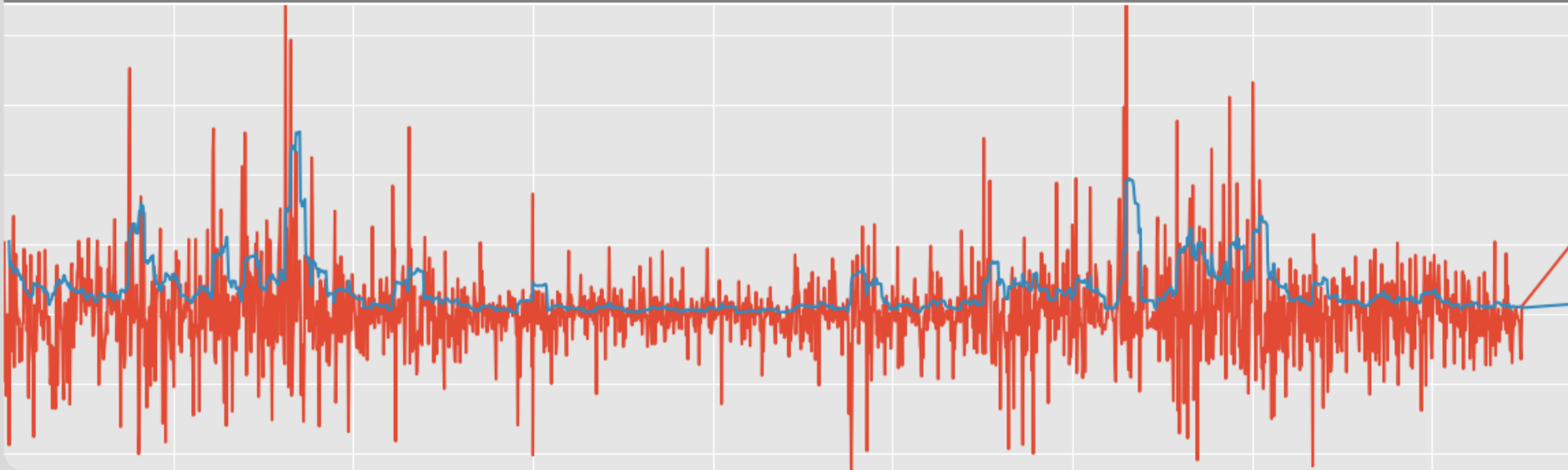


Problem Set 6

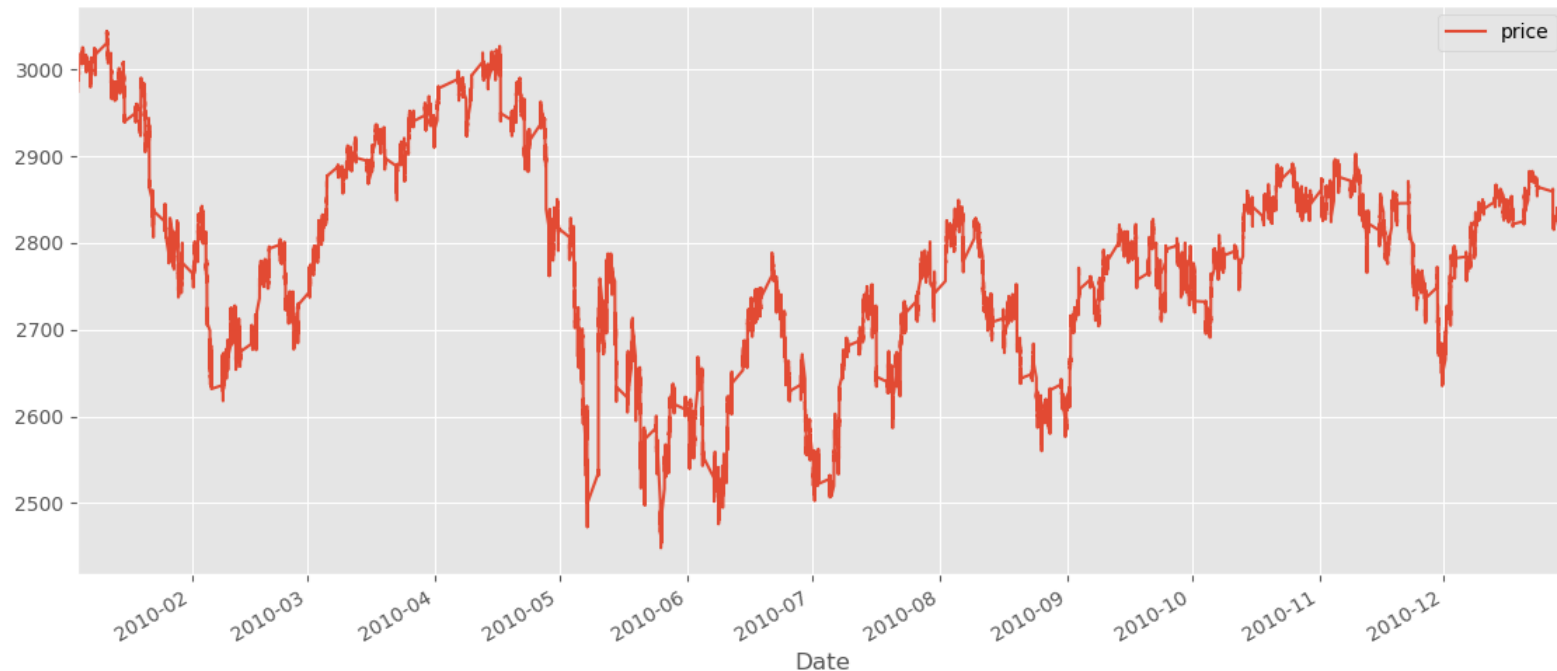
The Volatility of Stock Returns and ARCH Modeling

