06_employment_cleaning_eda

December 27, 2025

1 06 Accomodation and food services Employment Data Cleaning and EDA

Data Source: Statistics Canada Table 14-10-0355-01 (manually extracted)
Location: `data/interim/mb_employment_manual.csv`
Purpose: Clean and validate employment data (Food & Accommodation sector)
Date: December 2025

1.1 Objectives

1. Clean and validate employment data
2. Validate against Travel Manitoba Q4 2024 & Q1 2024 infographics
3. Basic trend analysis
4. Prepare dataset for Power BI dashboard

1.2 Setup

```python
[26]: # Path setup
import sys
from pathlib import Path
project_root = Path.cwd().parent
sys.path.insert(0, str(project_root / 'scripts'))
from paths import raw, processed, interim
```

```python
[27]: # Libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

# Plotting style
plt.style.use('seaborn-v0_8-darkgrid')
sns.set_palette('husl')
%matplotlib inline

# Display options
pd.set_option('display.max_columns', None)
pd.set_option('display.float_format', '{:,.0f}'.format)
```

```
print(' Libraries loaded')
```

  Libraries loaded

1.3 Part 1: Data Loading & Cleaning

1.3.1 1.1 Load Raw Data

```
[28]: csv_path = interim() / 'mb_employment_manual.csv'

      if not csv_path.exists():
          print(f'ERROR: File not found at {csv_path}')
      else:
          print(f'  Found: {csv_path}')
          print(f'   Size: {csv_path.stat().st_size:,} bytes')
```

  Found:
/Users/dpro/projects/travel_manitoba/data/interim/mb_employment_manual.csv
   Size: 25,753 bytes

```
[29]: # Load CSV
      df_raw = pd.read_csv(csv_path, encoding='utf-8-sig')

      print('RAW DATA')
      print('='*80)
      print(f'Shape: {df_raw.shape}')
      print(f'\nFirst 10 rows:')
      df_raw.head(10)
```

RAW DATA
==
Shape: (19, 252)

First 10 rows:

[29]:   North American Industry Classification System (NAICS) 6   Jan-05 Feb-05 \
     0   Total employed, all industries 7   565   570
     1   Goods-producing sector 8   134   132
     2   Agriculture 9   30   29
     3   Forestry, fishing, mining, quarrying, oil and …   5   5
     4   Utilities   6   6
     5   Construction   25   24
     6   Manufacturing   68   67
     7   Services-producing sector 12   431   438
     8   Wholesale and retail trade   84   86
     9   Transportation and warehousing   32   32

