including bridal studios and wedding planners)	8.5%	7.3%
Hairdressing salons/shops (including barber shops)	7.6%	8.9%
Other personal service activities n.e.c. (excluding online marketplaces)	6.3%	7.6%
Care services for pets and animals	3.9%	3.3%
Repair and maintenance of motor vehicles (including installation of parts & accessories)	2.6%	7.7%
Car washing and related services	1.8%	6.1%
Astrology, palmistry and other fortune telling services	1.8%	2.8%
Laundry and dry cleaning services except self-operated laundries	1.0%	1.6%

■ Distribution of female entrepreneurs   ■ Distribution of male entrepreneurs

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D.2. Types of businesses owned by female entrepreneurs for the top 2 GDP sectors, namely – (I) Wholesale & Retail Trade and (II) Manufacturing

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(I) In the "Wholesale and Retail Trade" sector, the top business type with the most number female entrepreneurs is 'Retail sale of clothing for adults'

- There is a large percentage point difference (6.8%) between female and male entrepreneurs (**higher for females**) for the retail clothing business for adults (**green** box).

- On the other hand, there is also a large percentage point difference (7.5%) between male and female entrepreneurs (**higher for males**) in the 'wholesale of variety of goods without dominant products' (**orange** box).

Figure 11: Distributions of Female and Male Entrepreneurs by Type of Business in **Wholesale and Retail Trade** Sector

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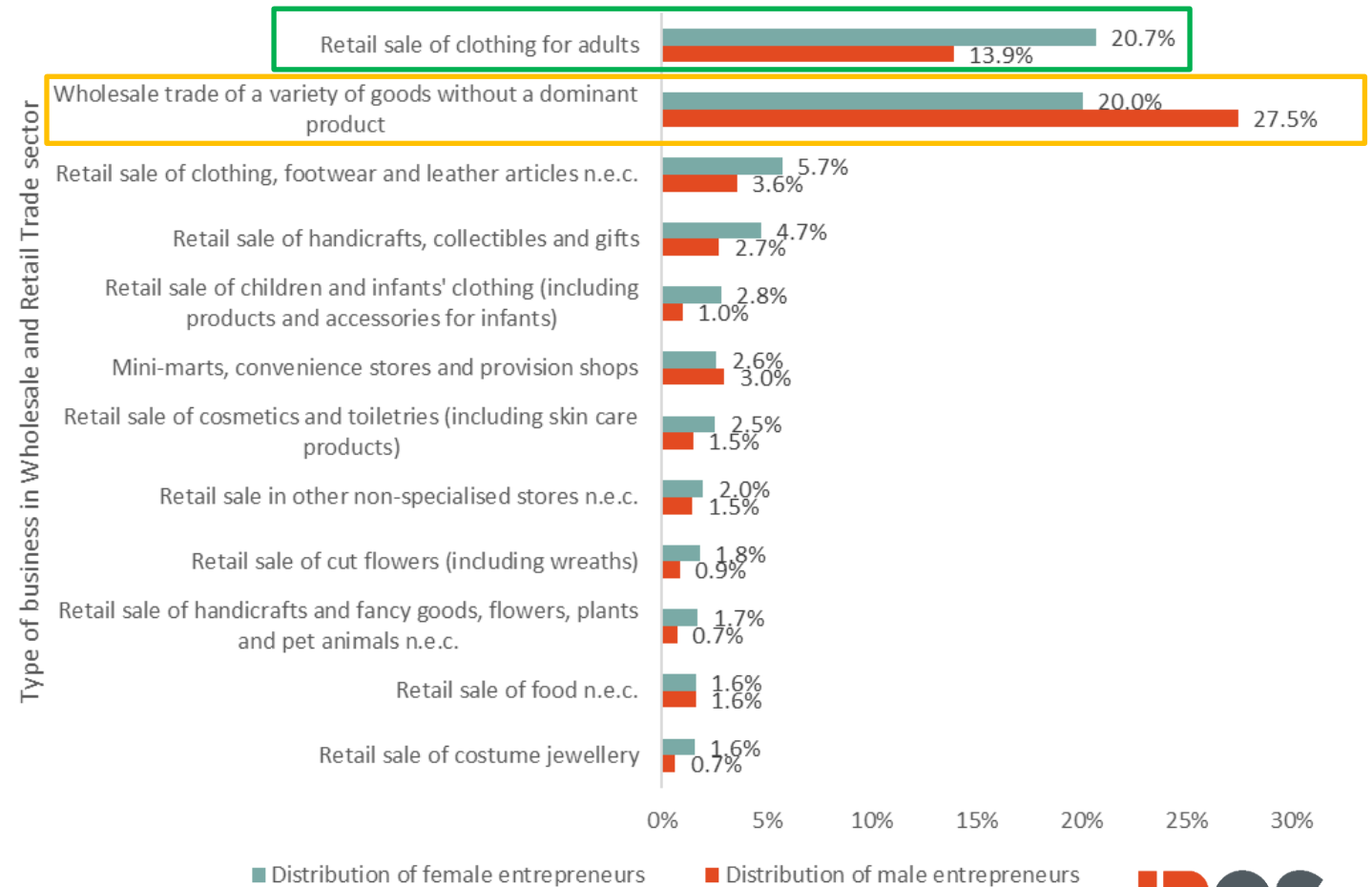
(II) In the "Manufacturing" sector, the top 2 businesses with the most number of female entrepreneurs are food-related

- The <u>largest percentage point difference</u> (10.9%) between female and male entrepreneurs (**higher for females**) is in the manufacturing of bread, cakes and confectionary, which is the business with the most number of females (**green** box).

