

IT @ Singapore

Information Technology in Singapore through and after Covid Inflation

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Github: <https://github.com/mzhang78usfca/cs360P1>

Website: <https://mzhang78usfca.github.io/IT-SG/>

Motivation:

I saw multiple articles on social medias that contains following topics:

- IT companies (as well as companies in other industries) that were previously located in US/Mainland China/Hong Kong are moving (or partially moving) to Singapore, especially from Mainland China due to the long-lasting and strict Covid restrictions.
- Singapore did really well on Covid control, which is one of the reasons that caused the previous phenomenon.

... and I'm curious if they are supported by any actual data.

Also, personally I'm applying to multiple companies in Singapore as New Grad 2023. I'm interested in investigating the actual labor market in this country.

Project Objectives:

- [1] Find out how good Singapore's Covid control was, compared with other countries. And why it is attractive for some companies.
- [2] Find out if the IT labor market (or overall labor market) is better than that under Covid Inflation and/or better than that before Covid Inflation.
 - Optional: [2.1] if the same thing happens to foreigner workers
- [3] Find out if IT companies recently moved to Singapore.

Data & Processing:

[1]

- The Covid cases count (maybe a comparison between total population)
Required processing: Log scale calculation, total population ratio calculation
 - Singapore[FOUND]: <https://www.moh.gov.sg/covid-19/statistics>
 - China Mainland[Still finding raw data]:
<https://covid19.who.int/region/wpro/country/cn>
 - US[Still finding raw data]:
<https://www.nytimes.com/interactive/2021/us/covid-cases.html>
- Covid restriction policy in Singapore and other countries
 - **Investigating:** foreign entries between Mainland China, Singapore and US

[2]

- GDP of Singapore over years
 - [FOUND]: wordbank GDP info for Singapore
<https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=SG>
- Some data that can show the IT industry growth over years
 - [FOUND, but no data after 2018] Infocomm Revenue Information
https://www.imda.gov.sg/-/media/Imda/Files/Infocomm-Media-Landscape/Research-and-Statistics/Survey-Report/II2019_Infographics.pdf?la=en

[2.1]

- Employment trend change in Singapore

Required processing: filter data for only IT industry (might be hard depending on data provided by government, some are non-public or not free)

 - [FOUND]: Average Monthly Recruitment/Resignation Rates by Industry and Occupational Group, Quarterly
https://data.gov.sg/dataset/average-monthly-recruitment-resignation-rates-by-industry-and-occupational-group-quarterly?resource_id=7e227620-eea6-4232-bb60-d2c6bbdc3a81
- Foreigner employment trend change in Singapore
 - [FOUND]: Foreign workforce numbers
<https://www.mom.gov.sg/documents-and-publications/foreign-workforce-numbers>

[3]

- List of IT Companies moved to Singapore
 - [FOUND, but only partial list] The battle between Asia's financial centers is heating up
<https://www.economist.com/finance-and-economics/2022/06/29/the-battle-between-asias-financial-centres-is-heating-up>
 - [Investigating] Planning to get numeric data (size, etc.) of these companies using LinkedIn or something...

Visualization Design & Features

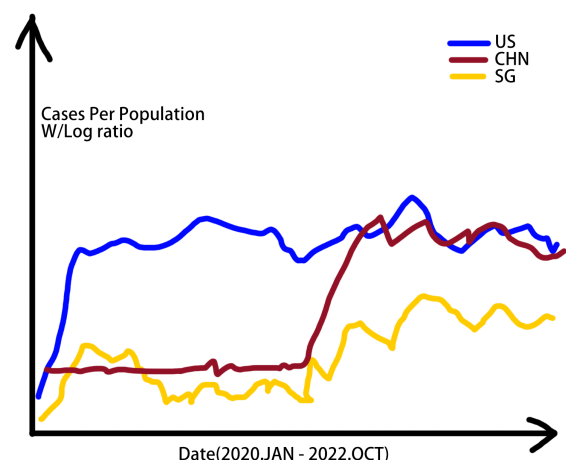
1.A - A **Grouped Bar Chart** of Covid Case-Population & Death-Population Ratio between Mainland China, Singapore and US

Must-have:

- 1.A.1: Finish data collection
- 1.A.2: Finish graph
- 1.A.3: Interaction to show specific number

Optional:

- 1.A.5: Interaction to show specific restriction policies signed by different governments (travel ban etc)



1.B - A **Line Graph** of foreign entries between Mainland China, Singapore and US (highlights the restriction by China government)
(Sketch not built yet since data not found)

Optional:

- 1.B.1: Finish data collection
- 1.B.2: Finish graph
- 1.B.3: Interaction to show specific restriction policies signed by different governments (travel ban etc), and merge interactive animation between 1.B and 1.A.

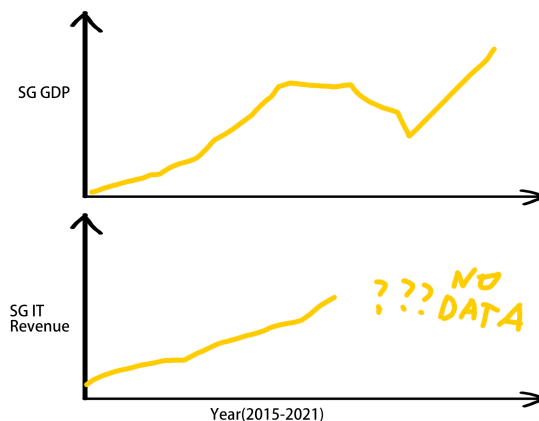
2.A - A **Line Graph** of GDP change and IT industry growth over years

Must-have:

- 2.A.1: Finish data collection
- 2.A.2: Finish graph
- 2.A.3: Interaction to show specific number

Optional:

- 2.A.4: Interaction to show specific IT-related events (new tax-related or employment-related government policy, etc)



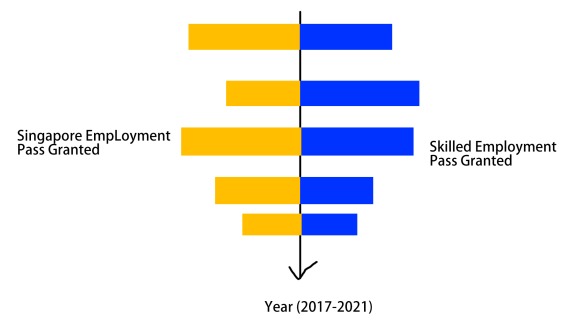
2.B - A **Line Graph** **Age Pyramid** (Suggested by Professor. Bar chart idea from Nathan) of Foreigner employment trend change (Regular worker and skilled worker) in Singapore

Must-have:

- 2.B.1: Finish data collection
- 2.B.2: Finish graph
- 2.B.3: Interaction to show specific number

Optional:

- 2.B.4: Collect data that is more related to IT industry (like jobs for IT)
- 2.B.5: Show specific events with interaction (new EP policy etc)
- 2.B.6: Show domestic employment info as comparison



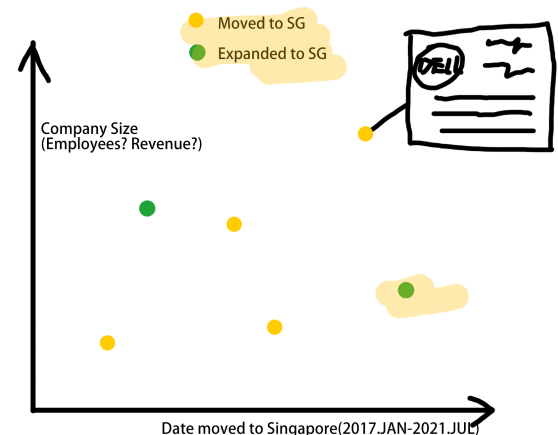
3.A - A Scatter Plot With Color (Suggested by Marisa) of companies moved to Singapore

Must-have:

- 3.A.1: Finish data collection
- 3.A.2: Finish graph
- 2.B.3: Interaction to show company info

Optional:

- 3.A.4: Collect data that is more related to IT industry (like jobs for IT)
- 3.A.5: Replace dots with small company logos
- 3.A.6: Modify the graph to a bubble chart (size=company employees) (Suggested by Mariah)



Related Work

Wu, S., & Zhao, X. (2021). Study on the Scientific and Technological Talents in Key Small Countries Based on the Background of International Competition - Taking the Field of Artificial Intelligence in Singapore as an Example. Technology Intelligence Engineering, 1(7).

(<https://www.scribd.com/document/548575956/%E5%9B%BD%E9%99%85%E7%AB%9E%E4%BA%89%E8%83%8C%E6%99%AF%E4%B8%8B%E5%85%B3%E9%94%AE%E5%B0%8F%E5%9B%BD%E4%BC%98%E5%8A%BF%E9%A2%86%E5%9F%9F%E7%A7%91%E6%8A%80%E4%BA%BA%E6%89%8D%E7%A0%94%E7%A9%B6-%E4%BB%A5%E6%96%B0%E5%8A%A0%E5%9D%A1%E4%BA%BA%E5%B7%A5%E6%99%BA%E8%83%BD%E9%A2%86%E5%9F%9F%E4%B8%BA%E4%BE%8B>)

Ji, W., & Su, N. (2020). Features and Insights of Building a Science and Technology Innovation Center in Singapore. Global City Studies, 2.

<https://wh.cnki.net/article/detail/QQCS202002009?album=Q>

Kim, S., Koh, K., & Zhang, X. (2020). Short-term impact of covid-19 on consumption and labor market outcomes: Evidence from Singapore. SSRN Electronic Journal.

<https://doi.org/10.2139/ssrn.3627056>

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3627056

Lean, H. H. (2022). Revitalising Asean economies in a post-covid-19 world: Socioeconomic issues in the new normal. World Scientific.

https://www.amazon.com/Revitalising-ASEAN-Economies-Post-COVID-19-World/dp/9811228469/ref=tmm_hrd_swatch_0?_encoding=UTF8&qid=&sr=

(Trying to find an E-copy. Definitely has valuable info in there)

Shen, Y. (2020). Unexpected Shocks to Movement and Job Search: Evidence from COVID-19 Policies in Singapore using Google Data. Asia Competitiveness Institute.
<https://lkyspp.nus.edu.sg/docs/default-source/aci/aciprp202004.pdf>

(More on next page)

Project Schedule(Suggested by professor):

Date	Schedule	Status
10/19	- Finish investigating, finalize the field of data to find, especially in 2.1 (Show overall employment status? Or only IT-related?)	Finished. Employment modified to show skilled worker status (IT-related data not found)
10/23	- Finish proposal - Finish all data Collection - Finish all data processing	Proposal Finished. Website built Data Processing - In progress.
10/30	- Finish graph 2.a, 2.b	
11/06(Alpha Release - 11/02)	- Finish graph 3.a	
11/13	- Finish graph 1.a - Finish as many interaction-related features as I can	
11/20(Beta Release - 11/16)	- Gather news, event, government policies that is related to the graph	
11/27	- Implement events to the graph	
12/04	- Write report, Add additional feature (scroll effect etc)	
12/11 (Presentation - 12/05)	- Write report	
Draft - 12/12 Everything - 12/15	- Write report	