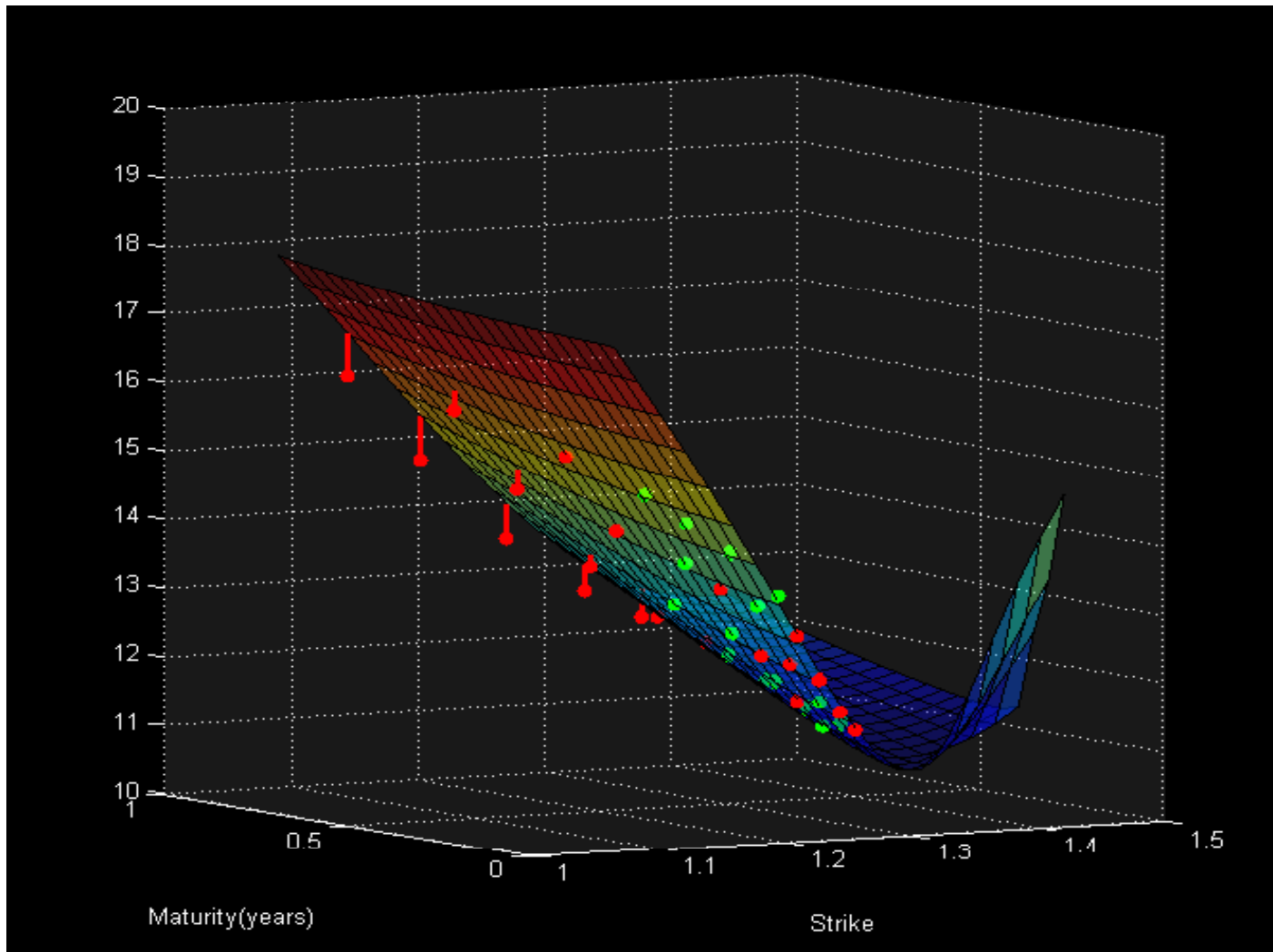