Solution submitted by Thi Ha Giang Vo and Lotta Rüter
CRAM-Programming Lab WS 2017/18

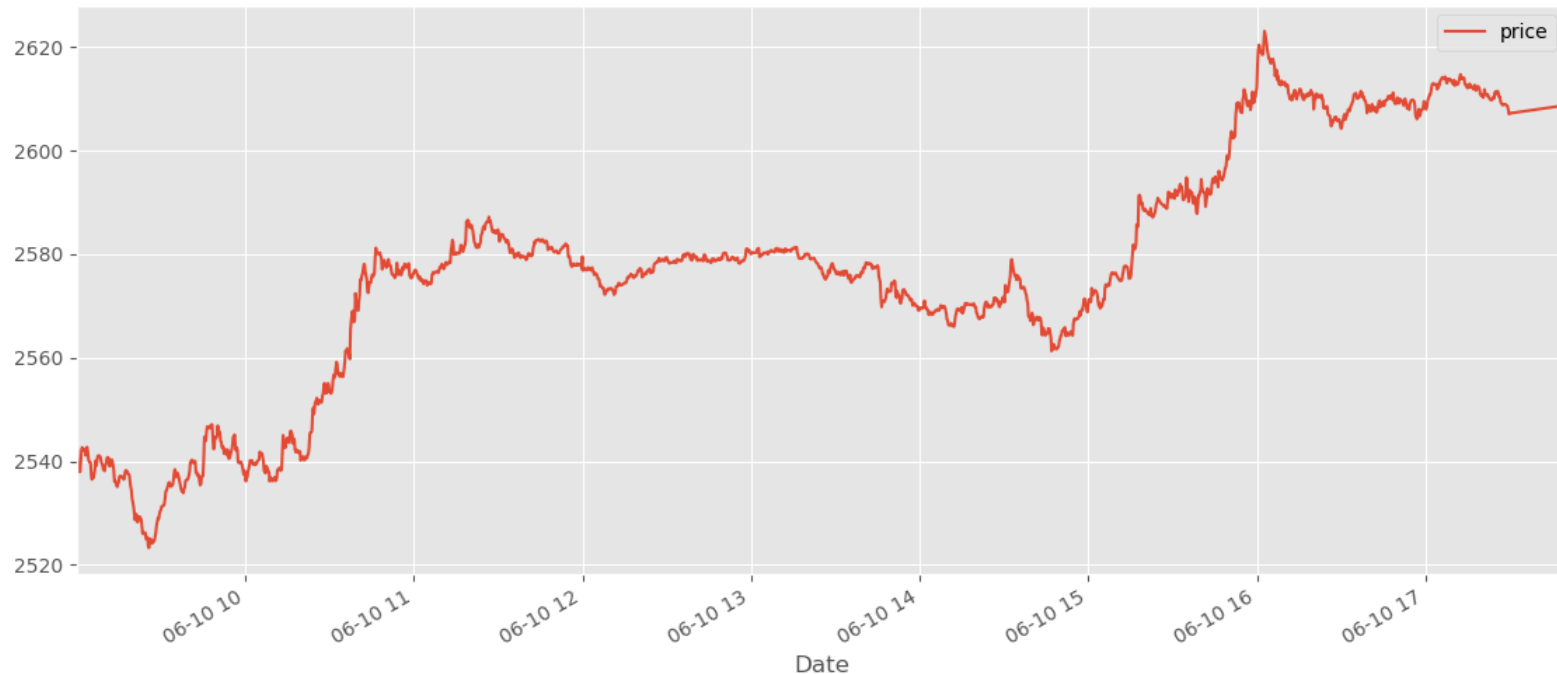
FBV, Chair of Financial Economics and Risk Management



