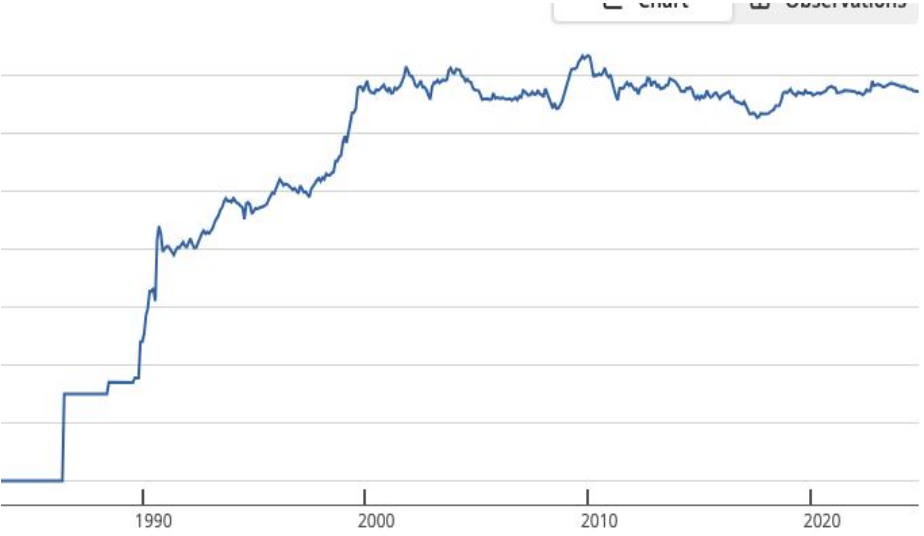
Forecast of Guatemalan Exchange Rate(2000-2024)