Figure 12: Distributions of Female and Male Entrepreneurs by Type of Business in **Manufacturing** Sector

Concluding remarks and key findings

- This study seeks to understand the landscape and trends of women entrepreneurship and trademark activity.

Specifically, this study

- Examined the distribution of local male and female entrepreneurs and trademark filers;
- Analysed the share of female entrepreneurs and trademark filers over time, by industries, by classes of trademarks filed, types of businesses owned, and Gross Domestic Product (GDP) sectors.

Key findings of this study

- The increasing women entrepreneurship activity over the years is reflected by the increasing women trademark filers (between 2016 and 2022, 17.9% to 24.9% for women entrepreneurs and 17.7% to 23.4% for women trademark filers).
- The top 3 sectors in terms of the shares of women entrepreneurs and trademark filers are the same (i.e., Health and Social Services, Other Service Activities, and Education), indicating the relevance of trademarks for women entrepreneurs doing business in these sectors.

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THANK YOU

Contrasting the shares of female entrepreneurs and trademark filers, there are higher shares of females entrepreneurs than female trademark filers <u>for all industries</u> except 'Health and Social Services' and 'Information and Communications'

- The 3 industries with the largest **percentage point difference** between female entrepreneurs and trademark filers are Health and Social Services, Financial and Insurance Activities, and Information and Communications (**blue** box).

- The 2 sectors with <u>higher percentage shares of female trademark filers</u> than female entrepreneurs are Health and Social Services and Information and Communications (**green** boxes). Detailed breakdown of the **classes of trademarks** owned and filed and the **types of businesses** owned by them can be found in the next slides.

Figure 13: Shares of Female Trademark Filers and Entrepreneurs by Industry Ranked by (Absolute) Percentage Point Difference (Largest to Smallest, Left to Right)
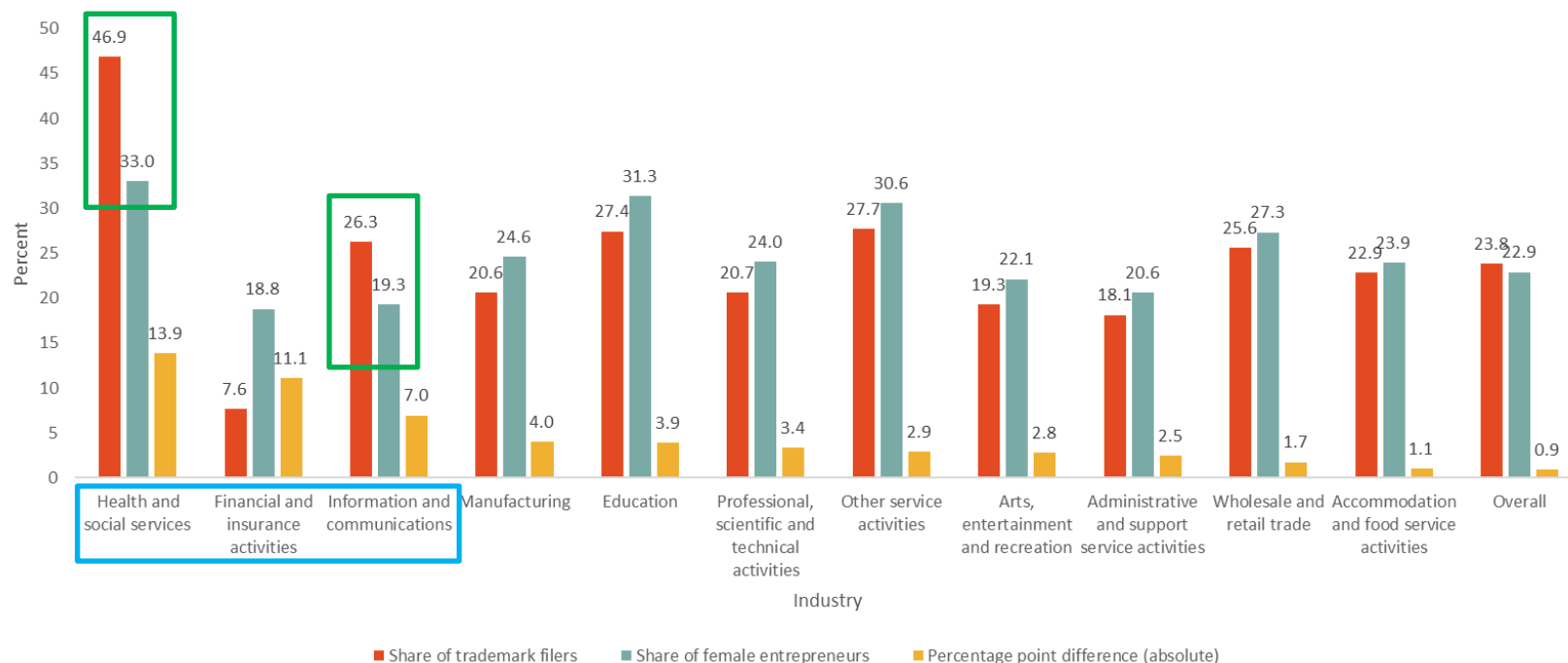
Types of businesses owned by female and male trademark filers in the <u>Health and Social Services sector</u>