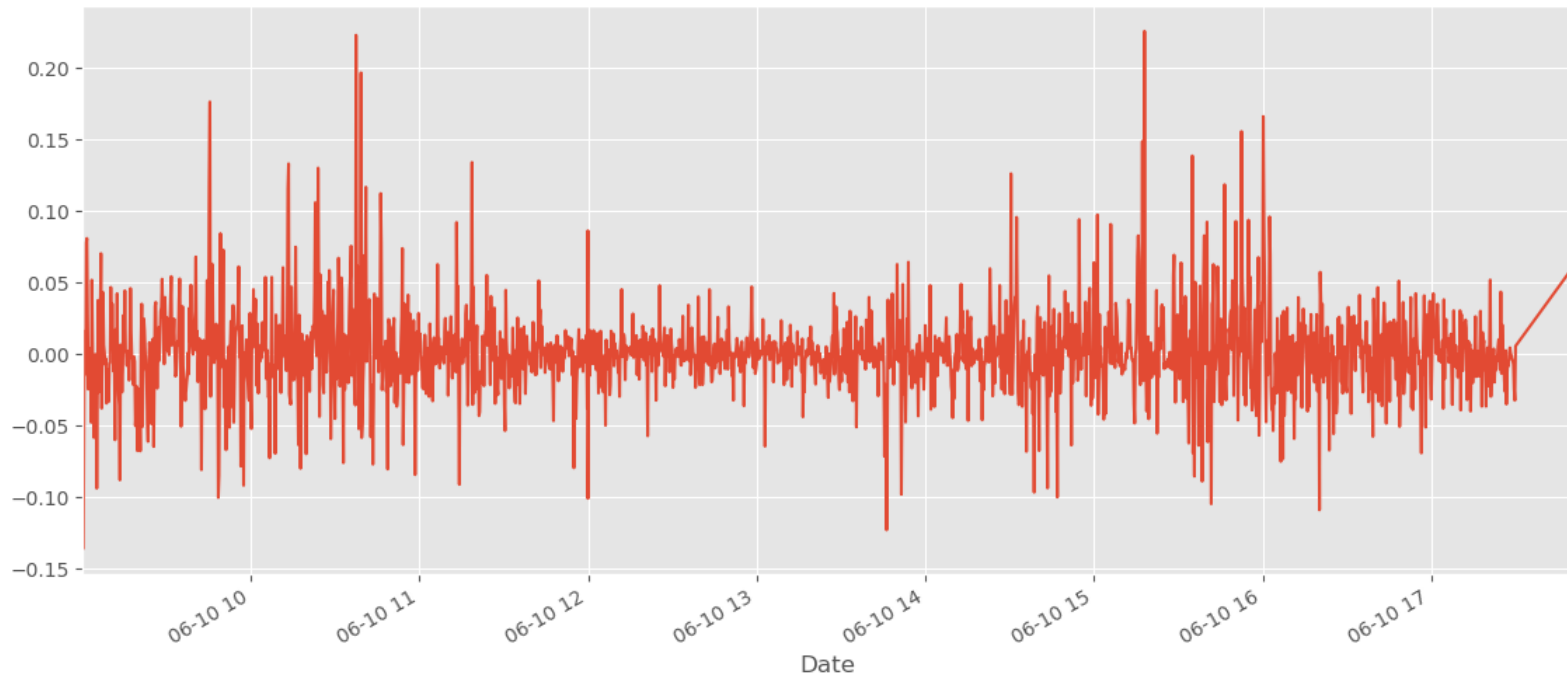
Question 1a: Euro Stoxx 50 - Intra-Day Index Values