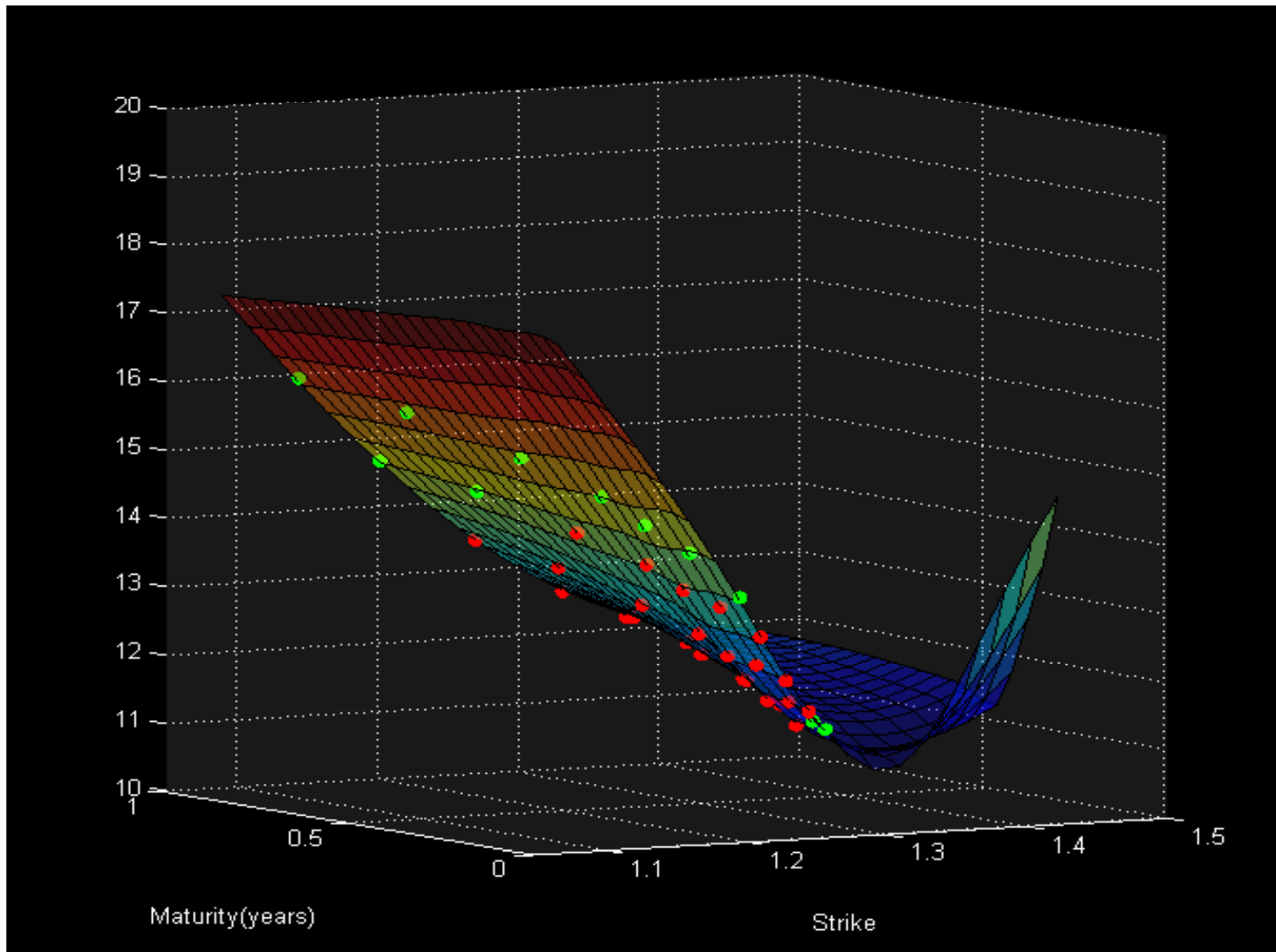


