Identifying Industries which were Adversely Impacted by COVID-19 to advise Financial Package Creation

February 3, 2023

0.1 Importing Common Libraries & Settings

[1]:
```
!pip3 install requests
!pip install wordcloud
import requests
import json
import time
import pandas as pd
import math
from datetime import timedelta, date, datetime as dt
import numpy as np
import plotly.express as px
import plotly.graph_objects as go
from wordcloud import WordCloud
from wordcloud import ImageColorGenerator
import matplotlib.pyplot as plt
print('Libraries Imported')
```

```
Requirement already satisfied: requests in /opt/conda/lib/python3.9/site-
packages (2.27.1)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in
/opt/conda/lib/python3.9/site-packages (from requests) (1.26.9)
Requirement already satisfied: idna<4,>=2.5 in /opt/conda/lib/python3.9/site-
packages (from requests) (3.3)
Requirement already satisfied: certifi>=2017.4.17 in
/opt/conda/lib/python3.9/site-packages (from requests) (2022.9.24)
Requirement already satisfied: charset-normalizer~=2.0.0 in
/opt/conda/lib/python3.9/site-packages (from requests) (2.0.12)
Requirement already satisfied: wordcloud in /opt/conda/lib/python3.9/site-
packages (1.8.1)
Requirement already satisfied: numpy>=1.6.1 in /opt/conda/lib/python3.9/site-
packages (from wordcloud) (1.21.6)
Requirement already satisfied: pillow in /opt/conda/lib/python3.9/site-packages
(from wordcloud) (9.1.1)
Requirement already satisfied: matplotlib in /opt/conda/lib/python3.9/site-
packages (from wordcloud) (3.5.2)
Requirement already satisfied: kiwisolver>=1.0.1 in
```

```
/opt/conda/lib/python3.9/site-packages (from matplotlib->wordcloud) (1.4.4)
Requirement already satisfied: pyparsing>=2.2.1 in
/opt/conda/lib/python3.9/site-packages (from matplotlib->wordcloud) (3.0.8)
Requirement already satisfied: cycler>=0.10 in /opt/conda/lib/python3.9/site-
packages (from matplotlib->wordcloud) (0.11.0)
Requirement already satisfied: python-dateutil>=2.7 in
/opt/conda/lib/python3.9/site-packages (from matplotlib->wordcloud) (2.8.2)
Requirement already satisfied: packaging>=20.0 in /opt/conda/lib/python3.9/site-
packages (from matplotlib->wordcloud) (21.3)
Requirement already satisfied: fonttools>=4.22.0 in
/opt/conda/lib/python3.9/site-packages (from matplotlib->wordcloud) (4.38.0)
Requirement already satisfied: six>=1.5 in /opt/conda/lib/python3.9/site-
packages (from python-dateutil>=2.7->matplotlib->wordcloud) (1.16.0)

/opt/conda/lib/python3.9/site-packages/requests/__init__.py:102:
RequestsDependencyWarning: urllib3 (1.26.9) or chardet
(5.0.0)/charset_normalizer (2.0.12) doesn't match a supported version!
  warnings.warn("urllib3 ({}) or chardet ({})/charset_normalizer ({}) doesn't
match a supported "

Libraries Imported
```

[2]:
```
pd.set_option('display.max_columns',None)
pd.set_option('display.max_rows',None)
print('Dataframe view set up')
```

```
Dataframe view set up
```

0.2 Identifying Industries which were Adversely Impacted by COVID-19 to advise Financial Package Creation

0.3 Setting the Context:

Q2 2020 witnessed the start of an unprecedented recession in the UK with the spread of COVID-19. As the country is still on the path to recovery and talks of another recession are in the air, the **Department of Trade and Industry wishes to create financial packages to promote new players for the industries which were worst hit by COVID-19 with the aim of helping them recover prior to the next recession to protect UK's Economy**. This report focuses on analysing the creation & dissolution across industries that ensued in the pre, during and post-pandemic period to guide the Department through this decision.