- Types of female businesses in the Health and Social Services sector that filed trademarks are equally diverse compared to male businesses (7 types versus 8 for males) although they are <u>concentrated in different types of businesses</u>.
- A large share (63.4%; **blue** box) comes from Child Care Services for Pre-school Children (Including Infant Care Services) and Other Health Services Not Elsewhere Classified (**e.g., slimming, counselling, therapy, chiropractic, etc**.)

Figure 14: Distributions of Female and Male Trademark Filers by Type of Business in Heath and Social Services Sector
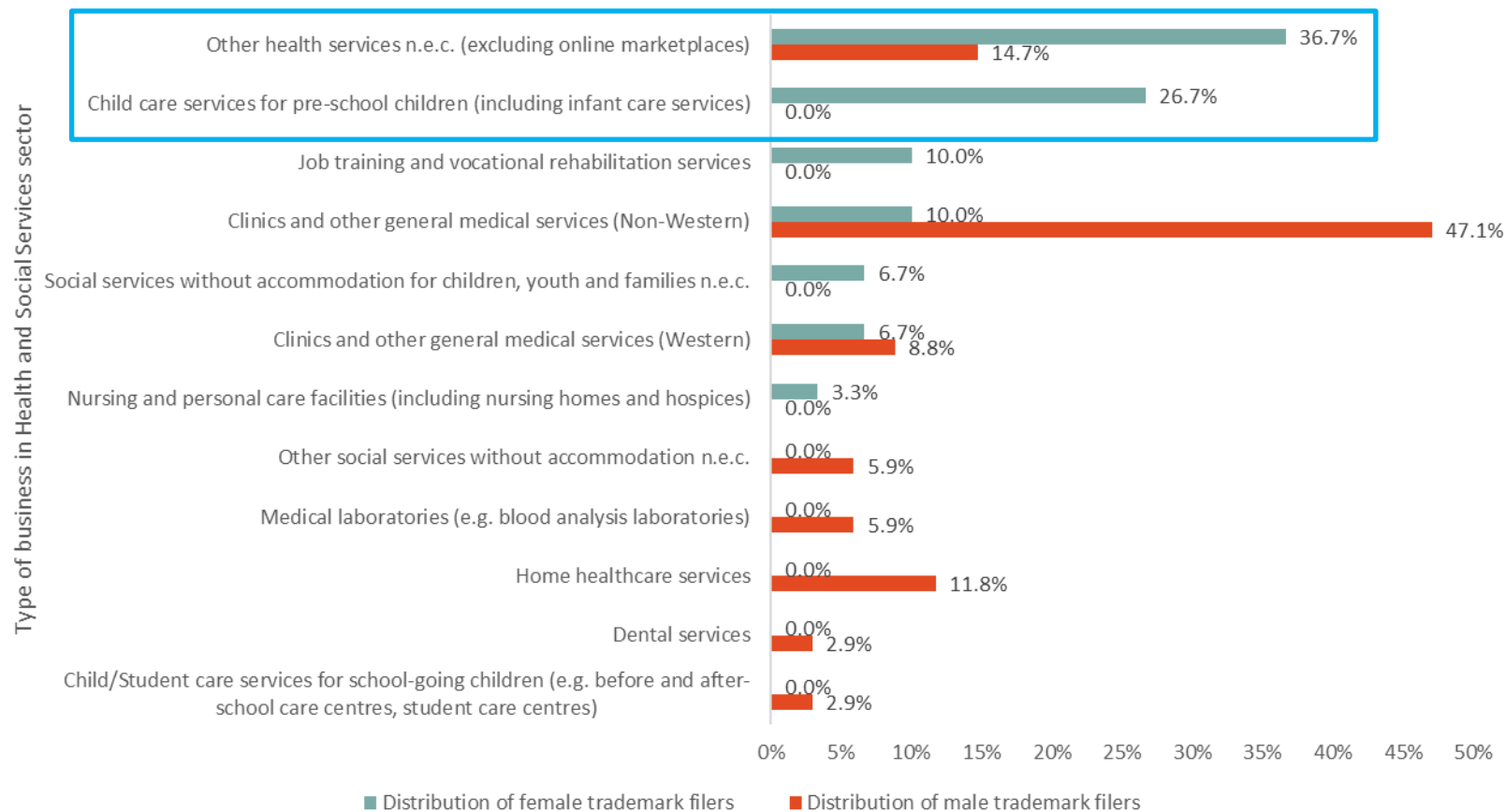
Products and services offered and filed for trademarks by female and male trademark filers in the Health and Social Services Sector

- Types of female products and services offered and filed for trademarks in the Health and Social Services sector are almost equally diverse (8 products and services for females and 9 for males).
- A larger percentage for **Education and Entertainment Services** (33.3% for females versus 14.7% for males; **purple** box) and a smaller percentage for **Pharmaceutical Products** (6.7% for females versus 44.1% for males; **green** box).


