

# Forecasting Wingstop

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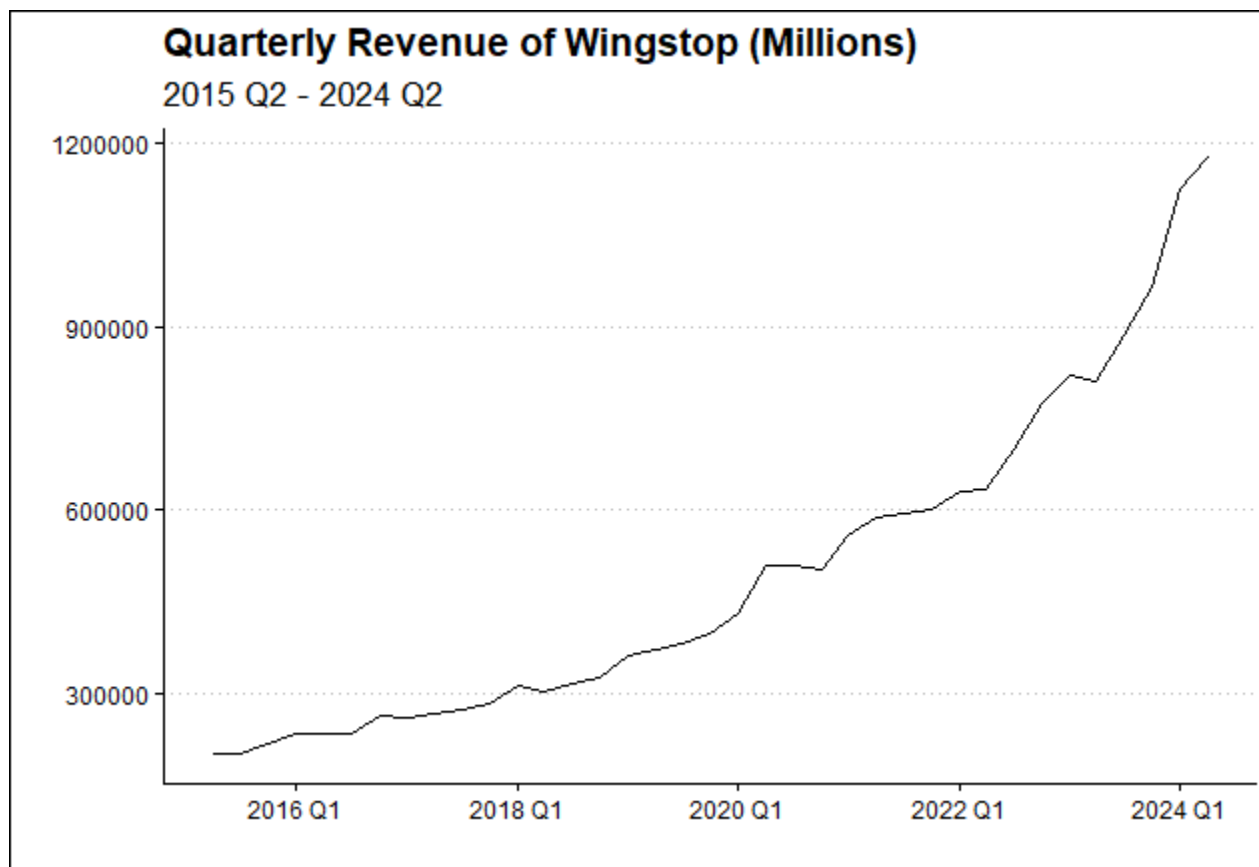