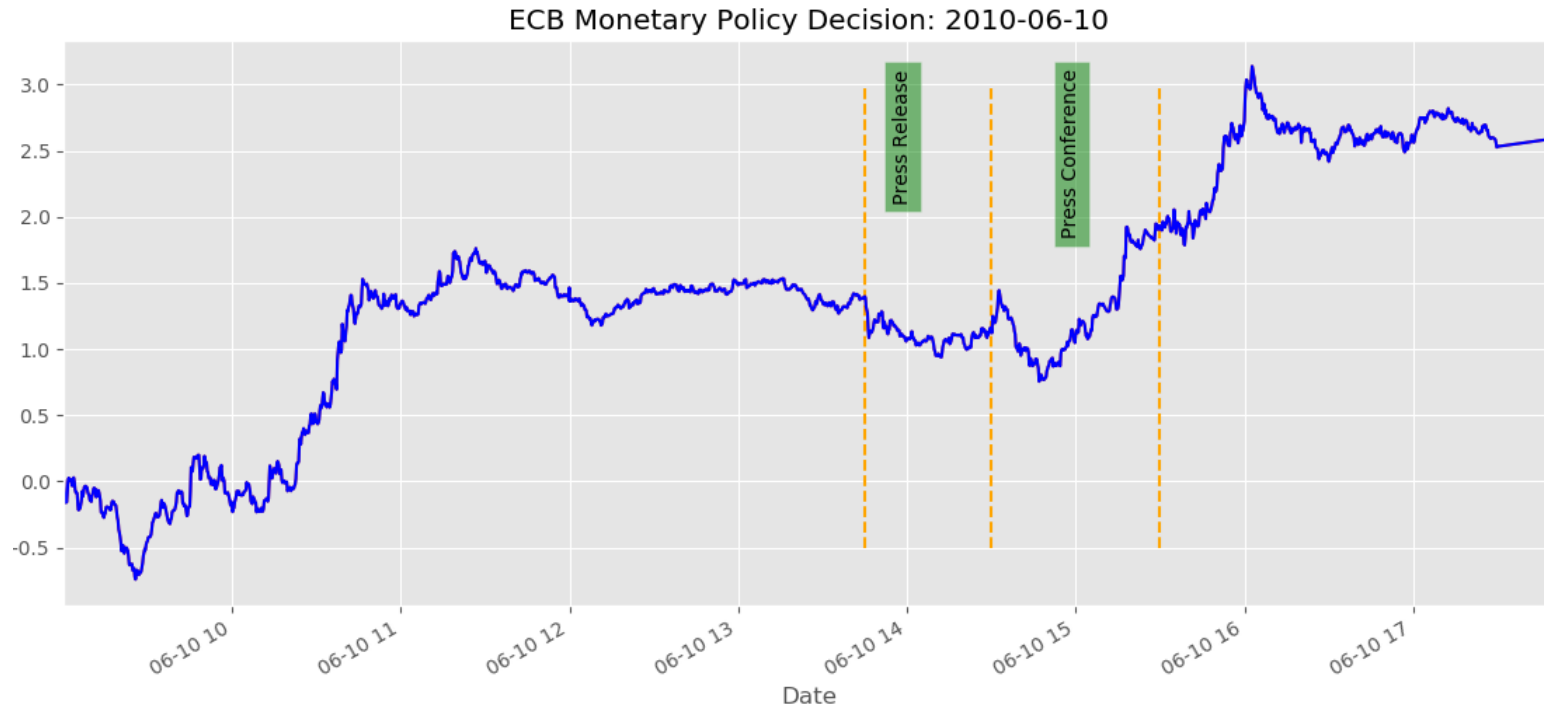
Question 1a: Euro Stoxx 50 - Intra-Day Index Values