Figure 15: Distributions of Female and Male Trademark Filers by Products & Services Offered and Filed in Health and Social Services Sector
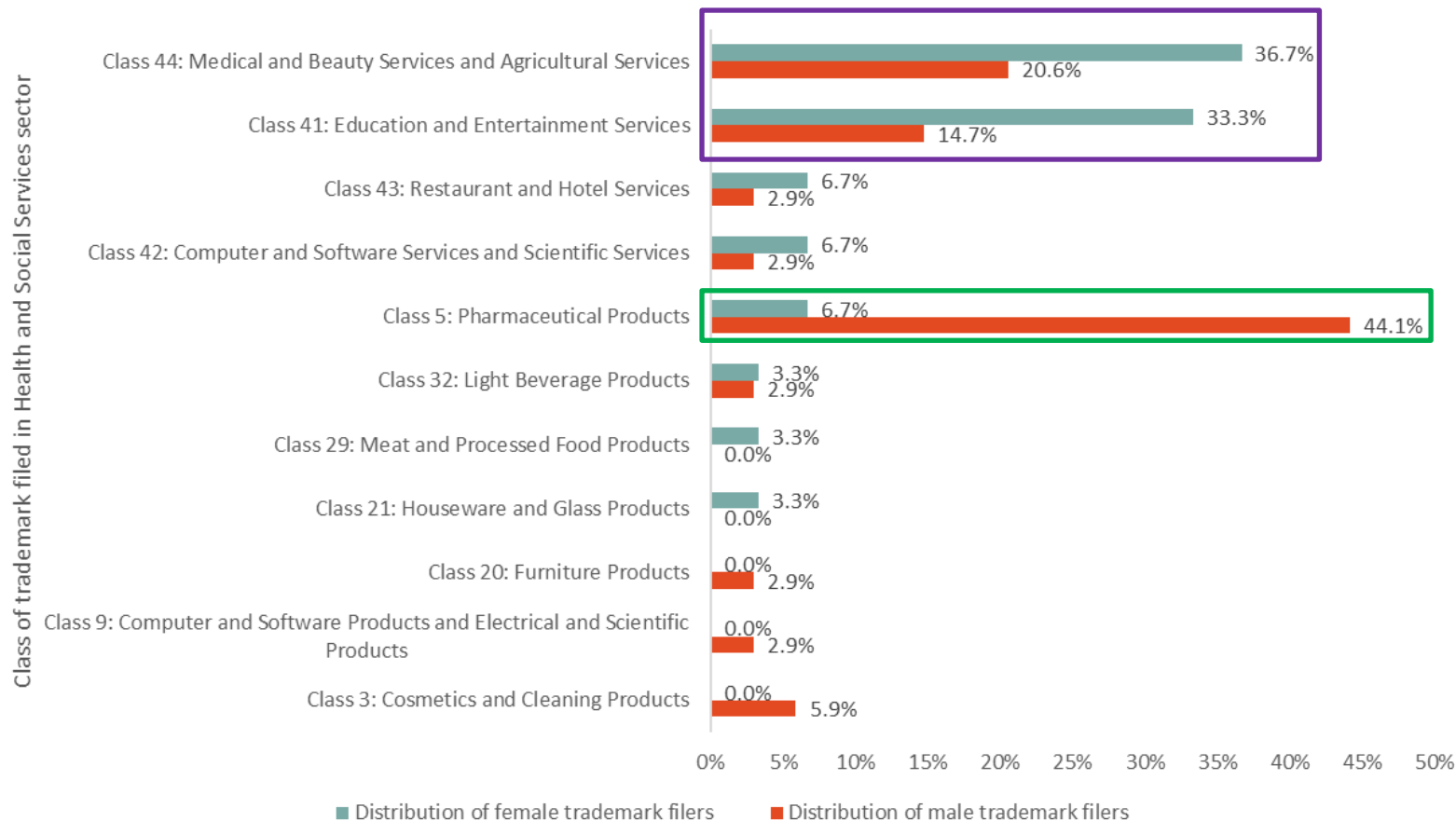
Types of businesses owned by female and male trademark filers in the <u>Information and Communications sector</u>

- Types of female businesses in the Information and Communication sector that filed trademarks are <u>less diverse</u> than males (8 types versus 26 for males).

- A larger percentage (36.6% for females versus 15.6% for males) of businesses are related to other sectors like **Education** (Publishing-related), and **Wholesale and Retail Trade** (Online marketplaces for goods (including food)) (green boxes).