The report begins by fetching, organising, transforming & checking the data in the **'Data Importing & Cleaning'** section. This is followed by devising a strategy to identify most impacted Industries in the **'Adverse Impact Identification'** section. The report ends with visualisation of trends in the **'Impact Summary'** followed by an outline of the problem, approach and findings in the **'Mini-Report'**.

0.3.1 Business Question 1: Code:

0.4 Data Importing & Cleaning

[3]:
```
def call_api_with(url_extension):
    your_company_house_api_key ="4fad447a-8aae-4fda-849c-9e64c9fbb86c"

    login_headers = {"Authorization":your_company_house_api_key}
    url = f"https://api.company-information.service.gov.uk/{url_extension}"
    print(f'requesting: {url}')
    res = requests.get(url, headers=login_headers)
    return res.json()
print('Created Function to authenticate and call API')
```

```
Created Function to authenticate and call API
```

[4]:
```
def fetch_data_for_created_companies(strt_creat_year, strt_creat_month,␣
 ↪strt_creat_day,
                                     end_creat_year, end_creat_month,␣
 ↪end_creat_day,
                                     number_of_companies, days):
    size=5000
    index_number = math.ceil(number_of_companies/size)
    data_in_list = []
    creat_dt_strt = date(strt_creat_year,strt_creat_month,strt_creat_day)
    creat_dt_end = date(end_creat_year,end_creat_month,end_creat_day)
    creat_dt_end_interim = creat_dt_strt + timedelta(days=days)
    while creat_dt_strt<=creat_dt_end:
        for index in range(0,index_number):
            data_in_list += call_api_with(f"""advanced-search/companies?
 ↪incorporated_from={creat_dt_strt}&incorporated_to={creat_dt_end_interim}&size={size}&start_
 ↪get('items', [])
            time.sleep(0.6)
        creat_dt_strt = creat_dt_strt + timedelta(days=days+1)
        creat_dt_end_interim = creat_dt_strt + timedelta(days=days)
    return data_in_list
print('Created Function to fetch data for companies created between 2017 and␣
 ↪2022')
```

```
Created Function to fetch data for companies created between 2017 and 2022
```

[5]:
```
def fetch_data_for_dissolved_companies(strt_creat_year, strt_creat_month,␣
 ↪strt_creat_day,
                                     end_creat_year, end_creat_month,␣
 ↪end_creat_day,
                                     number_of_companies, days):
    size=5000
    index_number = math.ceil(number_of_companies/size)
```

```
    data_in_list = []
    creat_dt_strt = date(strt_creat_year,strt_creat_month,strt_creat_day)
    creat_dt_end = date(end_creat_year,end_creat_month,end_creat_day)
    creat_dt_end_interim = creat_dt_strt + timedelta(days=days)
    while creat_dt_strt<=creat_dt_end:
        for index in range(0,index_number):
            data_in_list += call_api_with(f"""advanced-search/companies?
 ↪dissolved_from={creat_dt_strt}&dissolved_to={creat_dt_end_interim}&size={size}&start_index=
 ↪get('items', [])
            time.sleep(0.6)
        creat_dt_strt = creat_dt_strt + timedelta(days=days+1)
        creat_dt_end_interim = creat_dt_strt + timedelta(days=days)
    return data_in_list
print('Created Function to fetch data for companies dissolved between 2017 and␣
 ↪2022')
```

```
Created Function to fetch data for companies dissolved between 2017 and 2022
```

