Stochastic Financial Mathematics

Exchange Rates and Volatility

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Objective

- Use Sage to manipulate currency data
- Analyze results

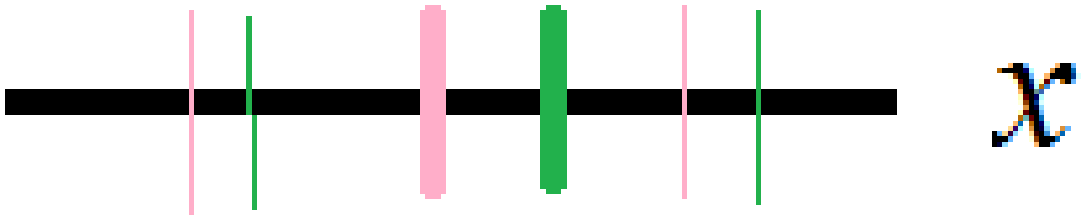
- Five currencies used: Euro, UK Pound, Chinese Yuan, Japanese Yen, Russian Ruble

Method

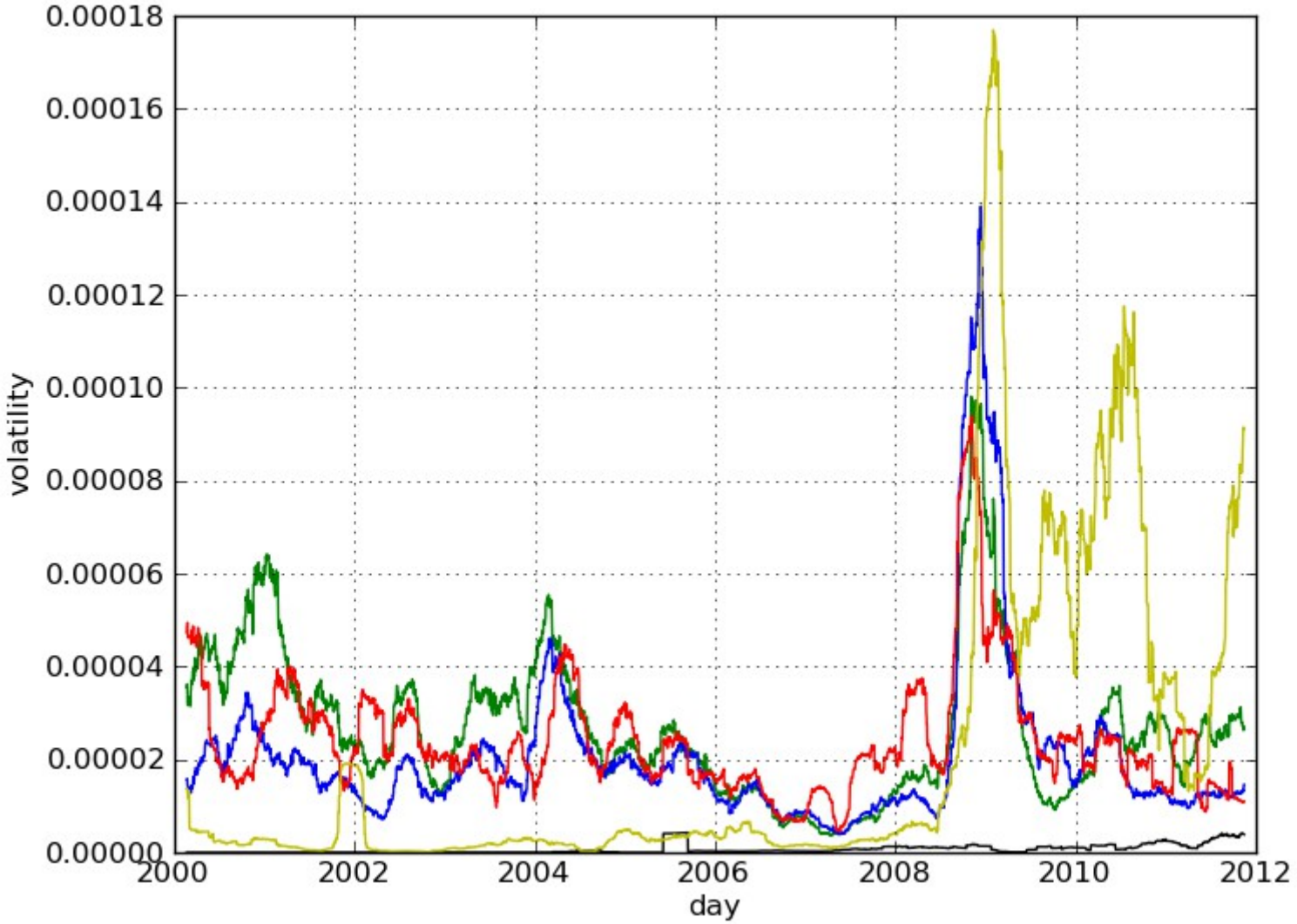
- Define n-long set S of exchange rates
- State that $S_{(k+1)} = S_{(k)} e^{(x_{(k+1)})}$ for some x_{k+1}
- Equivalently, $x_{(k+1)} = \ln\left(\frac{S_{(k+1)}}{S_{(k)}}\right)$

- Assume set of x are independent, identically distributed RVs (Normal)
- Able to calculate variance of subset of x
- What does this variance mean?