Figure 16: Distributions of Female and Male Trademark Filers by Type of Business in Information and Communications Sector

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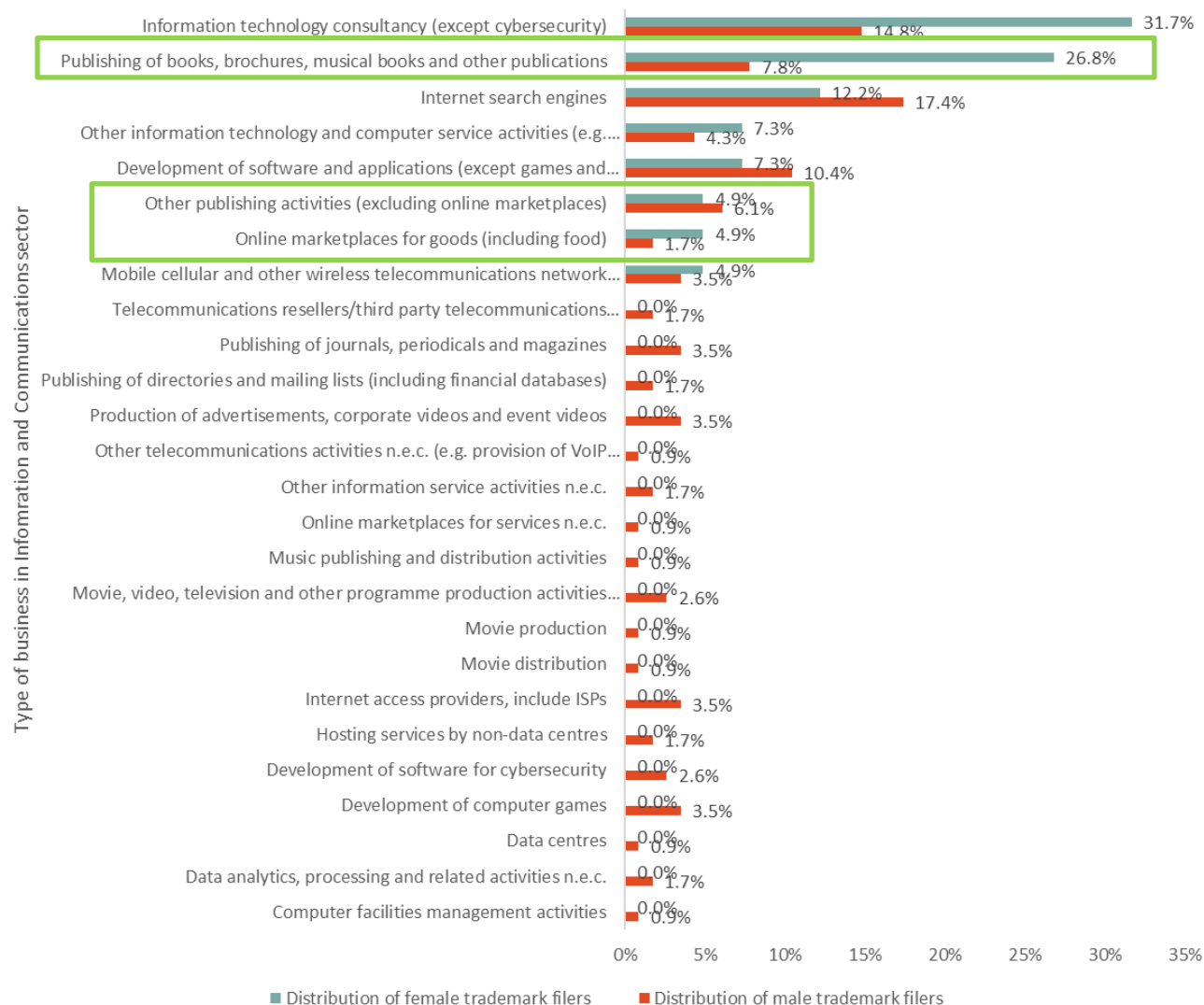
Types of products and services offered and filed for trademarks by female and male trademark filers in the Information and Communications sector

- Types of female products and services offered and filed for trademarks in the Information and Communication sector are less diverse (10 products and services versus 18 for males) with a larger percentage for **Furniture Products** (17.1% for females versus 1% for males; *orange* box) and a smaller percentage for **Paper and Printed Material Products** (9.8% for females versus 14.8% for males; **red** box).

- In a study done for the U.S. (National Women's Business Council, 2012), the top five industries with the highest participation in **trademark activity** by women were Advertising and Business, Clothing, Education and Entertainment, Miscellaneous Services – Scientific and Technological Services and Design, and Paper Goods and Printed Matter (pp. 44), all of which are associated with the trademark classes in the **green** boxes.