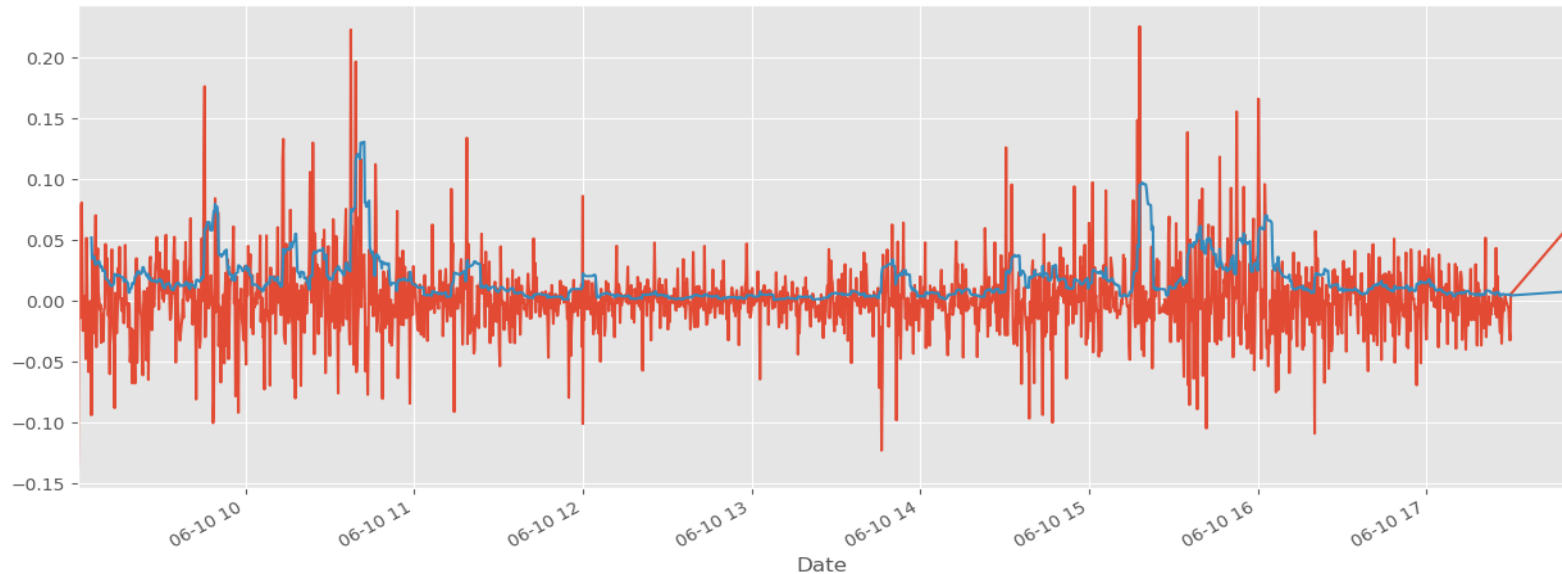
Question 1a: Euro Stoxx 50 - Intra-Day Index Values