Risk Neutral Densities

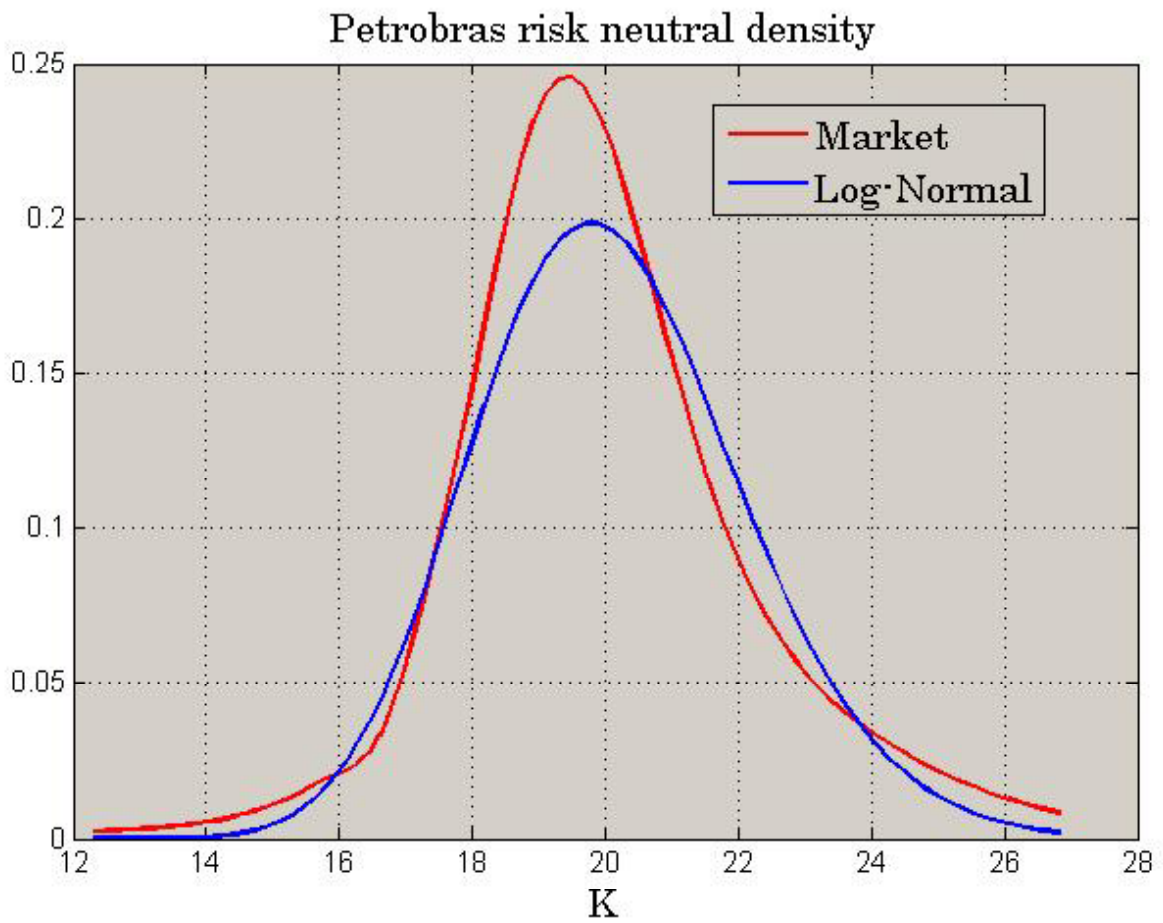
Heston (EURUSD)