        Mar-05 Apr-05 May-05 Jun-05 Jul-05 Aug-05 Sep-05 Oct-05 Nov-05 \
```

|   |     |     |     |     |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0 | 566 | 567 | 583 | 585 | 585 | 583 | 577 | 579 | 579 |
| 1 | 130 | 132 | 138 | 139 | 143 | 145 | 145 | 143 | 138 |
| 2 | 28  | 29  | 29  | 31  | 32  | 32  | 30  | 31  | 30  |
| 3 | 5   | 5   | 5   | 5   | 6   | 6   | 6   | 6   | 6   |
| 4 | 7   | 7   | 6   | 7   | 8   | 7   | 7   | 6   | 6   |
| 5 | 23  | 25  | 27  | 28  | 28  | 31  | 31  | 31  | 31  |
| 6 | 67  | 66  | 71  | 67  | 69  | 69  | 70  | 69  | 65  |
| 7 | 436 | 435 | 445 | 446 | 442 | 438 | 432 | 436 | 441 |
| 8 | 84  | 84  | 88  | 87  | 83  | 80  | 82  | 84  | 85  |
| 9 | 33  | 32  | 33  | 33  | 34  | 35  | 33  | 34  | 34  |

|   | Dec-05 | Jan-06 | Feb-06 | Mar-06 | Apr-06 | May-06 | Jun-06 | Jul-06 | Aug-06 | \ |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| 0 | 579    | 573    | 577    | 572    | 577    | 590    | 595    | 588    | 590    |   |
| 1 | 136    | 132    | 132    | 131    | 133    | 140    | 144    | 145    | 146    |   |
| 2 | 30     | 30     | 30     | 29     | 30     | 31     | 31     | 32     | 33     |   |
| 3 | 6      | 6      | 6      | 6      | 6      | 6      | 7      | 7      | 7      |   |
| 4 | 6      | 6      | 5      | 5      | 6      | 6      | 6      | 6      | 6      |   |
| 5 | 28     | 28     | 29     | 29     | 30     | 33     | 34     | 34     | 34     |   |
| 6 | 65     | 63     | 62     | 61     | 61     | 63     | 66     | 66     | 66     |   |
| 7 | 443    | 441    | 445    | 442    | 444    | 450    | 451    | 444    | 444    |   |
| 8 | 87     | 86     | 87     | 87     | 88     | 89     | 88     | 91     | 91     |   |
| 9 | 35     | 34     | 34     | 35     | 34     | 35     | 35     | 35     | 35     |   |

|   | Sep-06 | Oct-06 | Nov-06 | Dec-06 | Jan-07 | Feb-07 | Mar-07 | Apr-07 | May-07 | \ |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| 0 | 588    | 585    | 583    | 581    | 577    | 579    | 581    | 582    | 598    |   |
| 1 | 141    | 139    | 137    | 135    | 135    | 134    | 134    | 134    | 141    |   |
| 2 | 33     | 31     | 30     | 30     | 29     | 29     | 29     | 29     | 30     |   |
| 3 | 7      | 7      | 6      | 6      | 6      | 6      | 7      | 6      | 6      |   |
| 4 | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      |   |
| 5 | 32     | 31     | 31     | 30     | 30     | 28     | 28     | 31     | 35     |   |
| 6 | 63     | 64     | 63     | 63     | 64     | 64     | 63     | 62     | 64     |   |
| 7 | 447    | 446    | 446    | 446    | 442    | 445    | 447    | 449    | 457    |   |
| 8 | 91     | 93     | 92     | 92     | 88     | 89     | 88     | 90     | 89     |   |
| 9 | 35     | 36     | 35     | 36     | 36     | 36     | 37     | 36     | 36     |   |

|   | Jun-07 | Jul-07 | Aug-07 | Sep-07 | Oct-07 | Nov-07 | Dec-07 | Jan-08 | Feb-08 | \ |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| 0 | 605    | 601    | 601    | 597    | 600    | 601    | 596    | 592    | 592    |   |
| 1 | 144    | 145    | 149    | 146    | 145    | 146    | 141    | 139    | 138    |   |
| 2 | 30     | 31     | 31     | 30     | 29     | 28     | 27     | 27     | 27     |   |
| 3 | 7      | 7      | 7      | 6      | 7      | 7      | 6      | 6      | 6      |   |
| 4 | 7      | 7      | 6      | 6      | 6      | 6      | 6      | 6      | 7      |   |
| 5 | 35     | 37     | 40     | 38     | 37     | 38     | 34     | 32     | 33     |   |
| 6 | 65     | 63     | 65     | 66     | 67     | 67     | 67     | 67     | 65     |   |
| 7 | 461    | 456    | 451    | 451    | 455    | 455    | 455    | 453    | 454    |   |
| 8 | 90     | 92     | 92     | 89     | 90     | 89     | 91     | 89     | 90     |   |
| 9 | 37     | 37     | 37     | 37     | 37     | 38     | 38     | 38     | 38     |   |

|   | Mar-08 | Apr-08 | May-08 | Jun-08 | Jul-08 | Aug-08 | Sep-08 | Oct-08 | Nov-08 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 594 | 602 | 608 | 616 | 613 | 607 | 601 | 604 | 599 | |
| 1 | 141 | 144 | 150 | 152 | 157 | 156 | 155 | 153 | 147 | |
| 2 | 27 | 29 | 30 | 29 | 30 | 30 | 30 | 31 | 29 | |
| 3 | 7 | 6 | 6 | 7 | 7 | 6 | 7 | 6 | 6 | |
| 4 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | |
| 5 | 34 | 36 | 39 | 40 | 44 | 44 | 42 | 41 | 39 | |
| 6 | 66 | 67 | 68 | 69 | 69 | 69 | 68 | 68 | 66 | |
| 7 | 454 | 458 | 458 | 464 | 456 | 451 | 446 | 451 | 453 | |
| 8 | 90 | 92 | 92 | 93 | 91 | 88 | 86 | 89 | 89 | |
| 9 | 38 | 37 | 37 | 36 | 37 | 37 | 36 | 36 | 37 | |

|   | Dec-08 | Jan-09 | Feb-09 | Mar-09 | Apr-09 | May-09 | Jun-09 | Jul-09 | Aug-09 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 601 | 590 | 592 | 587 | 593 | 608 | 610 | 610 | 610 | |
| 1 | 145 | 140 | 139 | 136 | 137 | 142 | 145 | 147 | 148 | |
| 2 | 29 | 27 | 28 | 26 | 26 | 27 | 29 | 29 | 30 | |
| 3 | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | |
| 4 | 7 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | |
| 5 | 38 | 36 | 36 | 33 | 34 | 38 | 40 | 42 | 42 | |
| 6 | 65 | 63 | 62 | 64 | 64 | 64 | 62 | 62 | 62 | |
| 7 | 456 | 450 | 453 | 452 | 456 | 466 | 465 | 462 | 461 | |
| 8 | 89 | 88 | 88 | 88 | 89 | 89 | 88 | 91 | 90 | |
| 9 | 36 | 37 | 38 | 37 | 37 | 37 | 38 | 39 | 37 | |

|   | Sep-09 | Oct-09 | Nov-09 | Dec-09 | Jan-10 | Feb-10 | Mar-10 | Apr-10 | May-10 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 600 | 601 | 604 | 597 | 593 | 595 | 594 | 602 | 615 | |
| 1 | 144 | 142 | 139 | 132 | 131 | 133 | 135 | 139 | 141 | |
| 2 | 29 | 28 | 26 | 26 | 26 | 26 | 26 | 27 | 28 | |
| 3 | 6 | 6 | 6 | 5 | 6 | 7 | 7 | 7 | 8 | |
| 4 | 8 | 8 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | |
| 5 | 40 | 38 | 38 | 34 | 32 | 34 | 33 | 36 | 37 | |
| 6 | 62 | 62 | 61 | 60 | 59 | 59 | 61 | 60 | 60 | |
| 7 | 456 | 459 | 465 | 465 | 462 | 462 | 459 | 464 | 474 | |
| 8 | 88 | 88 | 89 | 92 | 89 | 90 | 88 | 90 | 92 | |
| 9 | 38 | 38 | 39 | 38 | 38 | 37 | 37 | 36 | 37 | |

|   | Jun-10 | Jul-10 | Aug-10 | Sep-10 | Oct-10 | Nov-10 | Dec-10 | Jan-11 | Feb-11 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 622 | 618 | 619 | 617 | 622 | 616 | 609 | 606 | 609 | |
| 1 | 145 | 151 | 150 | 147 | 149 | 144 | 142 | 141 | 141 | |
| 2 | 28 | 29 | 29 | 29 | 28 | 26 | 26 | 26 | 25 | |
| 3 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | |
| 4 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 7 | |
| 5 | 40 | 45 | 44 | 42 | 43 | 40 | 37 | 37 | 37 | |
| 6 | 60 | 61 | 60 | 60 | 62 | 63 | 64 | 63 | 64 | |
| 7 | 477 | 467 | 469 | 470 | 474 | 472 | 467 | 465 | 469 | |
| 8 | 92 | 91 | 91 | 92 | 94 | 94 | 94 | 92 | 91 | |
| 9 | 37 | 37 | 36 | 36 | 35 | 36 | 36 | 35 | 36 | |

|   | Mar-11 | Apr-11 | May-11 | Jun-11 | Jul-11 | Aug-11 | Sep-11 | Oct-11 | Nov-11 | \ |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| 0 | 606 | 608 | 621 | 625 | 620 | 619 | 616 | 621 | 617 | |
| 1 | 140 | 141 | 145 | 150 | 152 | 152 | 148 | 150 | 145 | |
| 2 | 25 | 25 | 25 | 26 | 27 | 27 | 26 | 26 | 22 | |
| 3 | 8 | 6 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | |
| 4 | 8 | 7 | 7 | 8 | 8 | 7 | 7 | 7 | 7 | |
| 5 | 38 | 40 | 41 | 44 | 47 | 47 | 45 | 46 | 45 | |
| 6 | 62 | 62 | 64 | 64 | 63 | 62 | 61 | 62 | 63 | |
| 7 | 466 | 467 | 476 | 476 | 468 | 467 | 468 | 471 | 472 | |
| 8 | 89 | 89 | 90 | 90 | 92 | 90 | 90 | 91 | 91 | |
| 9 | 35 | 35 | 34 | 36 | 36 | 37 | 36 | 36 | 38 | |

|   | Dec-11 | Jan-12 | Feb-12 | Mar-12 | Apr-12 | May-12 | Jun-12 | Jul-12 | Aug-12 | \ |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| 0 | 616 | 606 | 608 | 613 | 617 | 628 | 629 | 622 | 624 | |
| 1 | 141 | 140 | 139 | 140 | 141 | 146 | 150 | 152 | 154 | |
| 2 | 23 | 22 | 22 | 22 | 23 | 22 | 23 | 25 | 25 | |
| 3 | 7 | 7 | 7 | 8 | 7 | 7 | 7 | 8 | 7 | |
| 4 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | |
| 5 | 40 | 40 | 39 | 40 | 41 | 44 | 45 | 47 | 49 | |
| 6 | 64 | 63 | 63 | 64 | 63 | 66 | 67 | 65 | 65 | |
| 7 | 475 | 467 | 470 | 473 | 476 | 482 | 479 | 470 | 471 | |
| 8 | 94 | 92 | 90 | 91 | 91 | 90 | 90 | 92 | 95 | |
| 9 | 38 | 37 | 36 | 36 | 37 | 36 | 36 | 37 | 36 | |

|   | Sep-12 | Oct-12 | Nov-12 | Dec-12 | Jan-13 | Feb-13 | Mar-13 | Apr-13 | May-13 | \ |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| 0 | 626 | 624 | 623 | 627 | 623 | 622 | 622 | 617 | 630 | |
| 1 | 150 | 150 | 147 | 148 | 144 | 146 | 148 | 146 | 151 | |
| 2 | 24 | 23 | 23 | 24 | 23 | 24 | 25 | 25 | 27 | |
| 3 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | |
| 4 | 8 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | |
| 5 | 49 | 49 | 47 | 48 | 44 | 46 | 46 | 44 | 46 | |
| 6 | 63 | 63 | 62 | 62 | 62 | 62 | 62 | 63 | 63 | |
| 7 | 476 | 475 | 476 | 478 | 479 | 475 | 475 | 470 | 479 | |
| 8 | 93 | 94 | 95 | 95 | 92 | 93 | 93 | 92 | 92 | |
| 9 | 36 | 36 | 35 | 37 | 35 | 36 | 35 | 36 | 35 | |

|   | Jun-13 | Jul-13 | Aug-13 | Sep-13 | Oct-13 | Nov-13 | Dec-13 | Jan-14 | Feb-14 | \ |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| 0 | 641 | 632 | 629 | 630 | 627 | 621 | 620 | 618 | 618 | |
| 1 | 157 | 159 | 159 | 155 | 152 | 148 | 143 | 142 | 141 | |
| 2 | 28 | 27 | 28 | 27 | 26 | 24 | 24 | 24 | 24 | |
| 3 | 8 | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | |
| 4 | 8 | 8 | 8 | 8 | 8 | 8 | 9 | 9 | 9 | |
| 5 | 48 | 50 | 51 | 49 | 48 | 46 | 41 | 40 | 39 | |
| 6 | 66 | 65 | 64 | 63 | 64 | 62 | 62 | 63 | 63 | |
| 7 | 484 | 473 | 470 | 475 | 475 | 473 | 477 | 476 | 477 | |
| 8 | 94 | 95 | 94 | 92 | 90 | 93 | 96 | 94 | 93 | |

| 9 | 36 | 38 | 38 | 38 | 39 | 38 | 38 | 37 | 38 |

|   | Mar-14 | Apr-14 | May-14 | Jun-14 | Jul-14 | Aug-14 | Sep-14 | Oct-14 | Nov-14 | \ |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| 0 | 619 | 618 | 630 | 638 | 632 | 630 | 630 | 638 | 634 |   |
| 1 | 143 | 143 | 148 | 152 | 157 | 157 | 156 | 154 | 150 |   |
| 2 | 24 | 24 | 25 | 26 | 27 | 26 | 26 | 24 | 24 |   |
| 3 | 7 | 6 | 6 | 7 | 8 | 7 | 8 | 8 | 7 |   |
| 4 | 9 | 9 | 10 | 10 | 10 | 10 | 9 | 9 | 9 |   |
| 5 | 39 | 40 | 43 | 45 | 47 | 48 | 49 | 48 | 47 |   |
| 6 | 65 | 64 | 64 | 65 | 65 | 65 | 65 | 64 | 63 |   |
| 7 | 475 | 475 | 482 | 486 | 476 | 474 | 474 | 484 | 485 |   |
| 8 | 92 | 89 | 92 | 93 | 95 | 94 | 94 | 96 | 96 |   |
| 9 | 38 | 38 | 38 | 37 | 37 | 38 | 37 | 38 | 38 |   |