[6]:
```
print("""This may take upto 5 mins to run!""")
companies_2017_2022_created = pd.
 ↪json_normalize(fetch_data_for_created_companies(2017,1,1,2022,9,30,10000,30))
```

```
This may take upto 5 mins to run!
requesting: https://api.company-information.service.gov.uk/advanced-search/compa
nies?incorporated_from=2017-01-01&incorporated_to=2017-01-31&size=5000&start_ind
ex=0
requesting: https://api.company-information.service.gov.uk/advanced-search/compa
nies?incorporated_from=2017-01-01&incorporated_to=2017-01-31&size=5000&start_ind
ex=5000
requesting: https://api.company-information.service.gov.uk/advanced-search/compa
nies?incorporated_from=2017-02-01&incorporated_to=2017-03-03&size=5000&start_ind
ex=0
requesting: https://api.company-information.service.gov.uk/advanced-search/compa
nies?incorporated_from=2017-02-01&incorporated_to=2017-03-03&size=5000&start_ind
ex=5000
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nies?incorporated_from=2017-03-04&incorporated_to=2017-04-03&size=5000&start_ind
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nies?incorporated_from=2017-04-04&incorporated_to=2017-05-04&size=5000&start_ind
ex=0
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ex=5000
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nies?incorporated_from=2017-06-05&incorporated_to=2017-07-05&size=5000&start_ind
ex=0
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nies?incorporated_from=2017-10-07&incorporated_to=2017-11-06&size=5000&start_ind
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nies?incorporated_from=2017-10-07&incorporated_to=2017-11-06&size=5000&start_ind
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nies?incorporated_from=2017-11-07&incorporated_to=2017-12-07&size=5000&start_ind
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nies?incorporated_from=2017-11-07&incorporated_to=2017-12-07&size=5000&start_ind
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nies?incorporated_from=2017-12-08&incorporated_to=2018-01-07&size=5000&start_ind
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ex=5000
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ex=0
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ex=0
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ex=5000
requesting: https://api.company-information.service.gov.uk/advanced-search/compa
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ex=0
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ex=5000
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ex=5000
requesting: https://api.company-information.service.gov.uk/advanced-search/compa
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ex=0
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ex=5000
requesting: https://api.company-information.service.gov.uk/advanced-search/compa
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ex=0
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ex=5000
```