## Company Background and Motivation for Variables

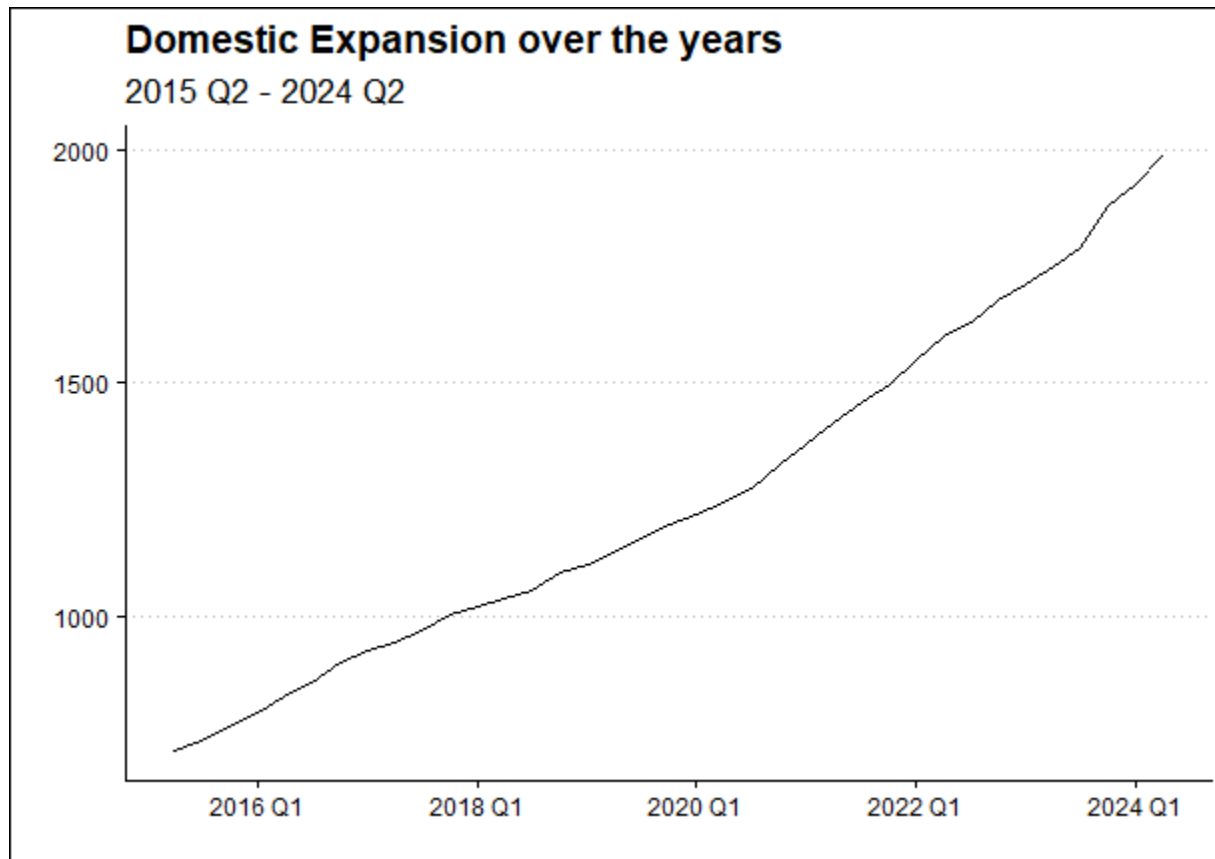
Wingstop was founded in 1994 in Garland, Texas by Antonio Swad and Bernadette Fiaschetti. Since opening one shop in '94 they have grown into a chain with more than 2,000 stores in more than 12 countries. Wingstop specializes in quality chicken wings and unique sauces. The company has become one of the fastest-growing restaurant chains in the industry. Originally a small chicken chain, Wingstop has garnered endorsements and investments from sports and entertainment superstars such as Troy Aikman, Tua Tagovailoa, Angel Reese, Richard Sherman, and Rick Ross, who owns 25 stores. Today, the company is a globally recognized brand and one of the most up-and-coming market disruptors within the food service industry.

## Data and Key Insights

We used data from Wingstop's investor relations portal at Wingstop.com to access their quarterly data from 2015 Q2 to 2024 Q2. First we loaded the necessary packages and read in our data.