Question 1a: Euro Stoxx 50 - Intra-Day Index Values

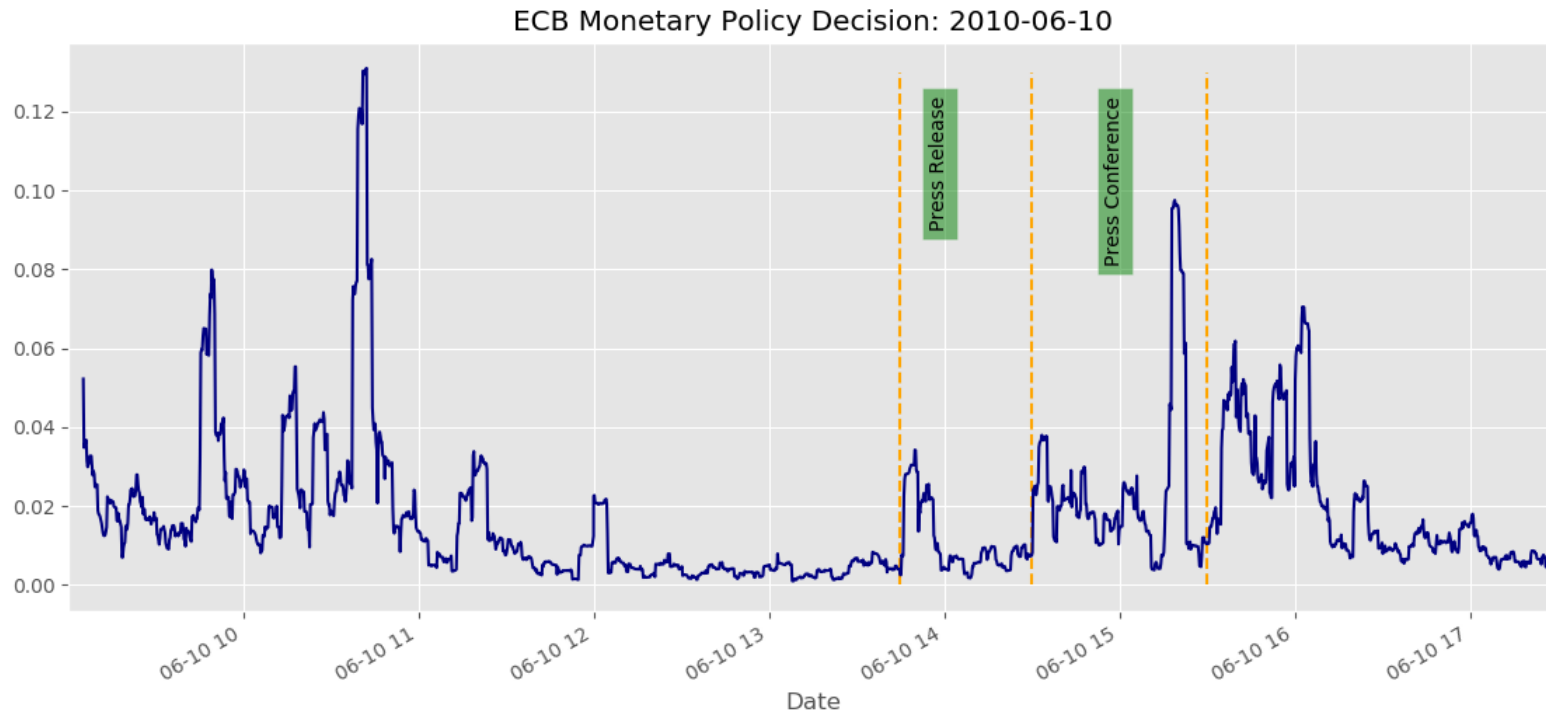


Question 1b: Stock Return Volatility



- The resulting intra-day volatility time series' pattern follows the stock returns' pattern: high in the middle of 2011 and the beginning of 2016

Question 1b: Stock Return Volatility



Question 1c: ECB Monetary Policy Decisions

- The Governing Council, the main decision-making body of the ECB, usually meets every two weeks.
- Every six weeks, it takes its monetary policy decision, i.e. setting the key interest rates for the euro area.
- 10 June 2010, the Governing Council of the ECB decided to adopt a fixed rate tender procedure with full allotment in the regular three-month longer-term refinancing operations to be allotted on 28 July, 25 August and 29 September 2010