Using ARIMA for Annual and Quarterly Projections

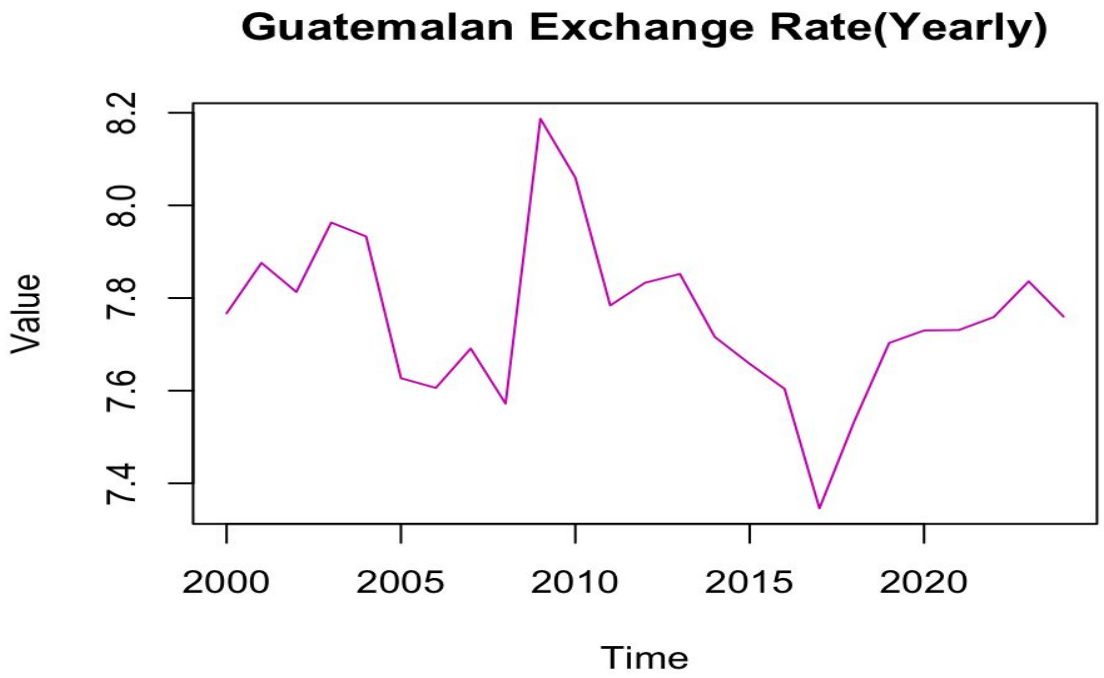
CONTEXT



https://data.bis.org/topics/XRU/BIS%2CWS_XRU%2C1.0/M.GT.GTQ.E?view=chart

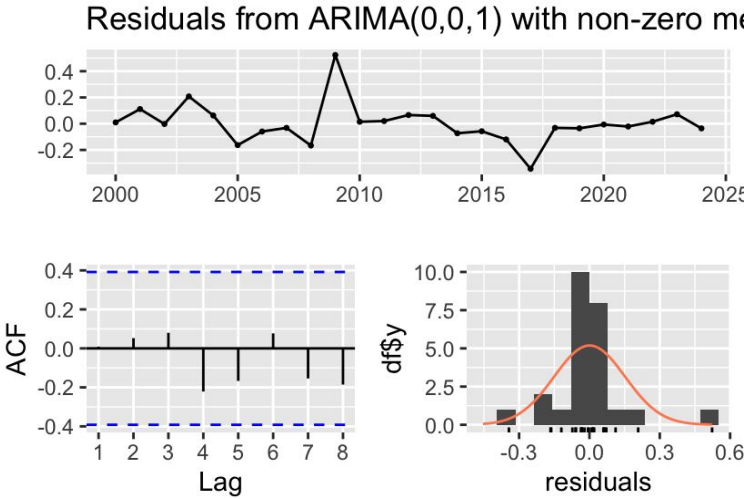
- Personal significance as a Guatemalan whose family sends remittances back home frequently.
- Always been curious about the historical trends of the exchange rate.
- Data was initially in monthly format, I converted it into quarterly averages, then annual averages for a more coherent analysis.

Annual Plot


Guatemalan Exchange Rate(Yearly)
Value
8.2
8.0
7.8
7.6
7.4
2000
2005
2010
2015
2020
Time