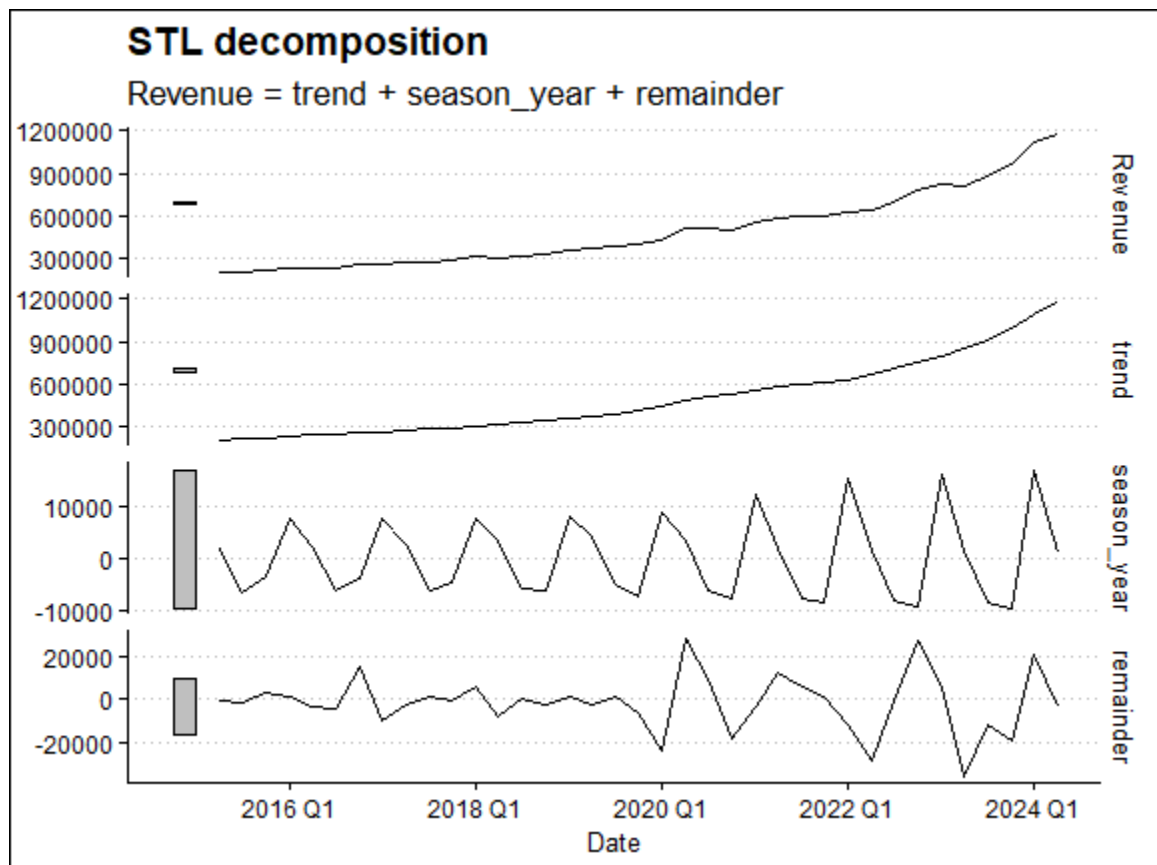
Here you can see the upward trend of revenue by quarter.



Here you can also see the upward trend of our second variable: domestic expansion.

## Descriptive Statistics

Here for our seasonality and trend plot for revenue we can see a seasonal component to our data. Specifically spikes at the beginning of each Q1. One hypothesis as to why this could be is the Super Bowl in February. The NBA season kicks off in the winter as well, and ends in April.



Also for domestic expansion, the seasonality follows a similar suit. Domestic expansion rises in Q4, plateaus in Q1, and steeply declines in Q2 and Q3.

## Forecasting Methodology

Now what we've done is split our dataset into test and training datasets. Our training dataset is from 2015 Q2 to 2024 Q1. And our test data set is 2024 Q2.