[7]:
```
print("""This may take another 5 mins to run!""")
companies_2017_2022_dissolved = pd.
  ↪json_normalize(fetch_data_for_dissolved_companies(2017,1,1,2022,9,30,10000,30))
```

```
This may take another 5 mins to run!
requesting: https://api.company-information.service.gov.uk/advanced-search/compa
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requesting: https://api.company-information.service.gov.uk/advanced-search/compa
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requesting: https://api.company-information.service.gov.uk/advanced-search/compa
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```

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nies?dissolved_from=2020-05-25&dissolved_to=2020-06-24&size=5000&start_index=500
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nies?dissolved_from=2020-06-25&dissolved_to=2020-07-25&size=5000&start_index=0
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nies?dissolved_from=2020-06-25&dissolved_to=2020-07-25&size=5000&start_index=500
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nies?dissolved_from=2020-07-26&dissolved_to=2020-08-25&size=5000&start_index=0
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nies?dissolved_from=2020-07-26&dissolved_to=2020-08-25&size=5000&start_index=500
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nies?dissolved_from=2020-08-26&dissolved_to=2020-09-25&size=5000&start_index=0
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nies?dissolved_from=2020-08-26&dissolved_to=2020-09-25&size=5000&start_index=500
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nies?dissolved_from=2020-09-26&dissolved_to=2020-10-26&size=5000&start_index=0
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nies?dissolved_from=2020-09-26&dissolved_to=2020-10-26&size=5000&start_index=500
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nies?dissolved_from=2020-10-27&dissolved_to=2020-11-26&size=5000&start_index=0
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nies?dissolved_from=2020-10-27&dissolved_to=2020-11-26&size=5000&start_index=500
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nies?dissolved_from=2020-11-27&dissolved_to=2020-12-27&size=5000&start_index=0
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nies?dissolved_from=2020-11-27&dissolved_to=2020-12-27&size=5000&start_index=500
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nies?dissolved_from=2020-12-28&dissolved_to=2021-01-27&size=5000&start_index=0
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nies?dissolved_from=2021-01-28&dissolved_to=2021-02-27&size=5000&start_index=0
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nies?dissolved_from=2021-01-28&dissolved_to=2021-02-27&size=5000&start_index=500
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nies?dissolved_from=2021-02-28&dissolved_to=2021-03-30&size=5000&start_index=0
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nies?dissolved_from=2021-02-28&dissolved_to=2021-03-30&size=5000&start_index=500
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nies?dissolved_from=2021-03-31&dissolved_to=2021-04-30&size=5000&start_index=0
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nies?dissolved_from=2021-03-31&dissolved_to=2021-04-30&size=5000&start_index=500
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nies?dissolved_from=2021-05-01&dissolved_to=2021-05-31&size=5000&start_index=0
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nies?dissolved_from=2021-07-02&dissolved_to=2021-08-01&size=5000&start_index=0
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nies?dissolved_from=2021-08-02&dissolved_to=2021-09-01&size=5000&start_index=0
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nies?dissolved_from=2021-09-02&dissolved_to=2021-10-02&size=5000&start_index=0
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nies?dissolved_from=2021-09-02&dissolved_to=2021-10-02&size=5000&start_index=500
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nies?dissolved_from=2021-10-03&dissolved_to=2021-11-02&size=5000&start_index=0
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nies?dissolved_from=2021-10-03&dissolved_to=2021-11-02&size=5000&start_index=500
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nies?dissolved_from=2022-02-04&dissolved_to=2022-03-06&size=5000&start_index=0
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nies?dissolved_from=2022-07-09&dissolved_to=2022-08-08&size=5000&start_index=0
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nies?dissolved_from=2022-08-09&dissolved_to=2022-09-08&size=5000&start_index=0
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nies?dissolved_from=2022-09-09&dissolved_to=2022-10-09&size=5000&start_index=0
requesting: https://api.company-information.service.gov.uk/advanced-search/compa
nies?dissolved_from=2022-09-09&dissolved_to=2022-10-09&size=5000&start_index=500
0
```

[8]:
```
def pick_first_sic_code(sic_list):
    if sic_list!=sic_list:
        sic = np.nan
    else:
        sic = sic_list[0]
    return sic
print('Created function to pick the first SIC Code from the list')
```

```
Created function to pick the first SIC Code from the list
```

[9]:
```
companies_2017_2022 = pd.
 ↪concat([companies_2017_2022_created,companies_2017_2022_dissolved],ignore_index=True)
companies_2017_2022['sic_code'] = companies_2017_2022['sic_codes'].
 ↪map(pick_first_sic_code)
companies_2017_2022 = companies_2017_2022.drop(columns='sic_codes').
 ↪drop_duplicates()
del companies_2017_2022_created
del companies_2017_2022_dissolved
print('Merged the 2 dataframes, retained the first SIC Code, dropped duplicates␣
 ↪& deleted old data frames')
```

```
Merged the 2 dataframes, retained the first SIC Code, dropped duplicates &
deleted old data frames
```

[10]:
```
if companies_2017_2022.shape[0] == companies_2017_2022['company_number'].
 ↪nunique():
    print('There are no duplicates in the data and the number of companies are␣
 ↪'+str(companies_2017_2022.shape[0]))
else:
    print('The data has duplicates')
```

```
There are no duplicates in the data and the number of companies are 1026200
```

[11]:
```
companies_2017_2022.to_pickle('ch.pkl')
print('Saving to Pickle before deleting for use later')
```

```
Saving to Pickle before deleting for use later
```

[13]:
```
sic_lookup = pd.read_csv('sic_lookup.txt', sep='\t', encoding='ISO-8859-1')
sic_lookup['siccode'] = sic_lookup['siccode'].astype(str).str.pad(5, 'left',␣
↪'0')
print('Imported SIC Code Lookup')
```

```
Imported SIC Code Lookup
```