Moving Variance

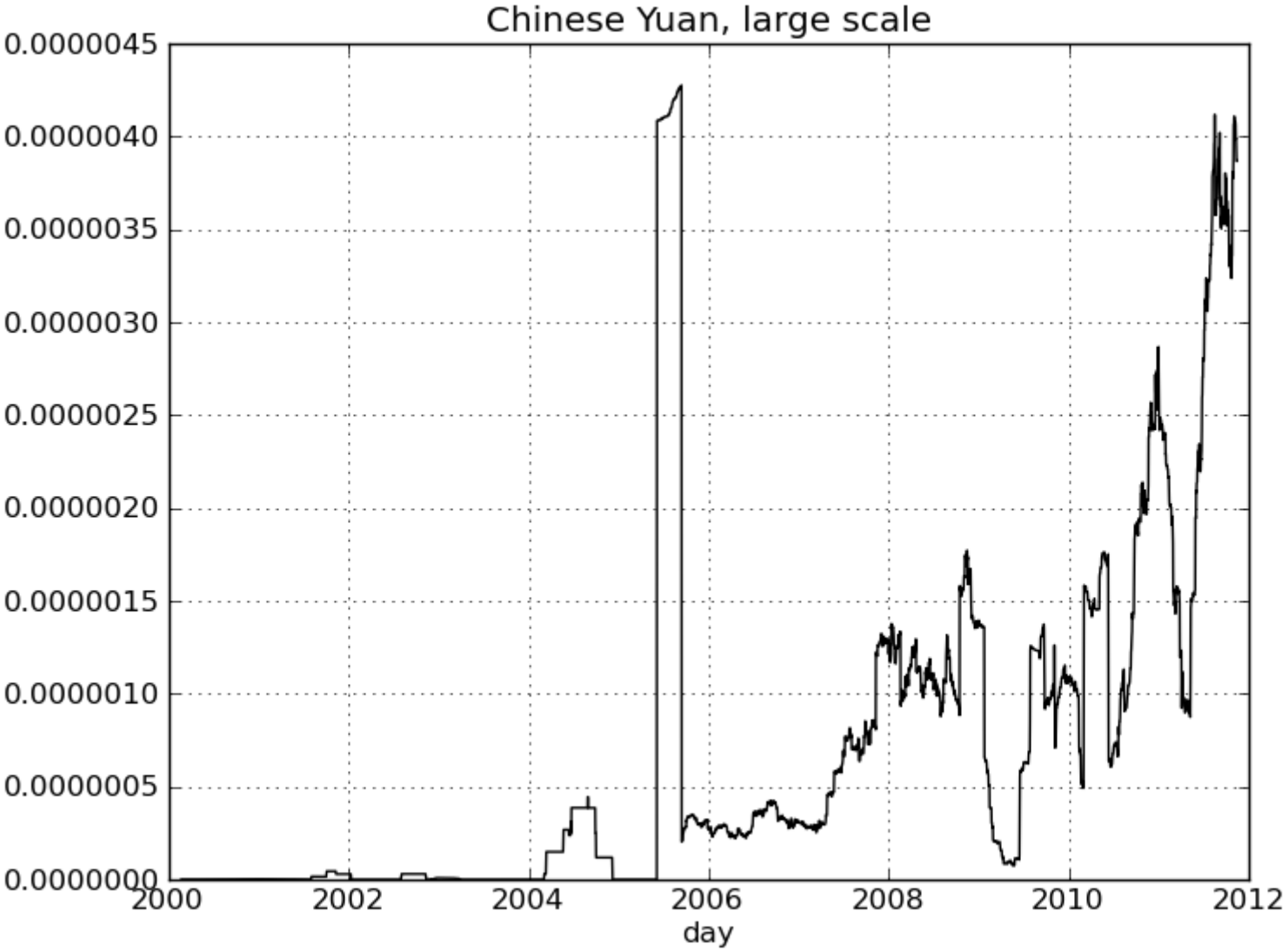


- Note this is Empirical Variance
- Subset of x-set length m
- Data limitations (days)
- Meaningful results
- Why moving variance?



EUR – green, GBP – blue, Yuan – black, JPY - red, RUB - yellow

Chinese Yuan



Varying Window Sizes