### Testing Models and Process Overview

We tested ARIMA, TSLM, TSLM (Quadratic), and ETS on our training dataset for Revenue. We found that ARIMA gave us the least amount of errors, and that is how we justified using ARIMA. We also looked at the Winkler score to justify picking ARIMA.

```

      .model .type      ME      RMSE      MAE      MPE      MAPE      MASE      RMSSE      ACF1
      <chr>  <chr>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>
1 TSLM      Training  4.09e-13  73759.  58998.    0.851  14.9  0.645  0.659  0.705
2 TSLM2     Training    0          30666.  20930.   -0.135  4.52  0.229  0.274  0.380
3 ETS       Training  9.10e+ 3  32916.  21048.    1.11   3.87  0.230  0.294  0.228
4 ARIMA     Training  6.29e+ 3  27752.  18462.    0.914   3.64  0.202  0.248 -0.0167
> |

```

We also checked using our training set, which didn't include 2024 Q2, how close the ARIMA model was to our 2024 Q2 revenue data. And we found that it was very close. For reference, Wingstop's 2024 Q2 revenue was 117600.

```

      <chr>      <qtr>      <dbl>      <hilo>
1 TSLM      2024 Q2  870169. [ 698429.4, 1041908]95
2 TSLM2     2024 Q2 1032526. [ 955235.9, 1109817]95
3 ETS       2024 Q2 1147066. [1020634.4, 1273498]95
4 ARIMA     2024 Q2 1154769. [1097061.9, 1212475]95
> View(test)

```

Now that we know ARIMA is the best model that fits our training set, we used cross validation to check which models are best to forecast. We used our actual dataset. (Spoiler Alert) ARIMA is the best model to fit our data.

```

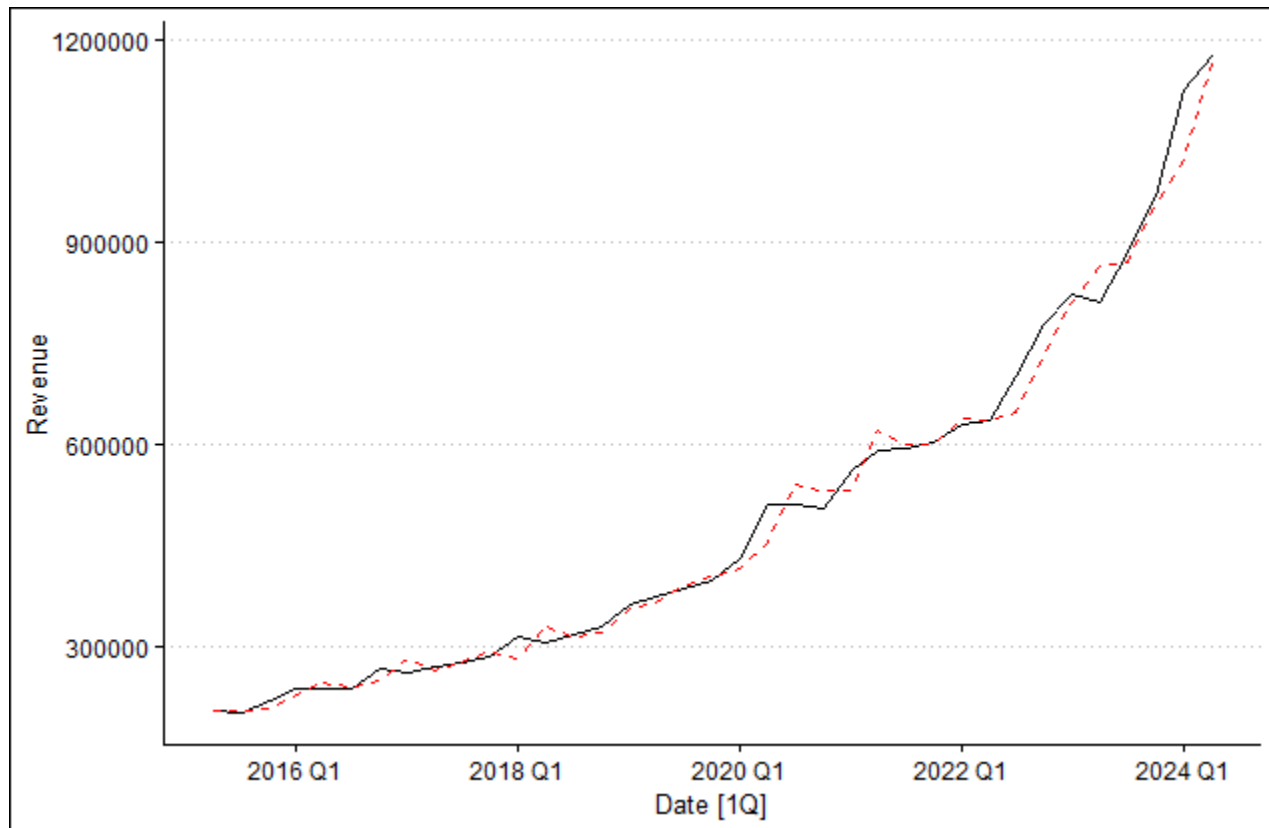
# A tibble: 5 × 10
      .model .type      ME      RMSE      MAE      MPE      MAPE      MASE      RMSSE      ACF1
      <chr>  <chr>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>
1 ARIMA    Test    13289.  44573.  36923.    1.34   5.23  0.370  0.350  0.0433
2 Combo    Test    16379.  46654.  37801.    1.67   5.16  0.379  0.367  0.242
3 ETS      Test    19468.  51683.  40583.    2.01   5.45  0.407  0.406  0.378
4 TSLM     Test   114381. 140362. 114381.   14.5  14.5  1.15  1.10  0.699
5 TSLM2    Test    29120.  64003.  46748.    3.07   5.92  0.468  0.503  0.618