Question 1c: ECB Monetary Policy Decisions

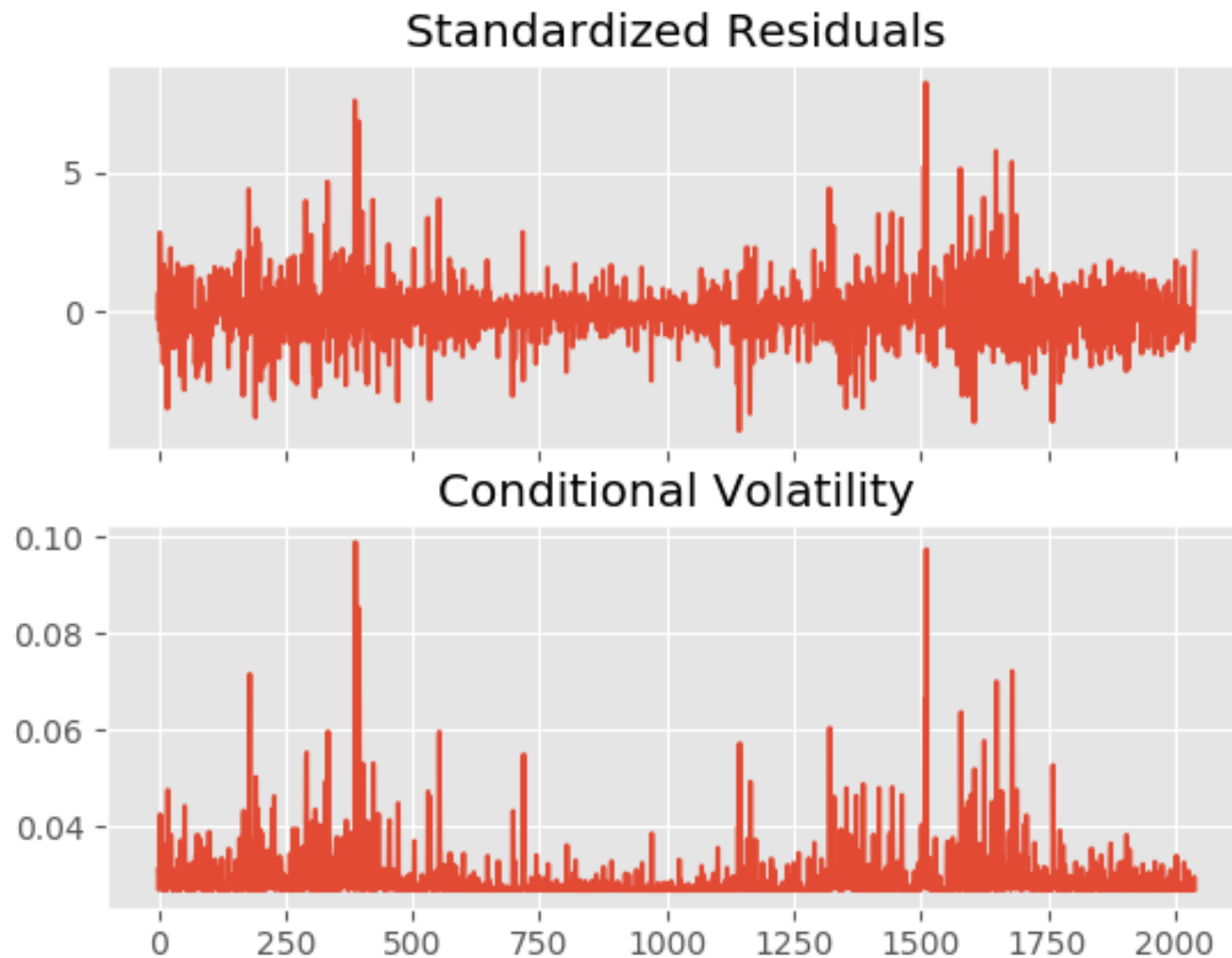
The fundamental economic environment:

- An environment of unusually high uncertainty
- On the upside
 - the ongoing recovery at the global economy and foreign trade
 - the accommodative monetary policy stance
 - the measures adopted to restore the functioning of the financial system
- On the downside
 - renewed tensions in some financial market segments and related confidence effects
 - a stronger or more protracted than expected negative feedback loop between the real economy and the financial sector
 - renewed increases in oil and other commodity prices
 - protectionist pressures
 - possibility of a disorderly correction of global imbalances
 - weak labour market prospects

Question 1d: Class 'ARMA ARCH'

See code.

Question 1e: Model-Implied Volatility



Question 1e: Model-Implied Volatility

Correlation matrix:

| | | | |
|------------------|--------|--------|--------|
| Vol_arch_2pass | 1 | 1 | 0.3400 |
| Vol_arch_package | 1 | 1 | 0.3399 |
| Volatility | 0.3400 | 0.3399 | 1 |

Question 1f: Volatility Forecasting

- Forecast 1 period ahead: 0.001301
 - Forecast 2 periods ahead: 0.000942
 - Forecast 3 periods ahead: 0.000879
-
- take $h=1$ in the formulas
 - Here: forecasted volatility is decreasing although it should be increasing as insecurity and therefore risk is increasing over time