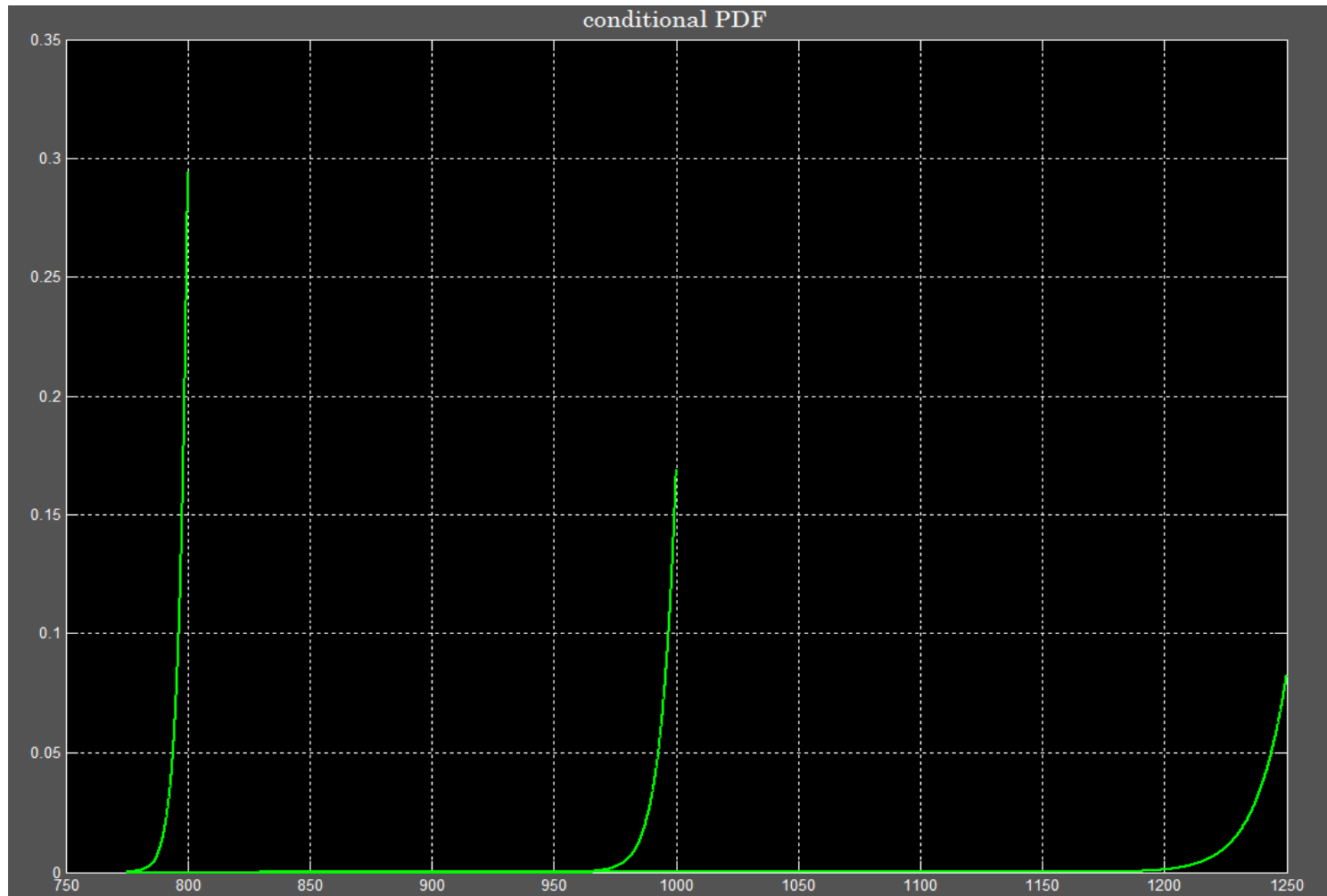
Heston + Residuals (EURUSD)