```

After this, we created a new variable called "fit2" that contained the best models which were, ARIMA, COMBO(the combination of ETS and ARIMA), and TSLM2.

## Data Visualization

Here we can see our ARIMA trend line layered in over our Wingstop revenue data:



Our trend line for domestic expansion follows a very similar trend. (Don't want to overdo it with the graphs).

## Forecasts

Using our fit2 variable we were able to forecast one quarter into the future for revenue:

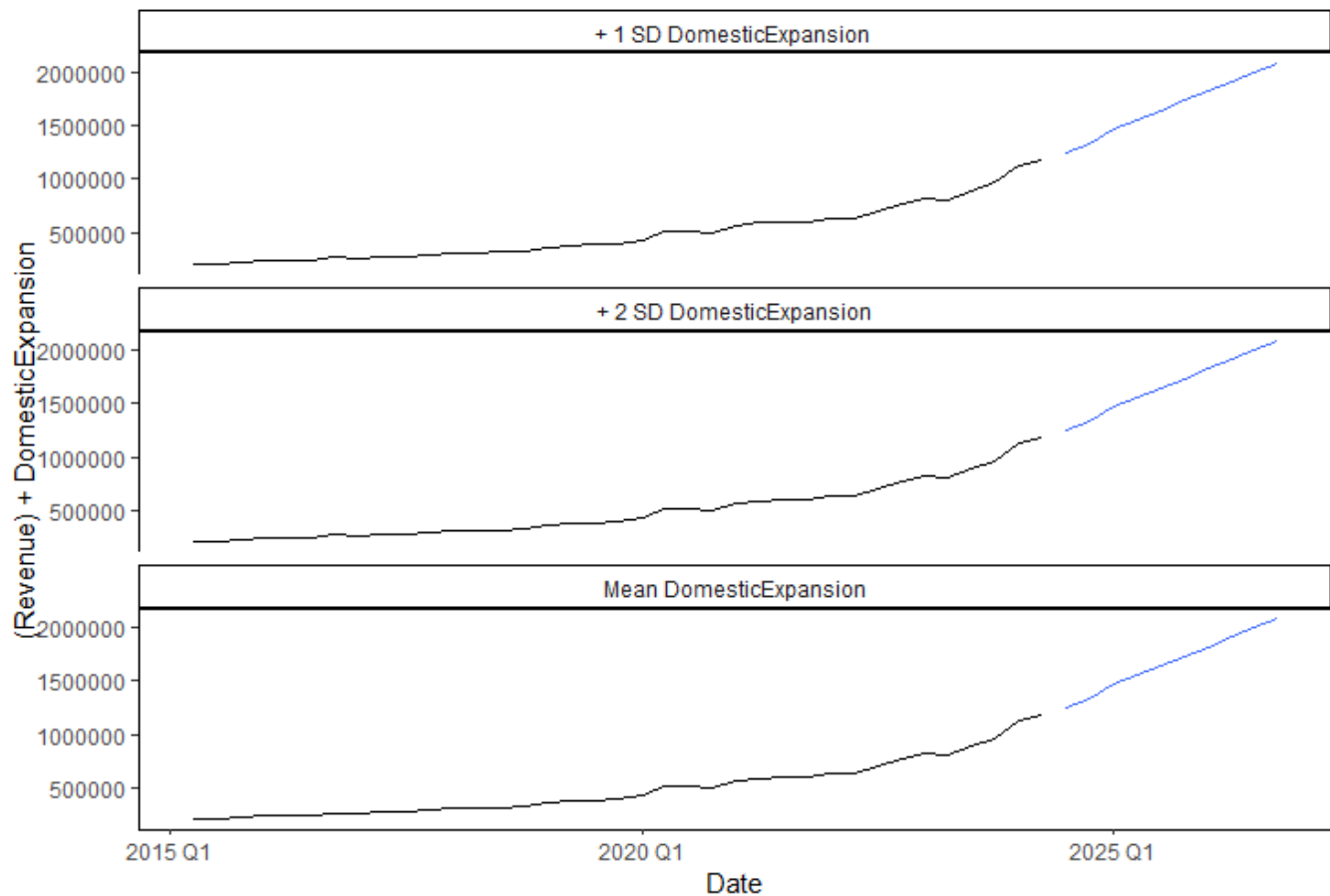
.model	Date	.mean	`95%`
<chr>	<qtr>	<dbl>	<hilo>
TSLM2	2024 Q3	1110294.	[1019097, 1201491]95
ARIMA	2024 Q3	1253317.	[1195718, 1310915]95
ETS	2024 Q3	1247609.	[1111980, 1383238]95
Combo	2024 Q3	1250463.	[1155981, 1344945]95