Figure 17: Distribution of Female and Male Trademark Filers by Products & Services Offered and Filed in Information and Communications Sector
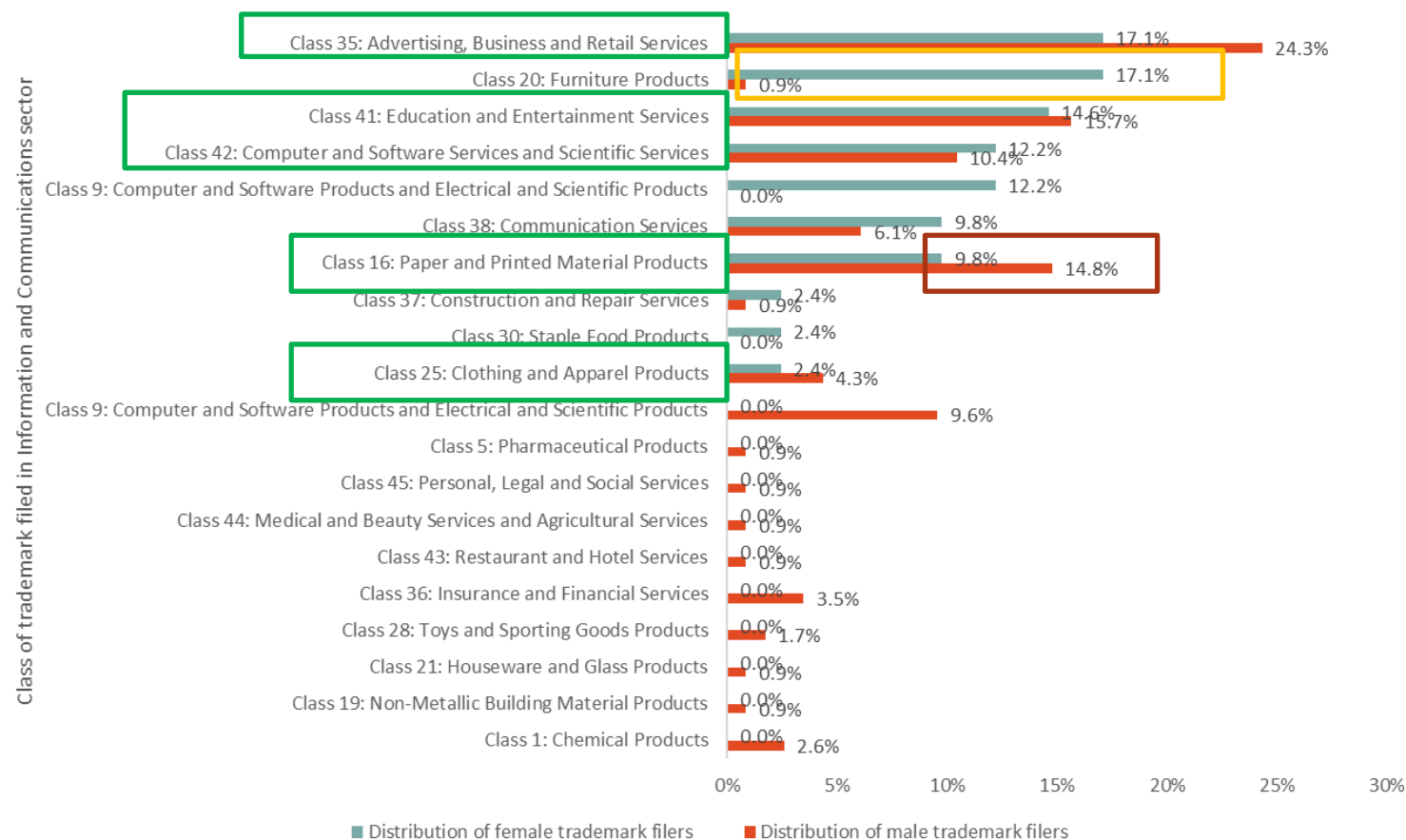
Background on Measuring Women's Entrepreneurship Activities (OECD Study, Halabisky, D., 2018, pp. 4)

Measuring women's entrepreneurship activities

- Self-employment is one of the measures used in economic analysis to proxy entrepreneurial activity. In labour force surveys, self-employed are defined as those persons who own and work in their own business, as employers or own-account workers, unless they are also in paid employment which is their main activity, in that case they are considered to be employees (http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Self-employed).

- In some countries, incorporated self-employed (owner/manager of incorporated businesses) are counted as employees rather than as self-employed (OECD, 2012).

- It is important to acknowledge that self-employment data does not capture the true extent of entrepreneurial activity, including that by women (FSB, 2016). Not all the self-employed are necessarily entrepreneurs. Many individuals who work as freelancers for only one client may report themselves to labour force surveys as self-employed rather than as employees although under some views working for a single client would not be considered as entrepreneurship.

- Equally many self-employed may not be counted as such if they have another primary occupation (i.e. "hybrid entrepreneurs").

- One well-known entrepreneurship survey, conducted by a consortium of academic institutions and consulting companies, is the Global Entrepreneurship Monitor. This survey asks people about whether they have taken steps to launch a business, whether they own and operate a "new" business (i.e. up to 42 months old), whether they own an "established" business (i.e. more than 42 months old) or whether they have closed down a business. This can provide useful information about the gender gap in the proportion of women and men who are entrepreneurs.

- The OECD-Eurostat Entrepreneurship Indicators Programme, which aims at developing policy-relevant and internationally comparable measures of entrepreneurship and its determinants, has contributed to improve understanding on gender differences in entrepreneurship (OECD, 2012). The programme has shown that relevant evidence on women's entrepreneurship can be produced with indicators organised along three main axes: i) business demography indicators for women and men-owned enterprises; ii) characteristics of women and men entrepreneurs; and iii) determinants of women's entrepreneurship, also based on secondary data sources on the business and policy environment.

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Innovation in diversified cities
Evidence from Canada's Urban Areas

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Canadian Intellectual Property Office Conference

May 30, 2023

Delivering insight through data for a better Canada

Motivation

Innovation is an important driver of growth in cities.

- Innovative cities experience faster growth : Commercial innovation and academic research expenditure increase employment in cities (Acs, 2002).