|   | Dec-14 | Jan-15 | Feb-15 | Mar-15 | Apr-15 | May-15 | Jun-15 | Jul-15 | Aug-15 | \ |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| 0 | 632 | 627 | 629 | 634 | 635 | 643 | 650 | 639 | 639 |   |
| 1 | 144 | 141 | 141 | 140 | 142 | 146 | 152 | 156 | 157 |   |
| 2 | 22 | 23 | 22 | 22 | 24 | 24 | 24 | 28 | 27 |   |
| 3 | 6 | 7 | 7 | 6 | 6 | 5 | 6 | 6 | 6 |   |
| 4 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 10 |   |
| 5 | 43 | 40 | 38 | 40 | 42 | 44 | 47 | 49 | 49 |   |
| 6 | 64 | 63 | 65 | 63 | 62 | 65 | 64 | 64 | 65 |   |
| 7 | 488 | 485 | 488 | 494 | 492 | 496 | 498 | 483 | 483 |   |
| 8 | 98 | 95 | 95 | 94 | 94 | 92 | 92 | 93 | 92 |   |
| 9 | 39 | 39 | 38 | 40 | 39 | 41 | 40 | 39 | 39 |   |

|   | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | \ |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| 0 | 643 | 645 | 638 | 634 | 621 | 628 | 633 | 632 | 646 |   |
| 1 | 154 | 153 | 151 | 150 | 147 | 146 | 149 | 151 | 159 |   |
| 2 | 26 | 26 | 26 | 26 | 25 | 24 | 24 | 26 | 28 |   |
| 3 | 6 | 6 | 6 | 7 | 6 | 6 | 6 | 6 | 7 |   |
| 4 | 9 | 9 | 9 | 9 | 9 | 11 | 10 | 10 | 11 |   |
| 5 | 48 | 47 | 45 | 44 | 42 | 41 | 44 | 44 | 49 |   |
| 6 | 65 | 65 | 66 | 64 | 65 | 64 | 65 | 64 | 64 |   |
| 7 | 489 | 492 | 487 | 484 | 474 | 482 | 484 | 482 | 487 |   |
| 8 | 92 | 95 | 94 | 92 | 88 | 88 | 88 | 90 | 90 |   |
| 9 | 39 | 38 | 37 | 36 | 35 | 34 | 35 | 34 | 35 |   |

|   | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 | Feb-17 | \ |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| 0 | 648 | 645 | 643 | 640 | 643 | 638 | 638 | 633 | 635 |   |
| 1 | 158 | 164 | 166 | 162 | 162 | 158 | 150 | 149 | 152 |   |
| 2 | 27 | 30 | 31 | 29 | 28 | 27 | 24 | 26 | 24 |   |
| 3 | 6 | 7 | 6 | 7 | 7 | 7 | 7 | 8 | 8 |   |
| 4 | 11 | 11 | 11 | 11 | 10 | 10 | 10 | 10 | 10 |   |
| 5 | 52 | 52 | 51 | 50 | 50 | 50 | 46 | 42 | 44 |   |
| 6 | 63 | 65 | 66 | 66 | 66 | 65 | 64 | 64 | 66 |   |
| 7 | 490 | 481 | 477 | 478 | 481 | 480 | 488 | 484 | 484 |   |

|   | 8 | 91 | 91 | 91 | 89 | 90 | 89 | 91 | 90 | 88 |
|---|---|---|---|---|---|---|---|---|---|---|
|   | 9 | 36 | 36 | 36 | 36 | 35 | 36 | 37 | 37 | 38 |

|   | Mar-17 | Apr-17 | May-17 | Jun-17 | Jul-17 | Aug-17 | Sep-17 | Oct-17 | Nov-17 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 639 | 641 | 655 | 661 | 659 | 658 | 652 | 657 | 650 | |
| 1 | 152 | 153 | 160 | 162 | 166 | 166 | 160 | 158 | 151 | |
| 2 | 23 | 24 | 26 | 27 | 29 | 29 | 27 | 26 | 26 | |
| 3 | 8 | 8 | 8 | 7 | 7 | 7 | 6 | 6 | 6 | |
| 4 | 10 | 10 | 10 | 10 | 9 | 9 | 9 | 8 | 8 | |
| 5 | 47 | 47 | 51 | 52 | 54 | 55 | 55 | 54 | 49 | |
| 6 | 64 | 66 | 65 | 65 | 67 | 66 | 63 | 63 | 62 | |
| 7 | 486 | 488 | 495 | 499 | 493 | 492 | 492 | 499 | 499 | |
| 8 | 90 | 91 | 91 | 91 | 92 | 92 | 91 | 92 | 94 | |
| 9 | 37 | 37 | 36 | 36 | 36 | 36 | 37 | 36 | 36 | |

|   | Dec-17 | Jan-18 | Feb-18 | Mar-18 | Apr-18 | May-18 | Jun-18 | Jul-18 | Aug-18 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 648 | 640 | 638 | 643 | 646 | 659 | 668 | 658 | 662 | |
| 1 | 149 | 147 | 145 | 145 | 147 | 155 | 159 | 158 | 158 | |
| 2 | 26 | 25 | 25 | 26 | 26 | 29 | 28 | 29 | 29 | |
| 3 | 6 | 7 | 7 | 6 | 6 | 6 | 7 | 6 | 6 | |
| 4 | 8 | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | |
| 5 | 46 | 46 | 45 | 45 | 45 | 48 | 53 | 51 | 52 | |
| 6 | 62 | 62 | 61 | 61 | 63 | 64 | 64 | 64 | 62 | |
| 7 | 499 | 493 | 493 | 498 | 499 | 504 | 509 | 500 | 504 | |
| 8 | 96 | 92 | 92 | 92 | 90 | 88 | 89 | 90 | 92 | |
| 9 | 35 | 35 | 35 | 36 | 37 | 37 | 38 | 40 | 40 | |

|   | Sep-18 | Oct-18 | Nov-18 | Dec-18 | Jan-19 | Feb-19 | Mar-19 | Apr-19 | May-19 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 658 | 659 | 657 | 656 | 652 | 651 | 655 | 659 | 670 | |
| 1 | 156 | 156 | 153 | 149 | 148 | 148 | 153 | 153 | 160 | |
| 2 | 29 | 27 | 24 | 23 | 24 | 23 | 24 | 26 | 28 | |
| 3 | 6 | 7 | 6 | 6 | 7 | 6 | 7 | 5 | 6 | |
| 4 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | |
| 5 | 52 | 53 | 53 | 49 | 48 | 46 | 50 | 51 | 54 | |
| 6 | 63 | 62 | 62 | 64 | 64 | 65 | 65 | 64 | 66 | |
| 7 | 501 | 503 | 504 | 507 | 504 | 503 | 503 | 506 | 510 | |
| 8 | 90 | 88 | 90 | 91 | 90 | 90 | 89 | 91 | 93 | |
| 9 | 39 | 40 | 42 | 41 | 40 | 42 | 43 | 43 | 43 | |

|   | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 | Jan-20 | Feb-20 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 676 | 663 | 666 | 664 | 665 | 658 | 660 | 660 | 662 | |
| 1 | 161 | 161 | 161 | 158 | 157 | 152 | 150 | 148 | 148 | |
| 2 | 28 | 28 | 28 | 28 | 28 | 27 | 25 | 26 | 27 | |
| 3 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 5 | 5 | |
| 4 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 7 | |
| 5 | 54 | 55 | 54 | 54 | 52 | 50 | 50 | 46 | 46 | |
| 6 | 67 | 64 | 65 | 64 | 64 | 62 | 62 | 63 | 63 | |

|   | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 7 | 515 | 502 | 505 | 505 | 508 | 506 | 510 | 512 | 514 |
| 8 | 93 | 93 | 93 | 92 | 93 | 95 | 95 | 94 | 95 |
| 9 | 44 | 43 | 41 | 41 | 40 | 38 | 39 | 40 | 40 |

|   | Mar-20 | Apr-20 | May-20 | Jun-20 | Jul-20 | Aug-20 | Sep-20 | Oct-20 | Nov-20 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 633 | 572 | 597 | 632 | 639 | 647 | 662 | 659 | 636 | |
| 1 | 146 | 138 | 144 | 150 | 153 | 155 | 154 | 153 | 148 | |
| 2 | 26 | 28 | 29 | 27 | 28 | 29 | 29 | 27 | 27 | |
| 3 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | |
| 4 | 8 | 7 | 6 | 7 | 7 | 7 | 6 | 6 | 5 | |
| 5 | 45 | 41 | 46 | 52 | 52 | 54 | 53 | 54 | 48 | |
| 6 | 62 | 58 | 58 | 58 | 60 | 61 | 62 | 62 | 64 | |
| 7 | 487 | 434 | 453 | 482 | 486 | 492 | 508 | 506 | 488 | |
| 8 | 87 | 74 | 83 | 86 | 86 | 89 | 91 | 93 | 94 | |
| 9 | 40 | 35 | 36 | 36 | 36 | 38 | 41 | 41 | 42 | |

|   | Dec-20 | Jan-21 | Feb-21 | Mar-21 | Apr-21 | May-21 | Jun-21 | Jul-21 | Aug-21 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 629 | 627 | 645 | 650 | 660 | 670 | 668 | 672 | 669 | |
| 1 | 147 | 146 | 146 | 147 | 152 | 157 | 158 | 162 | 159 | |
| 2 | 25 | 25 | 25 | 25 | 26 | 27 | 26 | 27 | 27 | |
| 3 | 6 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | |
| 4 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | |
| 5 | 48 | 46 | 45 | 46 | 49 | 53 | 53 | 57 | 54 | |
| 6 | 63 | 65 | 66 | 66 | 68 | 67 | 68 | 67 | 67 | |
| 7 | 482 | 481 | 498 | 503 | 508 | 514 | 510 | 510 | 510 | |
| 8 | 94 | 91 | 96 | 96 | 98 | 99 | 101 | 98 | 96 | |
| 9 | 42 | 41 | 43 | 42 | 43 | 42 | 41 | 43 | 43 | |

|   | Sep-21 | Oct-21 | Nov-21 | Dec-21 | Jan-22 | Feb-22 | Mar-22 | Apr-22 | May-22 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 677 | 679 | 675 | 678 | 674 | 685 | 678 | 682 | 695 | |
| 1 | 159 | 155 | 149 | 149 | 149 | 149 | 148 | 148 | 154 | |
| 2 | 29 | 26 | 26 | 25 | 23 | 22 | 22 | 21 | 22 | |
| 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 6 | |
| 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | |
| 5 | 54 | 54 | 50 | 48 | 50 | 49 | 49 | 49 | 52 | |
| 6 | 66 | 66 | 64 | 67 | 67 | 69 | 68 | 70 | 69 | |
| 7 | 518 | 524 | 526 | 529 | 526 | 536 | 530 | 534 | 541 | |
| 8 | 97 | 100 | 101 | 103 | 101 | 101 | 98 | 96 | 95 | |
| 9 | 44 | 45 | 44 | 42 | 41 | 42 | 41 | 40 | 42 | |

|   | Jun-22 | Jul-22 | Aug-22 | Sep-22 | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 701 | 692 | 684 | 688 | 696 | 690 | 691 | 685 | 693 | |
| 1 | 156 | 160 | 161 | 152 | 155 | 153 | 151 | 149 | 151 | |
| 2 | 21 | 21 | 21 | 18 | 18 | 17 | 14 | 13 | 15 | |
| 3 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 8 | 8 | |
| 4 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | |
| 5 | 52 | 56 | 56 | 55 | 56 | 55 | 55 | 53 | 53 | |

|   | 71 | 73 | 73 | 69 | 70 | 70 | 70 | 69 | 69 |
|---|---|---|---|---|---|---|---|---|---|
| 6 | 71 | 73 | 73 | 69 | 70 | 70 | 70 | 69 | 69 |
| 7 | 546 | 532 | 523 | 536 | 540 | 537 | 540 | 537 | 542 |
| 8 | 90 | 91 | 88 | 90 | 92 | 94 | 98 | 97 | 100 |
| 9 | 44 | 42 | 42 | 43 | 40 | 40 | 39 | 38 | 41 |

|   | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 | Oct-23 | Nov-23 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 699 | 695 | 719 | 723 | 708 | 707 | 713 | 715 | 711 | |
| 1 | 151 | 150 | 159 | 158 | 163 | 164 | 160 | 159 | 159 | |
| 2 | 16 | 15 | 17 | 16 | 16 | 15 | 15 | 14 | 13 | |
| 3 | 7 | 6 | 7 | 7 | 7 | 6 | 7 | 6 | 6 | |
| 4 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 6 | 6 | |
| 5 | 54 | 55 | 60 | 60 | 64 | 65 | 60 | 60 | 58 | |
| 6 | 68 | 68 | 69 | 68 | 70 | 71 | 71 | 72 | 76 | |
| 7 | 549 | 545 | 560 | 565 | 544 | 544 | 553 | 556 | 553 | |
| 8 | 98 | 97 | 102 | 104 | 102 | 101 | 100 | 101 | 103 | |
| 9 | 39 | 40 | 43 | 42 | 43 | 43 | 47 | 46 | 47 | |

|   | Dec-23 | Jan-24 | Feb-24 | Mar-24 | Apr-24 | May-24 | Jun-24 | Jul-24 | Aug-24 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 713 | 715 | 711 | 707 | 711 | 736 | 742 | 724 | 728 | |
| 1 | 158 | 161 | 153 | 150 | 152 | 156 | 156 | 158 | 160 | |
| 2 | 12 | 13 | 12 | 12 | 12 | 13 | 16 | 14 | 16 | |
| 3 | 5 | 6 | 5 | 5 | 6 | 6 | 7 | 7 | 8 | |
| 4 | 6 | 6 | 6 | 6 | 7 | 6 | 6 | 6 | 5 | |
| 5 | 59 | 61 | 58 | 55 | 55 | 56 | 56 | 59 | 59 | |
| 6 | 75 | 74 | 71 | 72 | 73 | 74 | 71 | 71 | 72 | |
| 7 | 556 | 555 | 558 | 557 | 558 | 580 | 586 | 566 | 569 | |
| 8 | 103 | 100 | 100 | 100 | 100 | 103 | 106 | 101 | 102 | |
| 9 | 48 | 50 | 51 | 49 | 47 | 51 | 51 | 48 | 49 | |

|   | Sep-24 | Oct-24 | Nov-24 | Dec-24 | Jan-25 | Feb-25 | Mar-25 | Apr-25 | May-25 | \ |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 731 | 732 | 732 | 724 | 722 | 727 | 726 | 731 | 742 | |
| 1 | 153 | 155 | 154 | 151 | 153 | 153 | 153 | 156 | 163 | |
| 2 | 13 | 12 | 13 | 13 | 13 | 14 | 14 | 15 | 16 | |
| 3 | 6 | 6 | 7 | 7 | 6 | 6 | 7 | 6 | 6 | |
| 4 | 5 | 5 | 6 | 7 | 6 | 6 | 6 | 7 | 7 | |
| 5 | 59 | 60 | 56 | 53 | 54 | 55 | 54 | 56 | 62 | |
| 6 | 69 | 72 | 72 | 71 | 73 | 72 | 72 | 72 | 72 | |
| 7 | 578 | 577 | 578 | 573 | 570 | 574 | 573 | 576 | 578 | |
| 8 | 103 | 102 | 102 | 102 | 98 | 98 | 98 | 100 | 100 | |
| 9 | 50 | 48 | 49 | 47 | 48 | 48 | 50 | 49 | 48 | |

|   | Jun-25 | Jul-25 | Aug-25 | Sep-25 | Oct-25 | Nov-25 |
|---|---|---|---|---|---|---|
| 0 | 754 | 742 | 736 | 741 | 737 | 738 |
| 1 | 167 | 166 | 162 | 162 | 158 | 155 |
| 2 | 16 | 14 | 16 | 15 | 14 | 14 |
| 3 | 6 | 7 | 6 | 7 | 6 | 6 |
| 4 | 7 | 7 | 8 | 8 | 7 | 7 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 64 | 63 | 62 | 64 | 63 | 62 |
| 6 | 75 | 74 | 70 | 69 | 68 | 66 |
| 7 | 586 | 577 | 574 | 579 | 579 | 583 |
| 8 | 101 | 103 | 103 | 97 | 100 | 105 |
| 9 | 48 | 46 | 47 | 44 | 46 | 46 |

### 1.3.2  1.2 Clean Numeric Columns