[14]:
```
companies_2017_2022 = companies_2017_2022.merge(sic_lookup,how = 'left',left_on␣
↪= ['sic_code'],
                                                right_on = ['siccode'])
print('Merged industry decription with original dataset')
```

```
Merged industry decription with original dataset
```

[15]:
```
#Creating a Function to Aggregate and Transform Dataframe
def aggregating_and_transforming_data(dataframe, aggregator):
    dataframe['cessation_period'] = pd.
↪to_datetime(dataframe['date_of_cessation']).dt.to_period('Q')
    dataframe['creation_period'] = pd.
↪to_datetime(dataframe['date_of_creation']).dt.to_period('Q')
    print('Created Cessation and Creation Periods')

    agg_creation_2017_2022 = dataframe.
↪groupby(['creation_period',aggregator])['company_number'].count().\
    to_frame().reset_index()
    agg_cessation_2017_2022 = dataframe.
↪groupby(['cessation_period',aggregator])['company_number'].count().\
    to_frame().reset_index()
    print('Created aggregates dataframes and deleted original data')

    agg_creation_2017_2022 =␣
↪agg_creation_2017_2022[agg_creation_2017_2022['creation_period']>='2017Q1'].\
    rename(columns={"company_number": "companies_created"})
    agg_cessation_2017_2022 =␣
↪agg_cessation_2017_2022[agg_cessation_2017_2022['cessation_period']>='2017Q1'].
↪\
    rename(columns={"company_number": "companies_dissolved"})
    print('Retaining 2017 onwards activity and renaming columns')

    if aggregator == 'industry':
        agg_sic = agg_creation_2017_2022.
↪groupby(['industry'])['companies_created'].sum().to_frame().reset_index()
        agg_sic = agg_sic[~agg_sic['industry'].str.startswith('Other')]
        list_of_valid_industries =␣
↪list(agg_sic[agg_sic['companies_created']>=100]['industry'])
        print('Creating a list of industries with atleast 100 companies created␣
↪in 2017-2022 & removing supplementary SIC codes for the analysis')
```

```
        agg_creation_2017_2022 =␣
↪agg_creation_2017_2022[agg_creation_2017_2022['industry'].
                                                          ␣
↪isin(list_of_valid_industries)]
        agg_cessation_2017_2022 =␣
↪agg_cessation_2017_2022[agg_cessation_2017_2022['industry'].
                                                            ␣
↪isin(list_of_valid_industries)]
        print('Filtering Dataframes to retain data for valid industries')

    agg_2017_2022 = agg_creation_2017_2022.merge(agg_cessation_2017_2022,how =␣
↪'left',
                                                 left_on =␣
↪['creation_period',aggregator],
                                                 right_on =␣
↪['cessation_period',aggregator]).fillna(0).\
    rename(columns = {'creation_period':'time_period', aggregator+'_x':
↪aggregator})\
    .drop(columns=['cessation_period'])
    print('Merging Creation and Cessation Figures aggregated by '+aggregator+'␣
↪and time period')

    agg_2017_2022['net_growth'] = agg_2017_2022['companies_created'] -␣
↪agg_2017_2022['companies_dissolved']
    print('Creating Net Growth')
    return agg_2017_2022
```

[16]:
```
agg_2017_2022 =␣
 ↪aggregating_and_transforming_data(companies_2017_2022,'industry')
```

```
Created Cessation and Creation Periods
Created aggregates dataframes and deleted original data
Retaining 2017 onwards activity and renaming columns
Creating a list of industries with atleast 100 companies created in 2017-2022 &
removing supplementary SIC codes for the analysis
Filtering Dataframes to retain data for valid industries
Merging Creation and Cessation Figures aggregated by industry and time period
Creating Net Growth
```