- Innovation is an important local activity that fosters the creation of start-ups that support the city's growth through thick labor markets or localized knowledge spillovers. (Acs, 2004).

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Motivation

Measuring the effects of diversity is important.

- **Cultural diversity**
  - Foreign-born individuals now represent about 10% of the workforce in OECD countries (Alesina et al, 2016). About a quarter in Canada.
  - Consequences of cultural diversity on economic performance (Alesina and La Ferrara, 2005) :
    - (+) Can lead to diversity of skills, experiences and ideas.
    - (–) Can be costly for public policies, create conflits, generate communication barriers.

- **Industrial diversity**
  - (+) Lead to complementarities in production, dissemination of ideas and transmission of innovations between industries.
  - (+) Resilience to economic downturn (Brown and Greenbaum, 2016).
  - (–) Reducing the chances of higher economic growth through high level of specialization in industries in which regions have a comparative advantage.

Aim of the paper

Empirical perspective on the relationship between innovation and the composition of local population and industry :

- How diversity affects innovation (inventor intensity) and at what level - firm or individual - diversity is most important in Canadian urban areas between 2006 and 2016.

  - Cultural diversity : Share of different people by country of origin.

  - Industrial diversity : Share of different firms by NAICS 4-digit sectors.

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Findings of the paper

Causal effect of diversity on innovation in Canadian urban areas :

- Cultural diversity (with weighted group measure) induces notable innovation gains.

- Industrial diversity (with all measures) increases local innovation.

- Effect on innovation of cultural diversity is stronger than industrial diversity.

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Contribution of paper (1/2)

Determinants of regional innovation.

- Most of the existing studies focus on the effect on innovation of the firm size (e.g. Cohen, 2010 ; Agrawal et al., 2014), market industry structure (e.g. Blundell et al., 1999 ; Aghion et al., 2005), R&D spending (e.g. Bottazzi and Peri, 2003), presence of universities (e.g. Acs et al., 1992 ; Feldman, 1994), population size and density (e.g. OhUallachain, 1999 ; Carlino et al., 2007).

→ **Local composition of cities can influence their economic performance. Analysis of the relationship between diversity and innovation at the local level.**

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Contribution of paper (2/2)

Regional diversity

- Effect of cultural diversity on local labor market outcomes such as productivity, wages and rents (see e.g. Ottaviano and Peri, 2006 Trax et al, 2015).
- Effect of skilled immigration (Kerr and Lincoln, 2010 ; Gagliardi, 2015 ; Ozgen et al., 2017) or cultural diversity related to immigration (Niebuhr, 2010, Alesina et al 2016) on innovation.

→ **Diversity can refer to economic diversity, i.e., the heterogeneity of firms and industries, or to the diversity of individuals. Which one is more important and in what way ?**

→ **Comprehensive measure of diversity : Majority of studies do not consider distance between groups.**

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Data : Cultural diversity

Census data from Statistics Canada (1996-2016) :

- Self-reported ethnicity (multiple responses)

- Aggregated to the country level (192 countries) by using the Geo Referencing of Ethnic Groups (GREG) database (Weidmann et al, 2010).

→ Alberta, British Columbia and Ontario are among the most culturally diverse (number of countries represented), including Edmonton, Vancouver and Toronto.

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Definition : Cultural diversity

Two sources of diversity :

- Composition effect (with groups homogeneity) : The presence of people from different countries. Each country (i) is given the same weight in the calculation (see Ottaviano and Peri, 2006 ; Lee and Rodríguez-Pose, 2013 ; Trax et al., 2015)

$$\text{CulturalDiv1}_{ct_0} = 1 - \sum_i s_{ict_0}^2$$

- Composition effect (with groups heterogeneity) : The presence of people from different countries. Countries are given different weights in the calculation according to their similarities (see Bossert et al., 2011)

$$\text{CulturalDiv2}_{ct_0} = 1 - \sum_i \sum_{j \neq i} s_{ict_0} s_{jct_0} w_{ij}$$

with $w_{ij} \in [0, 1]$ and $t_0 \in (2006, 2011)$

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Data : Industrial diversity

Firm-level data : National Account Longitudinal Microdata Files from Statistics Canada (2001-2016)

- Nearly all businesses operating in Canada, incorporated or not (329 sectors at NAICS 4-digit level).

- 1996 data from T2-Longitudinal Employment Analysis Program from Statistics Canada.

→ Quebec and Ontario are among the most industrially diverse (number of sectors represented) in Canada.

Definition : Industrial diversity

Two sources of diversity :

- Composition effect (with group homogeneity): The presence of firms from different 4-digit NAICS sectors. Each sector (i) is assigned the same weight in the calculation (see Ottaviano and Peri, 2006; Lee and Rodríguez-Pose, 2013; Trax et al., 2015).

$$\text{IndustrialDiv1}_{ct_0} = 1 - \sum_i s_{ict_0}^2$$

- Composition effect (with groups heterogeneity) : The presence of firm from different NAICS 4-digit sectors. Sectors are given different weights in the calculation according to their similarities (see Bossert et al., 2011)

$$\text{IndustrialDiv2}_{ct_0} = 1 - \sum_i \sum_{j \neq i} s_{ict_0} s_{jct_0} w_{ij}$$

with $w_{ij} \in [0, 1]$ and $t_0 \in (2006, 2011)$

Innovation

Employee-level data : Canadian Employer Employee Dynamics Database from Statistics Canada and Canadian Intellectual Property Office (2001-2016)

- Canadian-resident inventors associated with patent applications.