```
[30]: def clean_numeric_column(series):
          """Remove commas, quotes, convert to float, multiply by 1000."""
          return (
              series
              .astype(str)
              .str.replace(',', '', regex=False)
              .str.replace('"', '', regex=False)
              .str.strip()
              .replace('', np.nan)
              .replace('nan', np.nan)
              .astype('float')
              * 1000  # Convert from thousands to actual numbers
          )

      # Clean data
      df_cleaned = df_raw.copy()

      # Identify month columns (assume all except first are months)
      month_cols = df_cleaned.columns[1:].tolist()

      # Clean numeric columns
      for col in month_cols:
          df_cleaned[col] = clean_numeric_column(df_cleaned[col])

      print(' Cleaned numeric columns (multiplied by 1000)')
      print(f'\nData types:')
      print(df_cleaned.dtypes)
```

```
 Cleaned numeric columns (multiplied by 1000)

Data types:
North American Industry Classification System (NAICS) 6      object
Jan-05                                                      float64
Feb-05                                                      float64
Mar-05                                                      float64
Apr-05                                                      float64
                                                              …
Jul-25                                                      float64
Aug-25                                                      float64
Sep-25                                                      float64
```

```
Oct-25                                                        float64
Nov-25                                                        float64
Length: 252, dtype: object
```

1.3.3 1.3 Data Quality Checks

```python
print('DATA QUALITY SUMMARY')
print('='*80)
print(f'Total rows: {len(df_cleaned)}')
print(f'Total columns: {len(df_cleaned.columns)}')
print(f'Date range: {month_cols[0]} to {month_cols[-1]}')

print(f'\nNull values per column:')
null_summary = df_cleaned.isnull().sum()
if null_summary.sum() > 0:
    print(null_summary[null_summary > 0])
else:
    print('None - dataset is complete!')
```

```
DATA QUALITY SUMMARY
================================================================================
Total rows: 19
Total columns: 252
Date range: Jan-05 to Nov-25

Null values per column:
None - dataset is complete!
```

1.3.4 1.4 Validate Against Infographics

```python
print('VALIDATION AGAINST TRAVEL MANITOBA INFOGRAPHICS')
print('='*80)

# Filter for 'Accommodation and food services' row
first_col = df_cleaned.columns[0]
employment_data = df_cleaned[df_cleaned[first_col].str.contains('Accommodation
 ↪and food services', case=False, na=False)]

if employment_data.empty:
    print('ERROR: Accommodation and food services row not found')
    print(f'Available values in {first_col}:')
    print(df_cleaned[first_col].tolist())
else:
    # Q4 2024 YTD: 38,730 jobs
    # Q1 2024 YTD: 32,200 jobs

    print('\nQ4 2024 YTD - MB Food & Accommodation Employment')
    print('-'*60)
```

```python
    # Calculate YTD average for 2024 (columns ending in -24)
    cols_2024 = [col for col in month_cols if col.endswith('-24')]
    print(f'Found {len(cols_2024)} columns for 2024')

    if len(cols_2024) > 0:
        ytd_2024 = employment_data[cols_2024].iloc[0].mean()
        print(f'Calculated YTD average 2024: {ytd_2024:,.0f} jobs')
        print(f'Expected (Q4 infographic): ~38,730 jobs')

    print('\nQ1 2024 YTD - MB Food & Accommodation Employment')
    print('-'*60)
    q1_2024_cols = [col for col in month_cols if col.endswith('-24')][:3]   #
    ↪First 3 months
    if len(q1_2024_cols) > 0:
        q1_avg = employment_data[q1_2024_cols].iloc[0].mean()
        print(f'Calculated Q1 2024 average: {q1_avg:,.0f} jobs')
        print(f'Expected (Q1 infographic): ~32,200 jobs')
```

```
VALIDATION AGAINST TRAVEL MANITOBA INFOGRAPHICS
================================================================================

Q4 2024 YTD - MB Food & Accommodation Employment
------------------------------------------------------------
Found 12 columns for 2024
Calculated YTD average 2024: 35,983 jobs
Expected (Q4 infographic): ~38,730 jobs

Q1 2024 YTD - MB Food & Accommodation Employment
------------------------------------------------------------
Calculated Q1 2024 average: 33,633 jobs
Expected (Q1 infographic): ~32,200 jobs
```

1.4 Part 2: Basic EDA

1.4.1 2.1 Employment Trends Over Time

```python
[33]: # Reshape to long format for plotting
      first_col = df_cleaned.columns[0]
      employment_data = df_cleaned[df_cleaned[first_col].str.contains('Accommodation
       ↪and food services', case=False, na=False)]

      df_long = employment_data.melt(
          id_vars=[first_col],
          value_vars=month_cols,
          var_name='month',
          value_name='jobs'
      )
```

```
print(f'Long format shape: {df_long.shape}')
df_long.head()
```

Long format shape: (251, 3)

[33]:   North American Industry Classification System (NAICS) 6   month   jobs
     0   Accommodation and food services   Jan-05 32,200
     1   Accommodation and food services   Feb-05 32,800
     2   Accommodation and food services   Mar-05 33,800
     3   Accommodation and food services   Apr-05 36,000
     4   Accommodation and food services   May-05 35,700

[34]:
```python
# Simple time series plot
fig, ax = plt.subplots(figsize=(14, 6))

# Get Accommodation and food services row
first_col = df_cleaned.columns[0]
employment_data = df_cleaned[df_cleaned[first_col].str.contains('Accommodation␣
 ↪and food services', case=False, na=False)]

if not employment_data.empty:
    data = employment_data.iloc[0][month_cols]

    ax.plot(range(len(data)), data.values,
            linewidth=2, marker='o', markersize=3, color='steelblue')

    # Set x-axis labels every 12 months
    tick_interval = 12
    tick_positions = range(0, len(data), tick_interval)
    tick_labels = [month_cols[i] for i in tick_positions]

    ax.set_xticks(tick_positions)
    ax.set_xticklabels(tick_labels, rotation=45, ha='right')

    ax.set_xlabel('Year', fontsize=12)
    ax.set_ylabel('Employment (Jobs)', fontsize=12)
    ax.set_title('MB Food & Accommodation Sector Employment',
                 fontsize=14, fontweight='bold')
    ax.grid(True, alpha=0.3)
    ax.yaxis.set_major_formatter(plt.FuncFormatter(
        lambda x, p: f'{x/1e3:.0f}K'
    ))

    plt.tight_layout()
    plt.show()

    print('Key Observations:')
```

```
    print('- Track monthly employment trends')
    print('- Identify seasonal patterns')
    print('- Monitor year-over-year growth')
else:
    print('ERROR: Could not find Accommodation and food services data')
```


MB Food & Accommodation Sector Employment
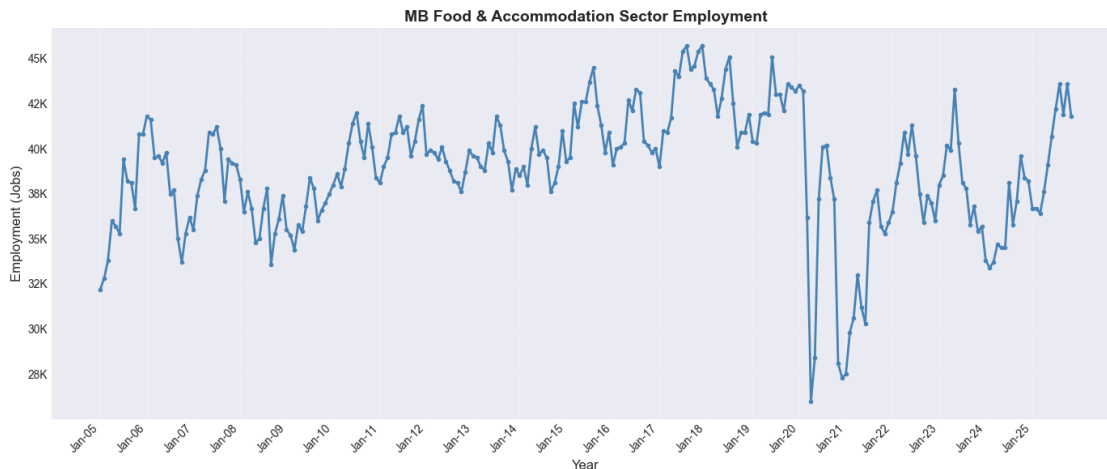
Key Observations:
- Track monthly employment trends
- Identify seasonal patterns
- Monitor year-over-year growth

1.4.2 2.2 Summary Statistics

```
[35]: print('SUMMARY STATISTICS')
      print('='*80)
      print(df_cleaned.describe())
```

```
SUMMARY STATISTICS
================================================================================
         Jan-05   Feb-05   Mar-05   Apr-05   May-05   Jun-05   Jul-05   Aug-05   Sep-05  \
count        19       19       19       19       19       19       19       19       19
mean     89,205   90,021   89,363   89,542   92,053   92,400   92,311   92,079   91,100
std     149,003  150,750  149,660  149,757  153,639  154,164  153,458  152,743  151,084
min       5,200    5,200    5,100    4,600    5,100    5,300    6,000    5,900    6,200
25%      24,950   25,250   24,250   25,050   26,500   26,500   27,900   28,250   25,700
50%      32,200   31,900   33,200   32,500   33,200   33,300   34,900   34,600   34,400
75%      73,600   72,600   71,400   70,150   71,750   70,650   71,500   71,700   71,900
max     565,000  570,100  566,000  567,100  582,900  585,200  584,700  583,200  577,000

         Oct-05   Nov-05   Dec-05   Jan-06   Feb-06   Mar-06   Apr-06   May-06   Jun-06  \
count        19       19       19       19       19       19       19       19       19
mean     91,384   91,489   91,426   90,542   91,158   90,358   91,111   93,242   93,895
```

```
std     151,827 152,599 152,725 151,561 152,709 151,441 152,456 155,502 156,298
min       6,000   6,100   6,000   5,800   5,300   5,300   5,700   6,200   6,500
25%      25,350  25,550  24,100  24,450  25,200  24,700  25,000  25,350  24,650
50%      34,100  34,300  34,900  34,100  33,700  33,800  34,500  34,900  35,200
75%      71,850  71,100  70,300  69,950  69,350  69,200  68,050  69,600  70,100
max     578,700 579,400 579,100 573,400 577,300 572,300 577,100 590,500 594,700