[17]:
```
del companies_2017_2022
```

0.5 Adverse Impact Identification

0.5.1 For Industries

[18]:
```
list_of_periods = list(agg_2017_2022['time_period'].unique().astype(str))

def identify_previous_period(period):
    index = list_of_periods.index(period)
    if index>0:
        prev_period = list_of_periods[index-1]
    else:
        prev_period = 'NA'
    return prev_period

print('Created a function to fetch Previous Period')
```

```
Created a function to fetch Previous Period
```

[19]:
```
agg_2017_2022['previous_period'] = agg_2017_2022['time_period'].astype(str).
 ↪map(identify_previous_period)
print('Created a Column with the Previous Period')
```

```
Created a Column with the Previous Period
```

[20]:
```
agg_2017_2022['time_period'] = agg_2017_2022['time_period'].astype(str)
print('Converted data type of time period to string')
```

```
Converted data type of time period to string
```

[21]:
```
agg_2017_2022_w_change =␣
 ↪agg_2017_2022[['time_period','previous_period','industry','net_growth']].\
merge(agg_2017_2022[['time_period','industry','net_growth']], how='left',␣
 ↪left_on=['industry',

 ↪   'previous_period'],
     right_on=['industry','time_period']).drop(columns=['time_period_y']).\
rename(columns={'time_period_x':'time_period','net_growth_x':
 ↪'net_growth_current',
                'net_growth_y':'net_growth_prev','industry_x':'industry'}).
 ↪drop_duplicates().reset_index(drop=True)

print('Merged Net Growth from Previous Period')
```

```
Merged Net Growth from Previous Period
```

[22]:
```
def change_from_prev_qtr(current, previous):
    if previous != previous:
        diff = np.nan
```

```
    else:
        diff = current-previous

    return diff
```

[23]:
```
agg_2017_2022_w_change['year'] = agg_2017_2022_w_change['time_period'].str[:4]
agg_2017_2022_w_change['change'] = agg_2017_2022_w_change.apply(lambda x:
                                                                ␣
 ↪change_from_prev_qtr(x['net_growth_current'],
                                                                                ␣
 ↪     x['net_growth_prev']),
                                                                 axis=1)
print('Included year, change in net growth from previous period')
```

```
Included year, change in net growth from previous period
```

[24]:
```
agg_2020_21_w_change =␣
 ↪agg_2017_2022_w_change[(agg_2017_2022_w_change['year']=='2020') |␣
 ↪(agg_2017_2022_w_change['year']=='2021')]
agg_2020_21_w_change['rank'] =  agg_2020_21_w_change['change'].rank(ascending =␣
 ↪True)
print('Ranked Industries based on maximum drop from previous quarters in 2020/
 ↪21')
```

```
Ranked Industries based on maximum drop from previous quarters in 2020/21
```

```
/tmp/ipykernel_88/1994621710.py:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  agg_2020_21_w_change['rank'] =  agg_2020_21_w_change['change'].rank(ascending
= True)
```

[25]:
```
ind_w_top_100_neg_change_in_2020_21 =␣
 ↪list(agg_2020_21_w_change[agg_2020_21_w_change['rank']<=10]['industry'])
print('Created list of top industries based on maximum drop from previous␣
 ↪quarters in 2020/21')
```

```
Created list of top industries based on maximum drop from previous quarters in
2020/21
```

0.5.2 For Sections

[26]:
```
#Taking a look at Sections at a High-Level
companies_2017_2022 = pd.read_pickle('ch.pkl')
print('Imported Data from saved pickle')
sic_lookup = pd.read_csv('sic_lookup.txt', sep='\t', encoding='ISO-8859-1')
sic_lookup['siccode'] = sic_lookup['siccode'].astype(str).str.pad(5, 'left',␣
 ↪'0')
print('Imported SIC Code Lookup')
companies_2017_2022 = companies_2017_2022.merge(sic_lookup,how = 'left',left_on␣
 ↪= ['sic_code'],
                                                right_on = ['siccode'])
print('Merged industry decription with original dataset')
```

```
Imported Data from saved pickle
Imported SIC Code Lookup
Merged industry decription with original dataset
```