Yearly Dataset Analysis

ARIMA Model



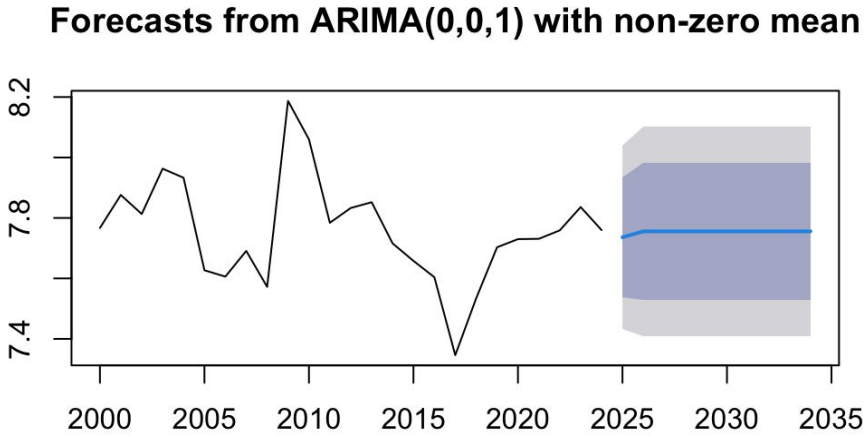
Ljung-Box test

data: Residuals from ARIMA(0,0,1) with non-zero mean

Q* = 2.7972, df = 4, p-value = 0.5923

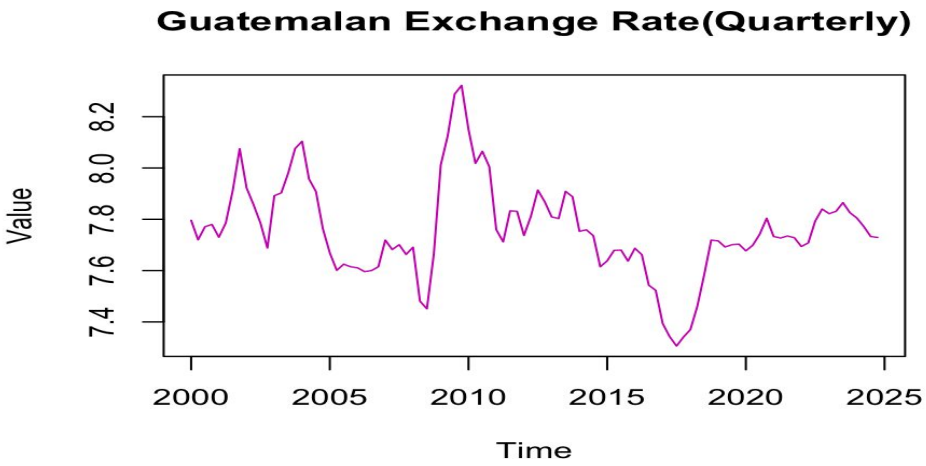
Model df: 1. Total lags used: 5

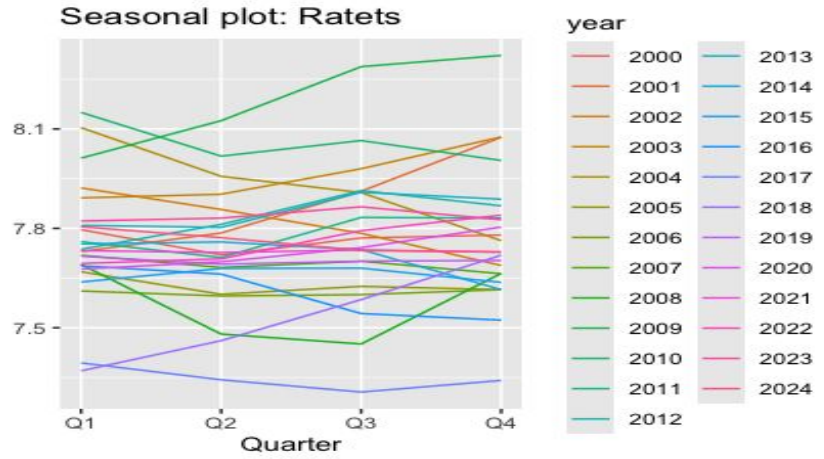
FORMULA: yt=0.5532e(t-1) + 7.7556



	Point Forecast	Lo 80	Hi 80	Lo 95	Hi 95
2025	7.736002	7.537639	7.934365	7.432632	8.039371
2026	7.755622	7.528930	7.982314	7.408926	8.102318
2027	7.755622	7.528930	7.982314	7.408926	8.102318
2028	7.755622	7.528930	7.982314	7.408926	8.102318
2029	7.755622	7.528930	7.982314	7.408926	8.102318