          Jul-06  Aug-06  Sep-06  Oct-06  Nov-06  Dec-06  Jan-07  Feb-07  Mar-07  \
count         19      19      19      19      19      19      19      19      19
mean      92,895  93,232  92,758  92,374  92,037  91,800  91,100  91,374  91,784
std      154,464 154,918 154,695 154,295 153,916 153,681 152,315 153,062 153,707
min        6,200   6,100   6,000   5,800   6,100   6,300   6,000   5,900   6,400
25%       25,100  25,800  24,400  23,100  23,450  23,700  24,250  24,450  23,900
50%       35,100  35,100  35,100  33,900  34,700  34,600  34,800  35,200  35,700
75%       71,550  71,450  70,800  72,150  72,150  71,650  71,650  72,350  72,250
max      588,300 590,500 587,500 585,100 582,900 581,400 576,900 578,700 581,300

          Apr-07  May-07  Jun-07  Jul-07  Aug-07  Sep-07  Oct-07  Nov-07  Dec-07  \
count         19      19      19      19      19      19      19      19      19
mean      91,926  94,374  95,505  94,958  94,826  94,242  94,753  94,884  94,063
std      154,016 157,575 159,268 158,188 157,509 156,766 157,775 157,893 157,070
min        6,000   6,400   6,600   6,800   6,100   6,100   6,400   6,300   6,200
25%       25,450  25,400  25,950  26,200  25,650  25,900  25,900  26,700  26,000
50%       36,000  36,400  37,300  36,900  36,800  36,900  36,600  37,600  35,600
75%       70,500  71,750  72,050  72,000  72,250  72,050  72,400  72,300  72,750
max      582,200 597,700 604,900 601,400 600,600 596,900 600,100 600,900 595,700

          Jan-08  Feb-08  Mar-08  Apr-08  May-08  Jun-08  Jul-08  Aug-08  Sep-08  \
count         19      19      19      19      19      19      19      19      19
mean      93,416  93,489  93,874  95,116  96,016  97,326  96,763  95,911  94,926
std      156,148 156,258 156,707 158,667 159,638 161,841 160,284 158,799 157,135
min        6,000   6,300   6,600   5,800   6,000   6,700   6,700   6,400   6,800
25%       26,450  27,150  26,600  27,600  27,350  27,600  27,750  27,250  26,550
50%       35,600  35,300  35,200  36,300  35,900  36,500  36,700  36,900  34,900
75%       72,200  71,850  72,800  73,400  74,250  76,050  76,950  77,400  75,400
max      591,700 592,100 594,500 602,400 608,100 616,400 612,800 607,400 601,200

          Oct-08  Nov-08  Dec-08  Jan-09  Feb-09  Mar-09  Apr-09  May-09  Jun-09  \
count         19      19      19      19      19      19      19      19      19
mean      95,332  94,647  94,821  93,095  93,526  92,732  93,647  96,000  96,295
std      158,155 157,526 158,065 155,497 156,311 155,281 156,816 160,426 160,614
min        6,100   6,300   6,200   6,000   6,100   6,300   6,300   6,600   6,800
25%       27,350  26,950  26,950  26,300  26,400  25,600  25,950  27,000  26,950
50%       35,700  36,100  36,400  35,500  35,200  34,400  35,800  36,900  36,800
75%       75,150  74,250  75,100  73,600  73,300  73,550  73,000  73,700  73,200
max      603,800 599,400 600,600 589,600 592,300 587,300 593,200 608,000 609,900

          Jul-09  Aug-09  Sep-09  Oct-09  Nov-09  Dec-09  Jan-10  Feb-10  Mar-10  \
```

```
count        19         19         19         19         19         19         19         19         19
mean     96,258     96,237     94,768     94,879     95,374     94,284     93,674     93,958     93,811
std     160,309    160,112    157,924    158,327    159,607    158,479    157,514    157,726    157,205
min       6,900      6,700      6,200      6,000      6,000      5,400      5,800      6,800      7,000
25%      27,200     27,600     25,500     25,500     25,550     25,150     24,900     25,800     25,550
50%      37,700     37,200     36,000     36,600     37,000     36,200     34,900     36,000     36,200
75%      73,700     73,300     71,150     71,250     71,700     71,450     71,750     71,000     71,900
max     609,600    609,500    600,200    600,900    604,000    597,100    593,300    595,100    594,100

         Apr-10    May-10    Jun-10    Jul-10    Aug-10    Sep-10    Oct-10    Nov-10    Dec-10  \
count        19         19         19         19         19         19         19         19         19
mean     95,121     97,142     98,184     97,526     97,779     97,432     98,247     97,274     96,116
std     159,208    162,709    164,125    162,348    162,866    162,598    163,969    162,736    160,901
min       7,300      7,600      8,200      7,800      8,200      7,700      8,000      7,800      7,500
25%      26,000     26,150     26,200     26,250     26,250     26,250     25,050     25,150     24,850
50%      35,700     37,200     36,700     36,700     36,500     35,900     35,400     36,300     36,400
75%      72,850     74,250     74,850     75,600     75,650     75,850     76,900     78,100     77,700
max     602,400    615,200    621,800    617,700    619,200    617,100    622,200    616,000    608,700

         Jan-11    Feb-11    Mar-11    Apr-11    May-11    Jun-11    Jul-11    Aug-11    Sep-11  \
count        19         19         19         19         19         19         19         19         19
mean     95,774     96,200     95,711     96,068     98,068     98,732     97,884     97,768     97,274
std     160,348    161,190    160,277    160,843    164,118    164,756    162,967    162,729    162,171
min       7,400      7,400      7,500      6,500      7,400      7,500      7,500      7,400      7,300
25%      24,950     24,900     24,850     25,150     24,700     24,850     25,700     26,000     26,100
50%      35,400     35,900     35,300     35,500     37,800     37,500     36,500     37,300     37,400
75%      77,750     77,750     75,750     75,750     77,050     76,800     77,550     76,400     75,600
max     606,500    609,300    606,200    608,400    621,200    625,300    619,900    619,200    616,100

         Oct-11    Nov-11    Dec-11    Jan-12    Feb-12    Mar-12    Apr-12    May-12    Jun-12  \
count        19         19         19         19         19         19         19         19         19
mean     98,021     97,416     97,332     95,753     96,089     96,742     97,426     99,105     99,295
std     163,385    162,827    163,133    160,486    161,107    162,191    163,341    165,800    165,686
min       7,200      7,100      6,900      7,100      7,000      7,300      6,600      6,800      7,400
25%      26,000     24,250     24,450     24,200     24,750     24,900     24,900     25,100     25,900
50%      36,500     37,600     37,600     37,300     36,300     36,500     36,600     37,100     37,300
75%      76,450     76,050     76,700     77,100     76,900     77,300     76,400     78,000     78,500
max     620,800    617,000    616,400    606,500    608,500    612,700    617,100    627,700    628,900