And domestic expansion:

.model	Date	.mean	`95%`
<chr>	<qtr>	<dbl>	<hilo>
1 TSLM2	2024 Q3	2001.	[1950.531, 2051.013]95
2 ARIMA	2024 Q3	2045.	[2021.860, 2067.622]95
3 ETS	2024 Q3	2040.	[2009.899, 2069.773]95
4 Combo	2024 Q3	2042.	[2016.896, 2067.681]95

## Forecasting Revenue with Domestic Expansion

Using ARIMA, we forecasted 10 quarters in the future for revenue with domestic expansion.



And received an ACF1 score of -0.00459.

## Implications for the Company

After looking at the forecasts, Wingstop has met expectations for revenue growth and follows the projected revenue model almost perfectly every quarter. Every Q1 since 2016 revenue has grown, this corresponds to the trend that revenue has continued to grow quite significantly, especially over the last 5 years, including generating over \$460.06 million in 2023. Proving that Wingstop's franchising business model continues to excel, which is a significant reason why the company is shaking up the food service industry. On the other hand, based on our predictions we can say that Wingstop is growing domestically and globally at a very similar slow rate, however, these store increases aren't necessarily linked to greater revenue or profit. This is likely due to the selective franchise business model that Wingstop uses that emphasizes efficiency and fit rather than rapid expansion. Despite the challenges of expanding internationally, such as translating core ideas and products, Wingstop is steadily making headway into more diverse spaces while maintaining its key differentiators.

Based on our predictions, the outlook for Wingstop is very positive. The trends in the graphs show that the company is in a strong position to continue growing within the food service industry. Wingstop's greatest strengths include its business model, efficiency, quality, and flavors. These things should not change and will continue to help the business grow especially domestically. Yet, despite the overly positive outlook, there are still some significant factors that can derail Wingstop's upward trajectory. Rapidly shifting consumer value expectations and over-eagerness to expand or change of the company's business plan/model can severely impact how the company performs, as these metrics are the biggest underlying reasons Wingstop has had such a meteoric rise. If the company maintains its strong growth pace and continues to rise to the challenge of meeting customer expectations both domestically and internationally, then it will continue to challenge the market leaders and gain market share in an extremely competitive industry.