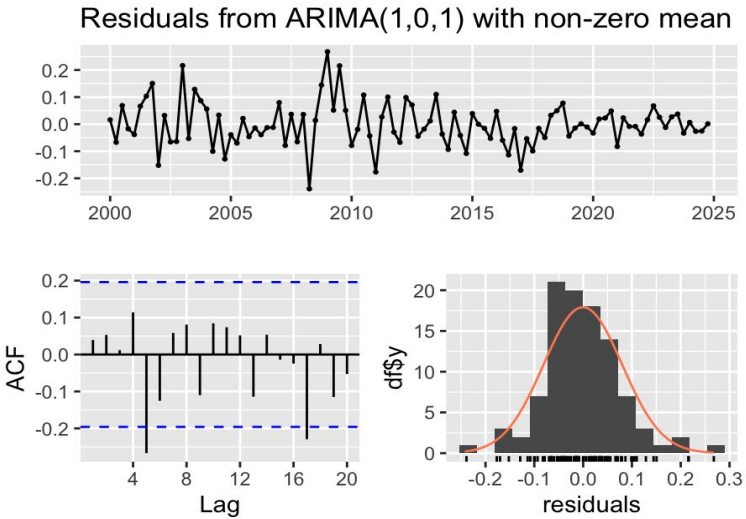
Quarterly Plot





Quarterly Dataset Analysis

ARIMA Model



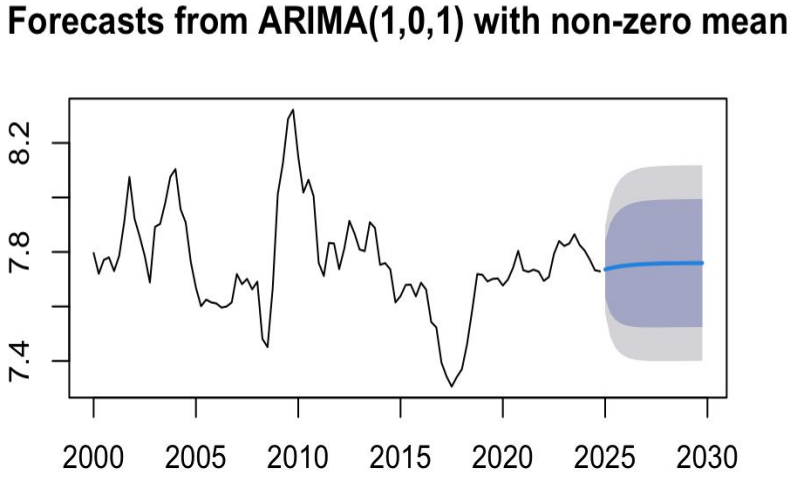
Ljung-Box test

data: Residuals from ARIMA(1,0,1) with non-zero mean

Q* = 12.306, df = 6, p-value = 0.05547

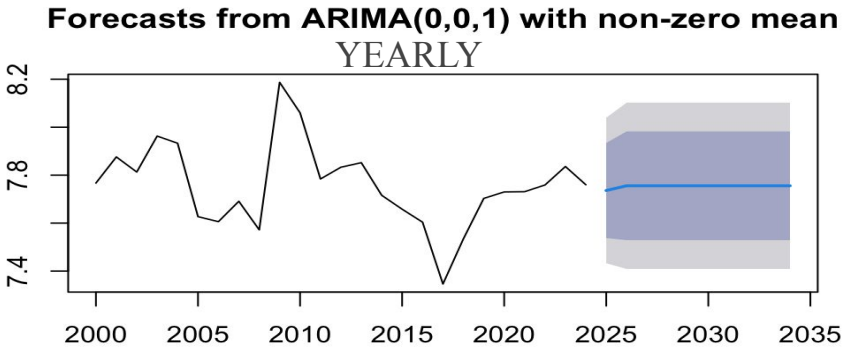
Model df: 2. Total lags used: 8

FORMULA: yt=0.7966y(t-1) +0.4211e(t-1)+ 7.7556

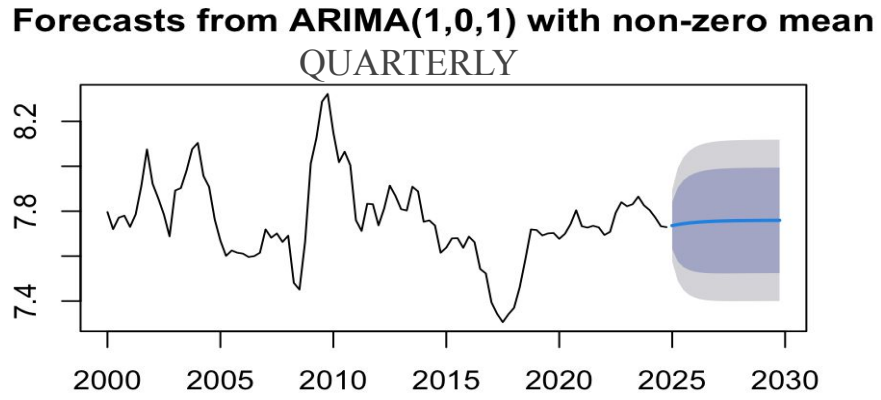


Forecasts for the next 5 years are:

	Point Forecast	Lo 80	Hi 80	Lo 95	Hi 95
2025 Q1	7.735743	7.631335	7.840151	7.576065	7.895421
2025 Q2	7.740584	7.576071	7.905097	7.488983	7.992185
2025 Q3	7.744440	7.551255	7.937625	7.448990	8.039891
2025 Q4	7.747512	7.538161	7.956863	7.427337	8.067687
2026 Q1	7.749959	7.530968	7.968949	7.415041	8.084876
2026 Q2	7.751908	7.527015	7.976801	7.407963	8.095852
2026 Q3	7.753460	7.524901	7.982020	7.403909	8.103011
2026 Q4	7.754697	7.523842	7.985552	7.401634	8.107760
2027 Q1	7.755682	7.523382	7.987982	7.400410	8.110955
2027 Q2	7.756467	7.523254	7.989679	7.399799	8.113135
2027 Q3	7.757092	7.523302	7.990881	7.399542	8.114642
2027 Q4	7.757590	7.523435	7.991745	7.399481	8.115699
2028 Q1	7.757986	7.523600	7.992373	7.399523	8.116450
2028 Q2	7.758302	7.523769	7.992836	7.399615	8.116990
2028 Q3	7.758554	7.523928	7.993180	7.399724	8.117384
2028 Q4	7.758754	7.524069	7.993440	7.399834	8.117675
2029 Q1	7.758914	7.524191	7.993637	7.399936	8.117892
2029 Q2	7.759041	7.524295	7.993788	7.400027	8.118055
2029 Q3	7.759143	7.524381	7.993904	7.400106	8.118180
2029 Q4	7.759223	7.524452	7.993995	7.400172	8.118275



Summary



It is important to note the quarterly model could use a re-evaluation in the future following more data since the model falls in a gray area. In all to conclude, following the forecasts for both datasets, the Guatemalan Quetzal will most likely continue to be stable within the 7.4 to 8.2 range amid the fluctuations that could occur. This is important because stability simplifies financial planning for businesses and families by reducing the risk of sudden value changes, enabling confident investments and remittances.