         Jul-12    Aug-12    Sep-12    Oct-12    Nov-12    Dec-12    Jan-13    Feb-13    Mar-13  \
count        19         19         19         19         19         19         19         19         19
mean     98,211     98,558     98,895     98,574     98,405     98,968     98,358     98,158     98,289
std     163,500    164,034    164,926    164,487    164,411    165,348    164,703    164,081    164,146
min       7,300      7,000      7,000      7,300      6,900      7,300      7,300      6,800      7,000
25%      25,800     26,700     26,550     25,900     25,250     25,200     25,600     25,000     26,050
50%      36,600     35,800     35,800     35,600     35,400     37,000     35,400     36,200     34,700
75%      78,200     78,550     77,250     77,500     76,950     77,700     76,900     77,250     77,700
max     621,900    624,200    626,300    624,300    623,200    626,800    623,000    621,700    622,500
```

	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13 \
count	19	19	19	19	19	19	19	19	19
mean	97,353	99,426	101,189	99,705	99,379	99,395	99,011	98,100	97,968
std	162,633	165,881	168,431	165,585	164,888	165,385	165,002	163,862	164,263
min	6,700	6,500	7,600	7,700	8,000	7,100	6,900	7,400	7,300
25%	25,450	27,550	28,050	27,700	27,100	26,400	26,100	25,200	25,050
50%	35,500	35,200	36,000	34,200	35,200	38,300	38,600	37,700	37,500
75%	77,200	77,550	79,750	79,450	78,600	77,250	76,850	77,900	79,250
max	616,600	629,700	640,900	631,500	629,400	629,500	627,100	621,300	620,500

	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14 \
count	19	19	19	19	19	19	19	19	19
mean	97,595	97,621	97,689	97,642	99,558	100,726	99,868	99,542	99,468
std	163,651	163,852	163,679	163,532	166,495	168,159	166,148	165,570	165,514
min	6,600	6,700	6,700	6,000	6,100	7,300	7,700	7,400	7,600
25%	25,000	24,700	24,500	24,250	25,050	25,400	25,700	25,800	25,000
50%	37,400	37,900	38,000	38,300	37,500	37,200	36,900	37,800	36,800
75%	78,800	78,100	78,600	76,750	78,350	78,800	80,300	79,200	79,300
max	618,100	618,300	618,700	618,300	630,500	637,900	632,400	630,400	629,900

	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15 \
count	19	19	19	19	19	19	19	19	19
mean	100,705	100,179	99,774	98,942	99,253	100,068	100,189	101,500	102,632
std	168,015	167,571	167,558	166,302	166,948	168,486	168,431	170,237	171,702
min	8,000	7,000	6,400	7,100	7,300	6,200	6,000	4,900	6,100
25%	24,600	24,350	22,800	23,500	23,850	24,400	24,500	24,950	25,750
50%	38,100	38,100	38,700	38,600	37,900	39,600	38,800	40,700	39,600
75%	80,450	79,600	80,650	79,100	79,900	78,500	78,300	78,150	77,950
max	637,800	634,400	631,900	626,600	628,600	633,700	634,600	642,800	650,000

	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16 \
count	19	19	19	19	19	19	19	19	19
mean	100,863	100,968	101,463	101,884	100,789	100,053	98,047	99,168	99,979
std	168,101	168,130	169,455	170,249	168,560	167,258	163,879	166,078	167,187
min	6,000	5,900	6,400	6,200	5,900	6,600	6,300	6,100	6,400
25%	26,650	26,450	25,500	25,800	25,800	26,200	25,650	25,900	26,800
50%	36,800	38,700	38,900	37,500	37,300	36,000	34,900	34,400	34,700
75%	78,500	78,500	78,100	79,750	79,700	78,450	76,300	76,100	76,750
max	638,800	639,400	642,600	645,200	638,300	633,600	620,900	628,100	633,200

	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16 \
count	19	19	19	19	19	19	19	19	19
mean	99,874	101,947	102,342	101,837	101,516	101,137	101,500	100,768	100,726
std	166,806	169,663	170,446	168,924	168,163	167,793	168,484	167,532	168,359
min	6,300	6,900	6,500	6,600	6,400	6,700	6,700	6,600	6,800
25%	27,500	27,800	27,300	28,700	28,300	27,150	27,200	27,050	25,450
50%	34,000	35,500	35,900	36,000	36,300	35,800	36,100	35,800	37,000

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75%      76,500   76,850   76,650   78,350   78,450   77,550   78,150   76,950   77,550
max     632,500  645,700  648,200  645,000  643,000  640,500  642,800  638,200  637,900


         Jan-17   Feb-17   Mar-17   Apr-17   May-17   Jun-17   Jul-17   Aug-17   Sep-17  \
count        19       19       19       19       19       19       19       19       19
mean     99,900  100,300  100,832  101,174  103,384  104,332  104,042  103,879  102,968
std     167,047  167,424  168,338  168,893  172,152  173,617  172,704  172,437  171,328
min       7,600    7,500    7,600    7,500    7,700    6,900    7,100    6,700    6,500
25%      25,950   25,450   25,000   24,850   26,600   27,500   28,300   27,850   26,700
50%      37,200   38,000   37,100   36,800   36,800   37,200   36,800   36,700   36,600
75%      77,000   76,800   77,250   78,150   77,900   78,000   79,200   78,800   77,200
max     632,700  635,300  638,600  640,700  654,800  660,700  658,900  657,900  652,100


         Oct-17   Nov-17   Dec-17   Jan-18   Feb-18   Mar-18   Apr-18   May-18   Jun-18  \
count        19       19       19       19       19       19       19       19       19
mean    103,679  102,584  102,279  101,084  100,805  101,553  101,989  104,000  105,437
std     172,914  171,735  171,497  169,373  169,129  170,521  171,025  173,769  175,929
min       6,500    6,300    6,400    6,600    6,800    6,400    6,500    6,400    6,600
25%      26,750   26,550   26,650   26,250   26,450   27,300   27,100   28,650   28,150
50%      37,100   36,300   35,900   36,200   36,300   36,200   36,800   37,500   38,300
75%      77,450   78,200   79,300   76,550   76,650   76,050   76,350   76,100   76,150
max     656,600  649,700  647,700  640,200  638,400  643,200  645,900  658,700  667,800


         Jul-18   Aug-18   Sep-18   Oct-18   Nov-18   Dec-18   Jan-19   Feb-19   Mar-19  \
count        19       19       19       19       19       19       19       19       19
mean    103,837  104,532  103,811  104,079  103,705  103,553  103,005  102,784  103,489
std     173,208  174,439  173,253  173,762  173,518  173,721  172,837  172,464  173,146
min       6,000    6,400    6,100    7,300    5,900    6,300    6,600    6,300    6,800
25%      28,600   28,900   28,600   28,050   26,600   26,000   25,900   25,700   24,800
50%      38,300   39,300   39,100   40,400   40,900   40,700   40,400   40,300   41,900
75%      77,200   77,050   76,450   75,100   76,250   77,350   77,050   77,450   77,050
max     657,600  662,100  657,500  659,200  656,800  655,800  652,400  651,000  655,400


         Apr-19   May-19   Jun-19   Jul-19   Aug-19   Sep-19   Oct-19   Nov-19   Dec-19  \
count        19       19       19       19       19       19       19       19       19
mean    103,984  105,884  106,732  104,705  105,205  104,779  104,942  103,868  104,168
std     174,113  176,682  178,041  174,404  175,320  174,883  175,329  174,092  174,879
min       5,200    5,700    5,600    6,000    5,900    6,000    6,000    5,400    5,900
25%      26,100   27,150   27,600   27,450   27,900   27,450   27,500   27,500   26,700
50%      42,000   41,900   43,700   39,500   40,800   40,800   39,500   38,300   38,900
75%      77,750   79,550   79,700   78,550   79,150   78,000   78,250   78,550   78,400
max     658,600  670,500  676,000  663,200  666,300  663,600  664,600  657,800  659,800


         Jan-20   Feb-20   Mar-20   Apr-20   May-20   Jun-20   Jul-20   Aug-20   Sep-20  \
count        19       19       19       19       19       19       19       19       19
mean    104,221  104,516   99,963   90,395   94,268   99,774  100,832  102,111  104,489
std     175,110  175,706  167,490  150,800  157,165  166,507  168,194  170,351  174,883
min       5,300    5,300    5,400    4,200    5,200    5,300    5,300    4,700    4,000
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25%	27,200	27,550	26,050	24,900	26,800	27,550	29,300	29,600	28,850
50%	40,100	39,600	36,200	34,400	36,000	37,200	37,200	37,800	38,400
75%	78,650	78,900	74,450	65,800	70,400	72,000	73,300	75,050	76,850
max	660,000	661,900	633,100	572,500	597,000	631,900	638,600	646,700	661,800

	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	\
count	19	19	19	19	19	19	19	19	19	
mean	104,021	100,495	99,247	98,984	101,805	102,579	104,158	105,811	105,484	
std	174,190	168,462	166,300	165,901	171,071	172,440	174,743	177,291	176,604	
min	3,900	3,700	5,500	4,900	5,000	5,000	4,200	3,800	4,200	
25%	28,150	26,950	25,100	25,800	27,000	27,100	27,200	26,450	25,600	
50%	37,200	34,800	34,800	34,900	35,700	35,800	36,100	38,600	38,200	
75%	77,400	79,000	78,150	77,800	80,950	81,000	82,700	82,850	84,450	
max	658,800	636,500	628,600	626,900	644,800	649,700	659,600	670,200	668,100	

	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	\
count	19	19	19	19	19	19	19	19	19	
mean	106,037	105,605	106,895	107,189	106,611	107,000	106,458	108,184	107,100	
std	177,072	176,477	178,801	179,917	179,568	180,377	179,364	182,572	180,516	
min	4,900	5,100	4,500	4,400	4,200	4,500	4,000	4,200	3,800	
25%	26,000	27,100	27,650	25,550	25,600	25,450	25,050	24,500	25,250	
50%	39,700	40,100	39,600	38,700	38,400	39,000	39,000	39,800	39,500	
75%	82,800	81,500	81,500	82,900	83,750	85,150	83,900	85,000	83,150	
max	671,600	668,800	677,000	678,900	675,200	677,700	674,300	685,200	678,300	

	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	\
count	19	19	19	19	19	19	19	19	19	
mean	107,621	109,674	110,700	109,237	107,953	108,689	109,816	108,921	109,111	
std	181,479	184,469	186,068	182,848	180,372	182,734	184,534	183,165	183,860	
min	3,400	4,800	4,700	4,900	5,100	5,000	4,800	5,400	5,300	
25%	25,100	25,500	25,700	27,200	27,350	25,750	25,650	26,100	25,200	
50%	40,300	41,900	43,000	42,500	42,400	42,700	43,500	42,300	43,200	
75%	82,850	82,300	80,850	81,800	80,600	79,600	81,200	81,900	84,100	
max	681,600	694,600	701,100	691,900	683,700	688,300	695,500	689,800	691,000	

	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	\
count	19	19	19	19	19	19	19	19	19	
mean	108,189	109,379	110,405	109,753	113,495	114,100	111,711	111,684	112,589	
std	182,445	184,444	186,219	185,129	190,964	192,166	187,211	187,101	189,257	
min	5,900	5,800	6,000	5,800	6,500	6,500	6,900	5,900	6,800	
25%	25,900	24,850	25,950	25,900	25,950	27,600	26,600	27,250	26,650	
50%	40,900	41,700	41,400	41,600	43,300	41,500	42,800	43,800	46,600	
75%	83,550	84,400	83,950	83,100	85,550	86,850	86,250	85,900	85,650	
max	685,100	692,700	699,200	695,100	718,800	722,600	707,500	707,300	713,000	

	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	\
count	19	19	19	19	19	19	19	19	19	
mean	112,958	112,332	112,589	112,942	112,253	111,700	112,237	116,147	117,242	

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        190,078 189,169 189,702 189,936 189,647 188,920 189,588 196,378 198,345
std
min       6,100   6,100   5,400   5,700   5,300   4,700   5,800   6,300   5,900
25%      24,950  23,950  24,850  25,350  27,050  27,100  28,400  30,050  29,650
50%      43,900  43,400  43,400  44,600  45,300  46,100  47,100  47,600  47,800
75%      86,450  89,350  88,600  87,250  85,400  85,950  86,350  88,400  88,400
max     715,400 711,400 713,100 715,300 711,000 707,400 710,800 735,600 742,500

          Jul-24  Aug-24  Sep-24  Oct-24  Nov-24  Dec-24  Jan-25  Feb-25  Mar-25  \
count        19      19      19      19      19      19      19      19      19
mean    114,237 114,989 115,405 115,563 115,589 114,289 114,005 114,747 114,700
std     192,543 193,765 195,382 195,413 195,602 193,597 192,921 194,156 194,145
min       6,000   5,400   5,200   5,100   5,900   6,900   6,200   6,100   6,400
25%      30,500  30,300  27,150  27,600  26,750  27,900  26,800  27,250  26,350
50%      47,900  48,300  47,800  48,500  47,800  46,500  45,000  44,500  44,300
75%      86,200  86,950  86,150  87,050  86,800  86,100  85,800  84,700  84,750
max     723,500 728,400 730,900 731,900 732,100 723,800 722,100 726,700 726,500

          Apr-25  May-25  Jun-25  Jul-25  Aug-25  Sep-25  Oct-25  Nov-25
count        19      19      19      19      19      19      19      19
mean    115,474 117,126 119,000 117,232 116,179 117,016 116,411 116,537
std     195,193 197,296 200,253 197,301 195,757 197,240 196,739 197,563
min       5,900   6,100   6,200   7,000   6,200   6,600   5,600   5,800
25%      25,800  26,600  26,800  28,100  27,500  27,050  25,300  26,200
50%      43,900  47,800  47,800  46,100  46,700  44,100  45,800  46,200
75%      86,150  86,000  88,000  88,600  86,500  82,800  83,800  85,700
max     731,300 741,800 753,600 742,500 735,800 741,100 737,200 738,100
          Jan-05  Feb-05  Mar-05  Apr-05  May-05  Jun-05  Jul-05  Aug-05  Sep-05  \
count        19      19      19      19      19      19      19      19      19
mean     89,205  90,021  89,363  89,542  92,053  92,400  92,311  92,079  91,100
std     149,003 150,750 149,660 149,757 153,639 154,164 153,458 152,743 151,084
min       5,200   5,200   5,100   4,600   5,100   5,300   6,000   5,900   6,200
25%      24,950  25,250  24,250  25,050  26,500  26,500  27,900  28,250  25,700
50%      32,200  31,900  33,200  32,500  33,200  33,300  34,900  34,600  34,400
75%      73,600  72,600  71,400  70,150  71,750  70,650  71,500  71,700  71,900
max     565,000 570,100 566,000 567,100 582,900 585,200 584,700 583,200 577,000

          Oct-05  Nov-05  Dec-05  Jan-06  Feb-06  Mar-06  Apr-06  May-06  Jun-06  \
count        19      19      19      19      19      19      19      19      19
mean     91,384  91,489  91,426  90,542  91,158  90,358  91,111  93,242  93,895
std     151,827 152,599 152,725 151,561 152,709 151,441 152,456 155,502 156,298
min       6,000   6,100   6,000   5,800   5,300   5,300   5,700   6,200   6,500
25%      25,350  25,550  24,100  24,450  25,200  24,700  25,000  25,350  24,650
50%      34,100  34,300  34,900  34,100  33,700  33,800  34,500  34,900  35,200
75%      71,850  71,100  70,300  69,950  69,350  69,200  68,050  69,600  70,100
max     578,700 579,400 579,100 573,400 577,300 572,300 577,100 590,500 594,700

          Jul-06  Aug-06  Sep-06  Oct-06  Nov-06  Dec-06  Jan-07  Feb-07  Mar-07  \
count        19      19      19      19      19      19      19      19      19
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mean     92,895   93,232   92,758   92,374   92,037   91,800   91,100   91,374   91,784
std     154,464  154,918  154,695  154,295  153,916  153,681  152,315  153,062  153,707
min       6,200    6,100    6,000    5,800    6,100    6,300    6,000    5,900    6,400
25%      25,100   25,800   24,400   23,100   23,450   23,700   24,250   24,450   23,900
50%      35,100   35,100   35,100   33,900   34,700   34,600   34,800   35,200   35,700
75%      71,550   71,450   70,800   72,150   72,150   71,650   71,650   72,350   72,250
max     588,300  590,500  587,500  585,100  582,900  581,400  576,900  578,700  581,300

          Apr-07   May-07   Jun-07   Jul-07   Aug-07   Sep-07   Oct-07   Nov-07   Dec-07  \
count        19       19       19       19       19       19       19       19       19
mean     91,926   94,374   95,505   94,958   94,826   94,242   94,753   94,884   94,063
std     154,016  157,575  159,268  158,188  157,509  156,766  157,775  157,893  157,070
min       6,000    6,400    6,600    6,800    6,100    6,100    6,400    6,300    6,200
25%      25,450   25,400   25,950   26,200   25,650   25,900   25,900   26,700   26,000
50%      36,000   36,400   37,300   36,900   36,800   36,900   36,600   37,600   35,600
75%      70,500   71,750   72,050   72,000   72,250   72,050   72,400   72,300   72,750
max     582,200  597,700  604,900  601,400  600,600  596,900  600,100  600,900  595,700

          Jan-08   Feb-08   Mar-08   Apr-08   May-08   Jun-08   Jul-08   Aug-08   Sep-08  \
count        19       19       19       19       19       19       19       19       19
mean     93,416   93,489   93,874   95,116   96,016   97,326   96,763   95,911   94,926
std     156,148  156,258  156,707  158,667  159,638  161,841  160,284  158,799  157,135
min       6,000    6,300    6,600    5,800    6,000    6,700    6,700    6,400    6,800
25%      26,450   27,150   26,600   27,600   27,350   27,600   27,750   27,250   26,550
50%      35,600   35,300   35,200   36,300   35,900   36,500   36,700   36,900   34,900
75%      72,200   71,850   72,800   73,400   74,250   76,050   76,950   77,400   75,400
max     591,700  592,100  594,500  602,400  608,100  616,400  612,800  607,400  601,200

          Oct-08   Nov-08   Dec-08   Jan-09   Feb-09   Mar-09   Apr-09   May-09   Jun-09  \
count        19       19       19       19       19       19       19       19       19
mean     95,332   94,647   94,821   93,095   93,526   92,732   93,647   96,000   96,295
std     158,155  157,526  158,065  155,497  156,311  155,281  156,816  160,426  160,614
min       6,100    6,300    6,200    6,000    6,100    6,300    6,300    6,600    6,800
25%      27,350   26,950   26,950   26,300   26,400   25,600   25,950   27,000   26,950
50%      35,700   36,100   36,400   35,500   35,200   34,400   35,800   36,900   36,800
75%      75,150   74,250   75,100   73,600   73,300   73,550   73,000   73,700   73,200
max     603,800  599,400  600,600  589,600  592,300  587,300  593,200  608,000  609,900

          Jul-09   Aug-09   Sep-09   Oct-09   Nov-09   Dec-09   Jan-10   Feb-10   Mar-10  \
count        19       19       19       19       19       19       19       19       19
mean     96,258   96,237   94,768   94,879   95,374   94,284   93,674   93,958   93,811
std     160,309  160,112  157,924  158,327  159,607  158,479  157,514  157,726  157,205
min       6,900    6,700    6,200    6,000    6,000    5,400    5,800    6,800    7,000
25%      27,200   27,600   25,500   25,500   25,550   25,150   24,900   25,800   25,550
50%      37,700   37,200   36,000   36,600   37,000   36,200   34,900   36,000   36,200
75%      73,700   73,300   71,150   71,250   71,700   71,450   71,750   71,000   71,900
max     609,600  609,500  600,200  600,900  604,000  597,100  593,300  595,100  594,100
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	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10 \
count	19	19	19	19	19	19	19	19	19
mean	95,121	97,142	98,184	97,526	97,779	97,432	98,247	97,274	96,116
std	159,208	162,709	164,125	162,348	162,866	162,598	163,969	162,736	160,901
min	7,300	7,600	8,200	7,800	8,200	7,700	8,000	7,800	7,500
25%	26,000	26,150	26,200	26,250	26,250	26,250	25,050	25,150	24,850
50%	35,700	37,200	36,700	36,700	36,500	35,900	35,400	36,300	36,400
75%	72,850	74,250	74,850	75,600	75,650	75,850	76,900	78,100	77,700
max	602,400	615,200	621,800	617,700	619,200	617,100	622,200	616,000	608,700

	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11 \
count	19	19	19	19	19	19	19	19	19
mean	95,774	96,200	95,711	96,068	98,068	98,732	97,884	97,768	97,274
std	160,348	161,190	160,277	160,843	164,118	164,756	162,967	162,729	162,171
min	7,400	7,400	7,500	6,500	7,400	7,500	7,500	7,400	7,300
25%	24,950	24,900	24,850	25,150	24,700	24,850	25,700	26,000	26,100
50%	35,400	35,900	35,300	35,500	37,800	37,500	36,500	37,300	37,400
75%	77,750	77,750	75,750	75,750	77,050	76,800	77,550	76,400	75,600
max	606,500	609,300	606,200	608,400	621,200	625,300	619,900	619,200	616,100

	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12 \
count	19	19	19	19	19	19	19	19	19
mean	98,021	97,416	97,332	95,753	96,089	96,742	97,426	99,105	99,295
std	163,385	162,827	163,133	160,486	161,107	162,191	163,341	165,800	165,686
min	7,200	7,100	6,900	7,100	7,000	7,300	6,600	6,800	7,400
25%	26,000	24,250	24,450	24,200	24,750	24,900	24,900	25,100	25,900
50%	36,500	37,600	37,600	37,300	36,300	36,500	36,600	37,100	37,300
75%	76,450	76,050	76,700	77,100	76,900	77,300	76,400	78,000	78,500
max	620,800	617,000	616,400	606,500	608,500	612,700	617,100	627,700	628,900

	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13 \
count	19	19	19	19	19	19	19	19	19
mean	98,211	98,558	98,895	98,574	98,405	98,968	98,358	98,158	98,289
std	163,500	164,034	164,926	164,487	164,411	165,348	164,703	164,081	164,146
min	7,300	7,000	7,000	7,300	6,900	7,300	7,300	6,800	7,000
25%	25,800	26,700	26,550	25,900	25,250	25,200	25,600	25,000	26,050
50%	36,600	35,800	35,800	35,600	35,400	37,000	35,400	36,200	34,700
75%	78,200	78,550	77,250	77,500	76,950	77,700	76,900	77,250	77,700
max	621,900	624,200	626,300	624,300	623,200	626,800	623,000	621,700	622,500

	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13 \
count	19	19	19	19	19	19	19	19	19
mean	97,353	99,426	101,189	99,705	99,379	99,395	99,011	98,100	97,968
std	162,633	165,881	168,431	165,585	164,888	165,385	165,002	163,862	164,263
min	6,700	6,500	7,600	7,700	8,000	7,100	6,900	7,400	7,300
25%	25,450	27,550	28,050	27,700	27,100	26,400	26,100	25,200	25,050
50%	35,500	35,200	36,000	34,200	35,200	38,300	38,600	37,700	37,500
75%	77,200	77,550	79,750	79,450	78,600	77,250	76,850	77,900	79,250