[27]:
```
agg_2017_2022 = aggregating_and_transforming_data(companies_2017_2022,'section')
agg_2017_2022['time_period'] = agg_2017_2022['time_period'].astype(str)
```

```
Created Cessation and Creation Periods
Created aggregates dataframes and deleted original data
Retaining 2017 onwards activity and renaming columns
Merging Creation and Cessation Figures aggregated by section and time period
Creating Net Growth
```

[28]:
```
del companies_2017_2022
```

0.6 Impact Summary

[34]:
```
graph1 = px.line(agg_2017_2022_w_change[agg_2017_2022_w_change['industry'].
 ↪isin(ind_w_top_100_neg_change_in_2020_21)],
              x="time_period", y="net_growth_current",␣
 ↪color='industry',height=900, width = 900,
              title ='Graph 1: Net Growth over the Quarters across Industries␣
 ↪that were Impacted by COVID-19')
graph1.update_layout(showlegend=True, legend=dict(orientation ='h'))
graph1.add_vline(x = '2020Q2',line_dash='dash', line_color='red')
graph1.add_vline(x = '2021Q2',line_dash='dash', line_color='green')
graph1.add_vrect(x0='2020Q2', x1='2021Q2', annotation_text='COVID-19',
              annotation_position='top left',fillcolor='red', opacity=0.15,␣
 ↪line_width=0)
graph1.show('notebook')
```

[ ]:
```

```

[35]:
```
graph2 = px.line(agg_2017_2022, x="time_period", y="net_growth",␣
 ↪color='section',height=1000, width = 900,
              title ='Graph 2: Net Growth over the Quarters across Sections')
graph2.update_layout(showlegend=True, legend=dict(orientation ='h'))
graph2.add_vline(x = '2020Q2',line_dash='dash', line_color='red')
graph2.add_vline(x = '2021Q2',line_dash='dash', line_color='green')
graph2.add_vrect(x0='2020Q2', x1='2021Q2', annotation_text='COVID-19',
              annotation_position='top left',fillcolor='red', opacity=0.15,␣
 ↪line_width=0)
graph2.show('notebook')
```

0.6.1 Business Question 1: Mini-report and visualisation (263 Words):

0.6.2 Problem Statement:

Q2-2020 witnessed an unprecedented recession in the UK with the spread of COVID-19. As the country is still on the path to recovery and talks of another recession are in the air, the **Department of Trade and Industry wishes to create financial packages to promote new players for the industries which were worst hit by COVID-19 with the aim of helping them recover prior to the next recession to protect UK's Economy**. This report focuses on analysing the creation & dissolution across sectors (high-level) & industries (drill-down) that ensued during the pandemic.

0.6.3 Insights Drawn:

Most Sectors have Recovered Counterintuitively, most sectors peaked in Q2-2020 in terms of net growth (# of companies created – dissolved). However, the real effect is seen as a lagged trend starting Q3-2020, when the consequences of the lockdowns and financial distress were realised. Beyond Q3-2021, most industries have recovered to pre-pandemic standards. Some, such as Human Health & Social Work & Financial and Insurance Services have even grown. (Graph 2)

Scientific Activities, Information & Communication, Hairdressers, Arts & Recreation & Construction have taken a hit as seen in in Graph 2 compared to pre-pandemic levels. Drilling down (Graph 1), Management & Computer Consultancy Industries drive this. Some reasons could be inhouse development of talent and at-home beauty services.

Potential in Retail Sale via Mail or Internet Q2-2020 to Q2-2021 saw a huge hike in these services, but they're at an all-time low now. Normalising demands could be driving this.

Given this, this report recommends injection of financial packages in consultancy, beauty & online/mail retail industries.

[36]:
```
graph2.show('notebook')
```

[37]:
```
graph1.show('notebook')
```