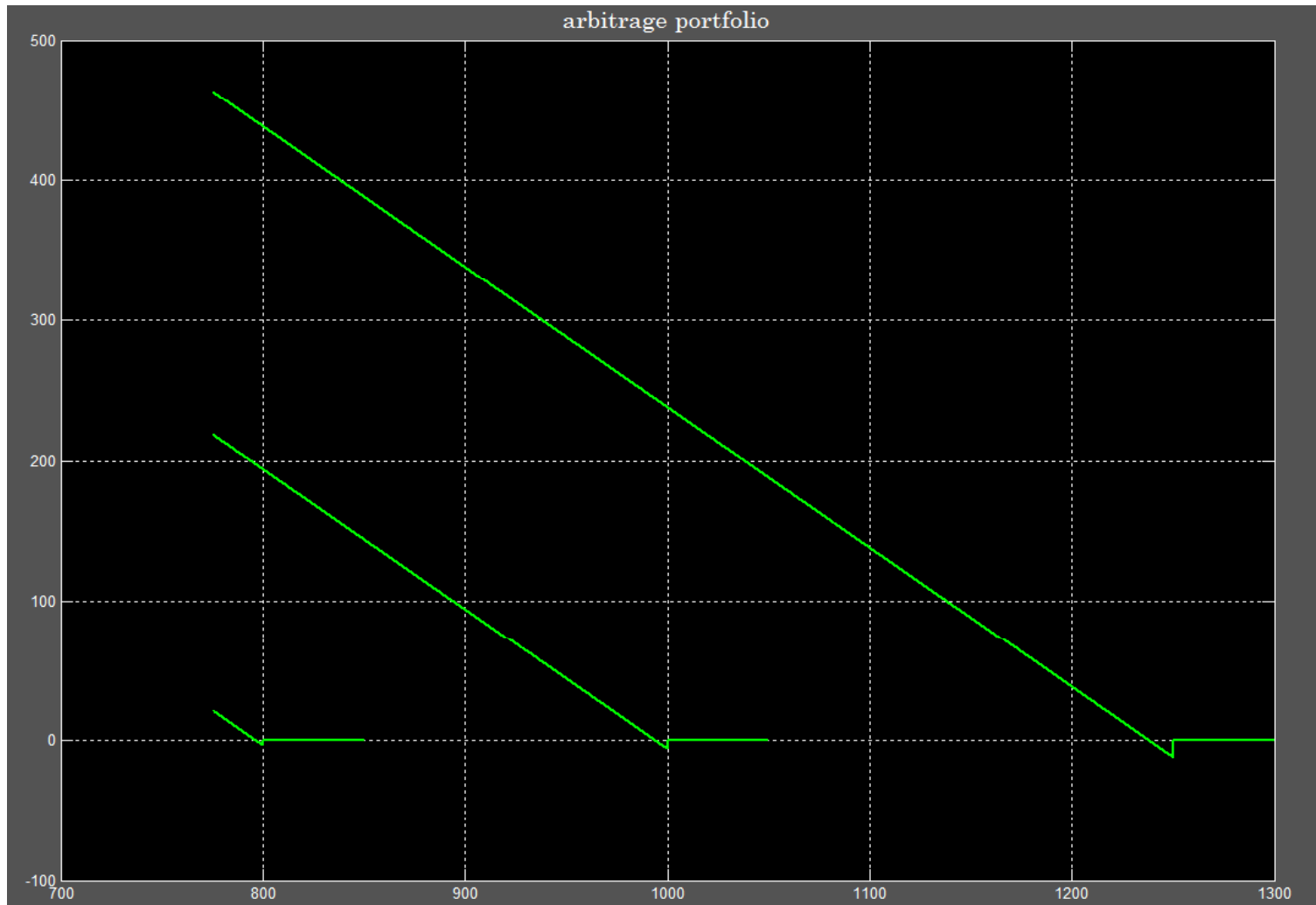
Petrobras possible prices in 1 month



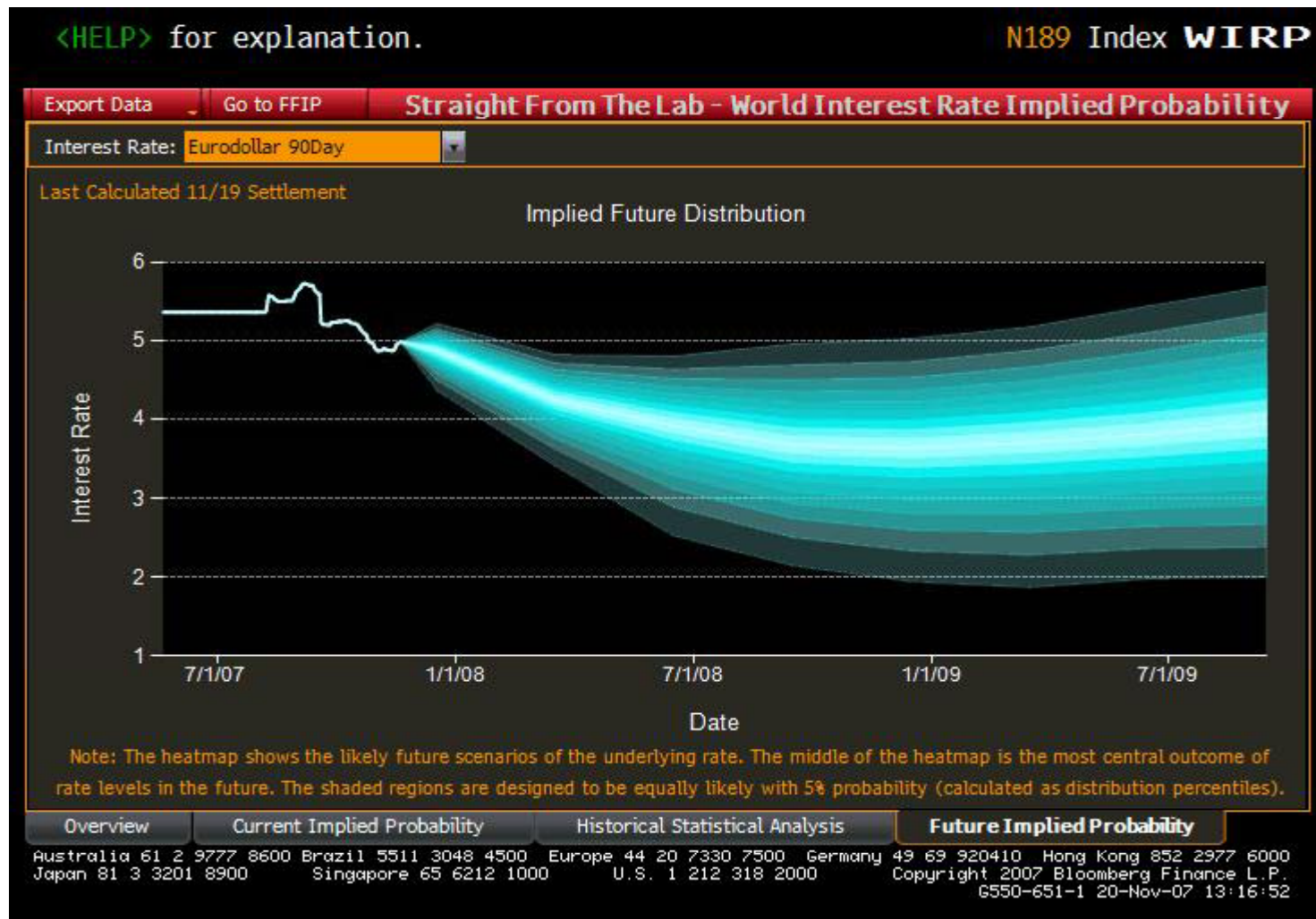
Extrapolate by conditioning



Arbitrage Portfolio



Interest rates evolution

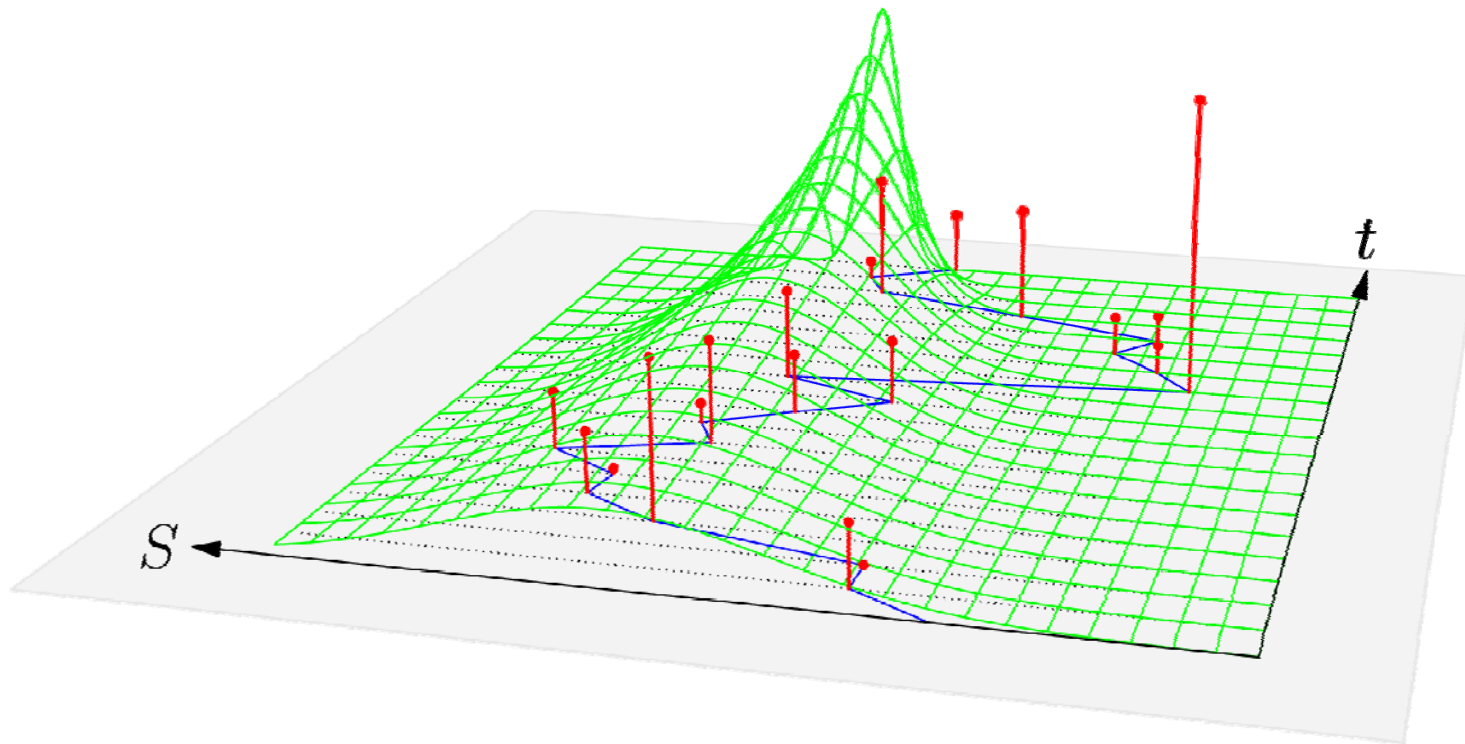


Fed Funds evolution