```
max    616,600 629,700 640,900 631,500 629,400 629,500 627,100 621,300 620,500


          Jan-14   Feb-14   Mar-14   Apr-14   May-14   Jun-14   Jul-14   Aug-14   Sep-14  \
count        19       19       19       19       19       19       19       19       19
mean     97,595   97,621   97,689   97,642   99,558  100,726   99,868   99,542   99,468
std     163,651  163,852  163,679  163,532  166,495  168,159  166,148  165,570  165,514
min       6,600    6,700    6,700    6,000    6,100    7,300    7,700    7,400    7,600
25%      25,000   24,700   24,500   24,250   25,050   25,400   25,700   25,800   25,000
50%      37,400   37,900   38,000   38,300   37,500   37,200   36,900   37,800   36,800
75%      78,800   78,100   78,600   76,750   78,350   78,800   80,300   79,200   79,300
max     618,100  618,300  618,700  618,300  630,500  637,900  632,400  630,400  629,900


          Oct-14   Nov-14   Dec-14   Jan-15   Feb-15   Mar-15   Apr-15   May-15   Jun-15  \
count        19       19       19       19       19       19       19       19       19
mean    100,705  100,179   99,774   98,942   99,253  100,068  100,189  101,500  102,632
std     168,015  167,571  167,558  166,302  166,948  168,486  168,431  170,237  171,702
min       8,000    7,000    6,400    7,100    7,300    6,200    6,000    4,900    6,100
25%      24,600   24,350   22,800   23,500   23,850   24,400   24,500   24,950   25,750
50%      38,100   38,100   38,700   38,600   37,900   39,600   38,800   40,700   39,600
75%      80,450   79,600   80,650   79,100   79,900   78,500   78,300   78,150   77,950
max     637,800  634,400  631,900  626,600  628,600  633,700  634,600  642,800  650,000


          Jul-15   Aug-15   Sep-15   Oct-15   Nov-15   Dec-15   Jan-16   Feb-16   Mar-16  \
count        19       19       19       19       19       19       19       19       19
mean    100,863  100,968  101,463  101,884  100,789  100,053   98,047   99,168   99,979
std     168,101  168,130  169,455  170,249  168,560  167,258  163,879  166,078  167,187
min       6,000    5,900    6,400    6,200    5,900    6,600    6,300    6,100    6,400
25%      26,650   26,450   25,500   25,800   25,800   26,200   25,650   25,900   26,800
50%      36,800   38,700   38,900   37,500   37,300   36,000   34,900   34,400   34,700
75%      78,500   78,500   78,100   79,750   79,700   78,450   76,300   76,100   76,750
max     638,800  639,400  642,600  645,200  638,300  633,600  620,900  628,100  633,200


          Apr-16   May-16   Jun-16   Jul-16   Aug-16   Sep-16   Oct-16   Nov-16   Dec-16  \
count        19       19       19       19       19       19       19       19       19
mean     99,874  101,947  102,342  101,837  101,516  101,137  101,500  100,768  100,726
std     166,806  169,663  170,446  168,924  168,163  167,793  168,484  167,532  168,359
min       6,300    6,900    6,500    6,600    6,400    6,700    6,700    6,600    6,800
25%      27,500   27,800   27,300   28,700   28,300   27,150   27,200   27,050   25,450
50%      34,000   35,500   35,900   36,000   36,300   35,800   36,100   35,800   37,000
75%      76,500   76,850   76,650   78,350   78,450   77,550   78,150   76,950   77,550
max     632,500  645,700  648,200  645,000  643,000  640,500  642,800  638,200  637,900