- Innovation is measured by the number of inventors per person of working age.

→ Quebec and Ontario are among the most innovative province in Canada.

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Empirical specification (1/2)

- Invention rate$_{crt}$ = α + βCulturalDiv$_{ct_0}$ + IndustrialDiv$_{ct_0}$ + δX$_{ct_0}$ + θ_r + ε_{crt}

- Invention rate$_{crt}$: Inventors per people 15-64 years of urban area$_c$ from region$_r$, averaged over t (2006-2011) and (2011-2016).

- CulturalDiv$_{ct_0}$ and IndustrialDiv$_{ct_0}$ are diversity indexes of urban area$_c$ at initial t_0 (2006 and 2011) :
  - Homogeneous group : country and firm sector with same weight.
  - Heterogeneous group : country and firm sector with different weight.

Empirical specification (2/2)

- X_{ct_0} : Initial characteristics of urban area c at t_0 (2006, 2011)
  - Share of manufacturing employment
  - Share of foreign origin population.
  - (log) of Population
  - Share of people with at least an university diploma.
  - (log) of urban area distance to the closest university.
  - University RD expenditures divided by full-time enrollment.

- θ_r is a regional fixed effect (Western, Ontario, Quebec and Atlantic provinces).

IV Strategy (1/2)

Simple OLS is likely to yield a biased measure of diversity estimates :

- Cities may experience an increase in average innovation following a positive economic shock, disproportionately attracting immigrants and thus leading to an increase in diversity.

- Possible reverse causality : People may come to a city because they are attracted by innovation spillovers, or the city's level of innovation is influenced by high diversity.

IV Strategy (2/2)

« Shift share » instrument (Card, 2001) : Compute for each Canadian urban area c, the predicted diversity index based on predicted shares of countries and sectors represented.

$$\text{Index } \widehat{\text{IV}}_{ct_0} = 1 - \sum_i \widehat{s_{ict_0}^2}$$

$$\text{Index } \widehat{\text{IV}}_{ct_0} = 1 - \sum_i \sum_{j \neq i} \widehat{s_{ict_0}} \widehat{s_{jct_0}} w_{ij}$$

- $\text{with } \widehat{s_{ict_0}} = s_{ic,1996}(1 + g_{i,t_{0-1996}}^{-c})$

Results

Dependent variable : (log) Inventors per capita	OLS(1) Simple index	OLS(2) Weighted index	IV(1) Simple index	IV(2) Weighted index
Cultural diversity	0.090		0.018	
	(0.071)		(0.107)	
Industrial diversity	0.084*		0.178*	
	(0.035)		(0.106)	
Cultural diversity (geographic weight)		0.258***		0.512***
		(0.059)		(0.089)
Industrial diversity (input/output weight)		0.113**		0.172**
		(0.048)		(0.084)
Log of initial population	0.038	0.119*	0.018	0.266***
	(0.056)	(0.067)	(0.066)	(0.092)
Share of foreign population	0.234***	0.189**	0.393***	0.077
	(0.083)	(0.090)	(0.103)	(0.114)
Share of manufacturing employment	0.233***	0.260***	0.158**	0.307***
	(0.052)	(0.051)	(0.064)	(0.053)
Share of graduated people	0.330***	0.387***	0.338***	0.448***
	(0.055)	(0.059)	(0.061)	(0.070)
(log) Minimal distance to university	-0.061	-0.010	-0.034	0.027
	(0.048)	(0.042)	(0.046)	(0.044)
University RD spending per student	0.031	0.066	0.062	0.075
	(0.050)	(0.051)	(0.052)	(0.063)
Region dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Observations	310	310	310	310

- Local innovation activity increases by 51.2% with a one standard deviation increase in cultural diversity, and by 17.2% with a one standard deviation increase in industrial diversity (with weights).

- Cultural diversity brings additional innovation gains of 34%.

17

Robustness test

- **Value of a patent** : Not all patents lead to the creation of a product (Feldman 1994). Control for granted and non granted patents.

- **Measures of distance between groups** : cultural and genetic distance ; patent distance and the flow of labor between sectors.

- **Productivity externalities** : Dissociating specialization and diversity effects (see Moretti, 2021). Control with unique inventor by sector in a postal code.

- **Skilled immigration** : Dissociating recent immigration effects (see Hunt and Gauthier-Loiselle, 2010 ; Kerr and Lincoln, 2010). Control with the share of immigrants within the last 5 years rant

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Conclusion

- Diversity due to ethnic and industrial mix positively affects the rate of innovation in Canadian urban areas between 2006 and 2016.
- Ethnic diversity has triple the quantitative effect of manufacturing diversity.
- Distance between groups is important when it comes to measuring ethnic diversity.

→ Effect of cultural diversity through segregation ? (Census Population data from Statistics Canada)

→ Effect of industrial diversity through labor shock ? (Business openings and closures data from Statistics Canada)