          Jan-17   Feb-17   Mar-17   Apr-17   May-17   Jun-17   Jul-17   Aug-17   Sep-17  \
count        19       19       19       19       19       19       19       19       19
mean     99,900  100,300  100,832  101,174  103,384  104,332  104,042  103,879  102,968
std     167,047  167,424  168,338  168,893  172,152  173,617  172,704  172,437  171,328
min       7,600    7,500    7,600    7,500    7,700    6,900    7,100    6,700    6,500
25%      25,950   25,450   25,000   24,850   26,600   27,500   28,300   27,850   26,700
```

```
50%     37,200  38,000  37,100  36,800  36,800  37,200  36,800  36,700  36,600
75%     77,000  76,800  77,250  78,150  77,900  78,000  79,200  78,800  77,200
max    632,700 635,300 638,600 640,700 654,800 660,700 658,900 657,900 652,100


        Oct-17  Nov-17  Dec-17  Jan-18  Feb-18  Mar-18  Apr-18  May-18  Jun-18  \
count       19      19      19      19      19      19      19      19      19
mean   103,679 102,584 102,279 101,084 100,805 101,553 101,989 104,000 105,437
std    172,914 171,735 171,497 169,373 169,129 170,521 171,025 173,769 175,929
min      6,500   6,300   6,400   6,600   6,800   6,400   6,500   6,400   6,600
25%     26,750  26,550  26,650  26,250  26,450  27,300  27,100  28,650  28,150
50%     37,100  36,300  35,900  36,200  36,300  36,200  36,800  37,500  38,300
75%     77,450  78,200  79,300  76,550  76,650  76,050  76,350  76,100  76,150
max    656,600 649,700 647,700 640,200 638,400 643,200 645,900 658,700 667,800


        Jul-18  Aug-18  Sep-18  Oct-18  Nov-18  Dec-18  Jan-19  Feb-19  Mar-19  \
count       19      19      19      19      19      19      19      19      19
mean   103,837 104,532 103,811 104,079 103,705 103,553 103,005 102,784 103,489
std    173,208 174,439 173,253 173,762 173,518 173,721 172,837 172,464 173,146
min      6,000   6,400   6,100   7,300   5,900   6,300   6,600   6,300   6,800
25%     28,600  28,900  28,600  28,050  26,600  26,000  25,900  25,700  24,800
50%     38,300  39,300  39,100  40,400  40,900  40,700  40,400  40,300  41,900
75%     77,200  77,050  76,450  75,100  76,250  77,350  77,050  77,450  77,050
max    657,600 662,100 657,500 659,200 656,800 655,800 652,400 651,000 655,400


        Apr-19  May-19  Jun-19  Jul-19  Aug-19  Sep-19  Oct-19  Nov-19  Dec-19  \
count       19      19      19      19      19      19      19      19      19
mean   103,984 105,884 106,732 104,705 105,205 104,779 104,942 103,868 104,168
std    174,113 176,682 178,041 174,404 175,320 174,883 175,329 174,092 174,879
min      5,200   5,700   5,600   6,000   5,900   6,000   6,000   5,400   5,900
25%     26,100  27,150  27,600  27,450  27,900  27,450  27,500  27,500  26,700
50%     42,000  41,900  43,700  39,500  40,800  40,800  39,500  38,300  38,900
75%     77,750  79,550  79,700  78,550  79,150  78,000  78,250  78,550  78,400
max    658,600 670,500 676,000 663,200 666,300 663,600 664,600 657,800 659,800


        Jan-20  Feb-20  Mar-20  Apr-20  May-20  Jun-20  Jul-20  Aug-20  Sep-20  \
count       19      19      19      19      19      19      19      19      19
mean   104,221 104,516  99,963  90,395  94,268  99,774 100,832 102,111 104,489
std    175,110 175,706 167,490 150,800 157,165 166,507 168,194 170,351 174,883
min      5,300   5,300   5,400   4,200   5,200   5,300   5,300   4,700   4,000
25%     27,200  27,550  26,050  24,900  26,800  27,550  29,300  29,600  28,850
50%     40,100  39,600  36,200  34,400  36,000  37,200  37,200  37,800  38,400
75%     78,650  78,900  74,450  65,800  70,400  72,000  73,300  75,050  76,850
max    660,000 661,900 633,100 572,500 597,000 631,900 638,600 646,700 661,800


        Oct-20  Nov-20  Dec-20  Jan-21  Feb-21  Mar-21  Apr-21  May-21  Jun-21  \
count       19      19      19      19      19      19      19      19      19
mean   104,021 100,495  99,247  98,984 101,805 102,579 104,158 105,811 105,484
std    174,190 168,462 166,300 165,901 171,071 172,440 174,743 177,291 176,604
```

```
min      3,900    3,700    5,500    4,900    5,000    5,000    4,200    3,800    4,200
25%     28,150   26,950   25,100   25,800   27,000   27,100   27,200   26,450   25,600
50%     37,200   34,800   34,800   34,900   35,700   35,800   36,100   38,600   38,200
75%     77,400   79,000   78,150   77,800   80,950   81,000   82,700   82,850   84,450
max    658,800  636,500  628,600  626,900  644,800  649,700  659,600  670,200  668,100
```

	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22 \
count	19	19	19	19	19	19	19	19	19
mean	106,037	105,605	106,895	107,189	106,611	107,000	106,458	108,184	107,100
std	177,072	176,477	178,801	179,917	179,568	180,377	179,364	182,572	180,516
min	4,900	5,100	4,500	4,400	4,200	4,500	4,000	4,200	3,800
25%	26,000	27,100	27,650	25,550	25,600	25,450	25,050	24,500	25,250
50%	39,700	40,100	39,600	38,700	38,400	39,000	39,000	39,800	39,500
75%	82,800	81,500	81,500	82,900	83,750	85,150	83,900	85,000	83,150
max	671,600	668,800	677,000	678,900	675,200	677,700	674,300	685,200	678,300

	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22 \
count	19	19	19	19	19	19	19	19	19
mean	107,621	109,674	110,700	109,237	107,953	108,689	109,816	108,921	109,111
std	181,479	184,469	186,068	182,848	180,372	182,734	184,534	183,165	183,860
min	3,400	4,800	4,700	4,900	5,100	5,000	4,800	5,400	5,300
25%	25,100	25,500	25,700	27,200	27,350	25,750	25,650	26,100	25,200
50%	40,300	41,900	43,000	42,500	42,400	42,700	43,500	42,300	43,200
75%	82,850	82,300	80,850	81,800	80,600	79,600	81,200	81,900	84,100
max	681,600	694,600	701,100	691,900	683,700	688,300	695,500	689,800	691,000

	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23 \
count	19	19	19	19	19	19	19	19	19
mean	108,189	109,379	110,405	109,753	113,495	114,100	111,711	111,684	112,589
std	182,445	184,444	186,219	185,129	190,964	192,166	187,211	187,101	189,257
min	5,900	5,800	6,000	5,800	6,500	6,500	6,900	5,900	6,800
25%	25,900	24,850	25,950	25,900	25,950	27,600	26,600	27,250	26,650
50%	40,900	41,700	41,400	41,600	43,300	41,500	42,800	43,800	46,600
75%	83,550	84,400	83,950	83,100	85,550	86,850	86,250	85,900	85,650
max	685,100	692,700	699,200	695,100	718,800	722,600	707,500	707,300	713,000

	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24 \
count	19	19	19	19	19	19	19	19	19
mean	112,958	112,332	112,589	112,942	112,253	111,700	112,237	116,147	117,242
std	190,078	189,169	189,702	189,936	189,647	188,920	189,588	196,378	198,345
min	6,100	6,100	5,400	5,700	5,300	4,700	5,800	6,300	5,900
25%	24,950	23,950	24,850	25,350	27,050	27,100	28,400	30,050	29,650
50%	43,900	43,400	43,400	44,600	45,300	46,100	47,100	47,600	47,800
75%	86,450	89,350	88,600	87,250	85,400	85,950	86,350	88,400	88,400
max	715,400	711,400	713,100	715,300	711,000	707,400	710,800	735,600	742,500

	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25 \
count	19	19	19	19	19	19	19	19	19

```
mean   114,237 114,989 115,405 115,563 115,589 114,289 114,005 114,747 114,700
std    192,543 193,765 195,382 195,413 195,602 193,597 192,921 194,156 194,145
min      6,000   5,400   5,200   5,100   5,900   6,900   6,200   6,100   6,400
25%     30,500  30,300  27,150  27,600  26,750  27,900  26,800  27,250  26,350
50%     47,900  48,300  47,800  48,500  47,800  46,500  45,000  44,500  44,300
75%     86,200  86,950  86,150  87,050  86,800  86,100  85,800  84,700  84,750
max    723,500 728,400 730,900 731,900 732,100 723,800 722,100 726,700 726,500


         Apr-25  May-25  Jun-25  Jul-25  Aug-25  Sep-25  Oct-25  Nov-25
count        19      19      19      19      19      19      19      19
mean    115,474 117,126 119,000 117,232 116,179 117,016 116,411 116,537
std     195,193 197,296 200,253 197,301 195,757 197,240 196,739 197,563
min       5,900   6,100   6,200   7,000   6,200   6,600   5,600   5,800
25%      25,800  26,600  26,800  28,100  27,500  27,050  25,300  26,200
50%      43,900  47,800  47,800  46,100  46,700  44,100  45,800  46,200
75%      86,150  86,000  88,000  88,600  86,500  82,800  83,800  85,700
max     731,300 741,800 753,600 742,500 735,800 741,100 737,200 738,100
```

1.5 Part 3: Save Processed Data

```
[36]: # Save cleaned data
      output_path = processed() / 'mb_employment_clean.csv'
      df_cleaned.to_csv(output_path, index=False)

      print(' SAVED PROCESSED DATA')
      print('='*80)
      print(f'Location: {output_path}')
      print(f'Size: {output_path.stat().st_size:,} bytes')
      print(f'Shape: {df_cleaned.shape}')
      print(f'\nReady for Power BI import!')
```

```
 SAVED PROCESSED DATA
================================================================================
Location:
/Users/dpro/projects/travel_manitoba/data/processed/mb_employment_clean.csv
Size: 41,357 bytes
Shape: (19, 252)

Ready for Power BI import!
```

1.6 Summary

1.6.1 Data Cleaning

- Loaded manual CSV from interim directory
- Cleaned numeric formatting (removed commas/quotes)
- Validated against infographic values
- Saved to data/processed/mb_employment_clean.csv

1.6.2 Key Findings

1. Monthly employment data for Food & Accommodation sector
2. Seasonal trends visible in the data

1.6.3 Next Steps

1. Import `mb_employment_clean.csv` into Power BI
2. Create measures for YoY%, YTD calculations
3. Build visualizations matching Travel Manitoba style