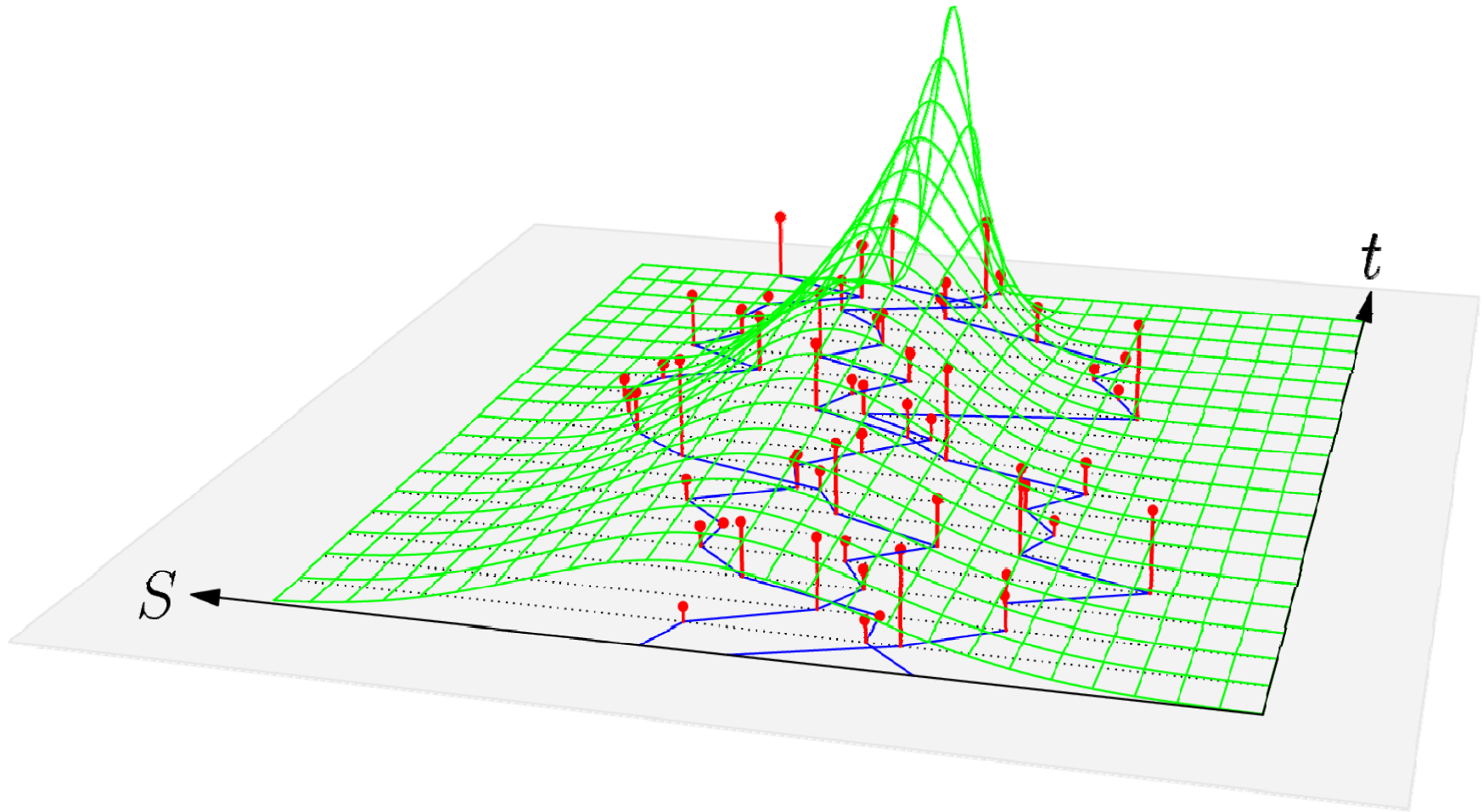


Historical Volatilities by Strike

- Usual historical volatility is a single number
- Break-Even volatility is an average of squared returns, weighted by the Gammas, which depend on the strike



Averaging over Multiple Paths



Optimal Investment

Input:

- Risk neutral measure Q
- Subjective measure P (view)
- Utility function U
- Initial budget

=> Marginal utility proportional to Radon-Nikodym density:

$$U'(g(X_T)) = \lambda \frac{dQ}{dP}(X_T)$$

Output:

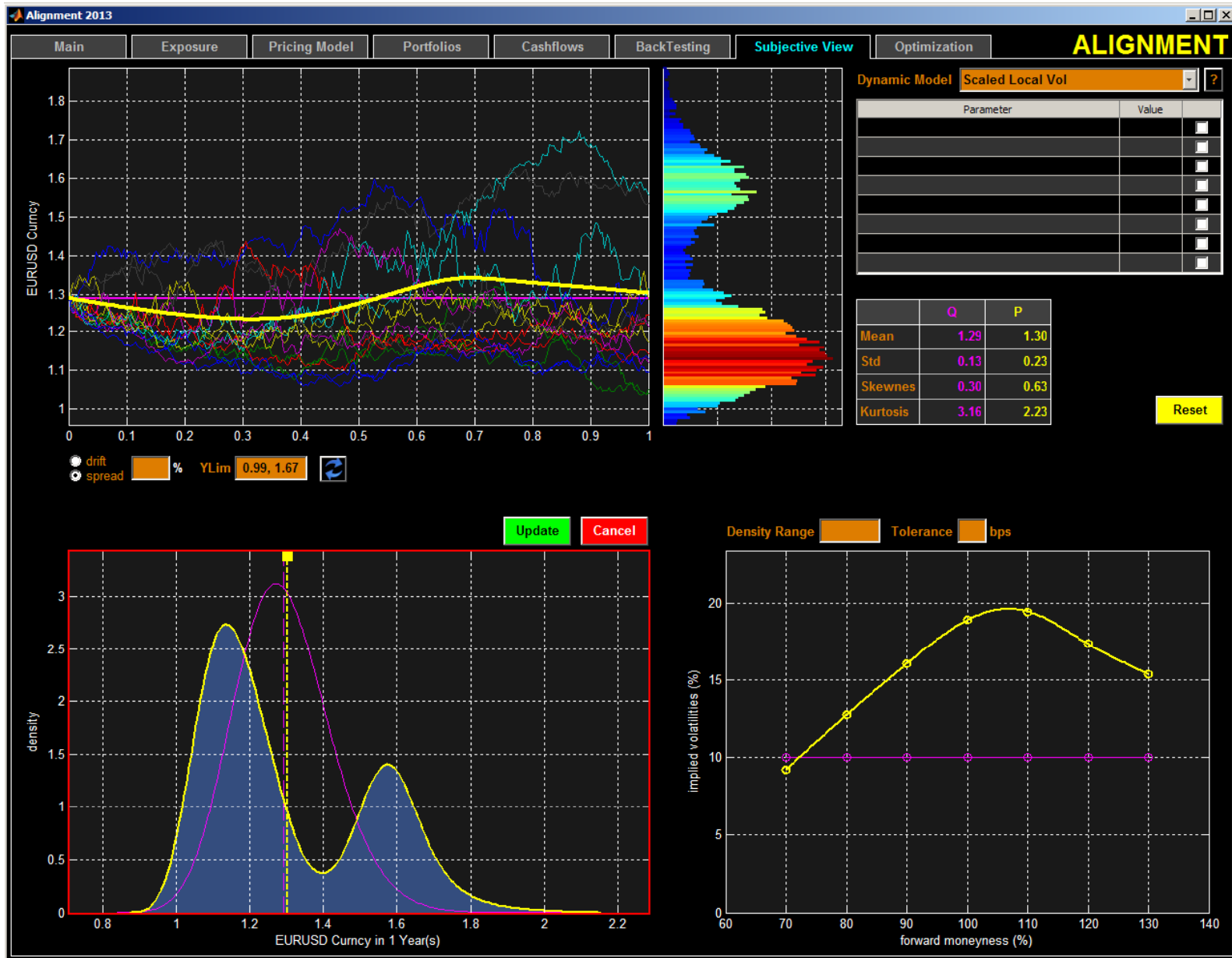
- Optimal investment:

$$g(X_T) = (U')^{-1} \left(\lambda \frac{dQ}{dP}(X_T) \right)$$

Subjective Density and Optimal Payoff



Express View on the Market



Implied View

Input:

- Risk neutral measure Q
- Utility function U
- Optimal investment g

Output:

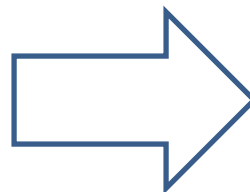
- Subjective measure P (view) $\frac{dP}{dQ}(X_T) = \frac{\lambda}{U'(g(X_T))}$

Implied View

Alternative Interpretation: complete model case

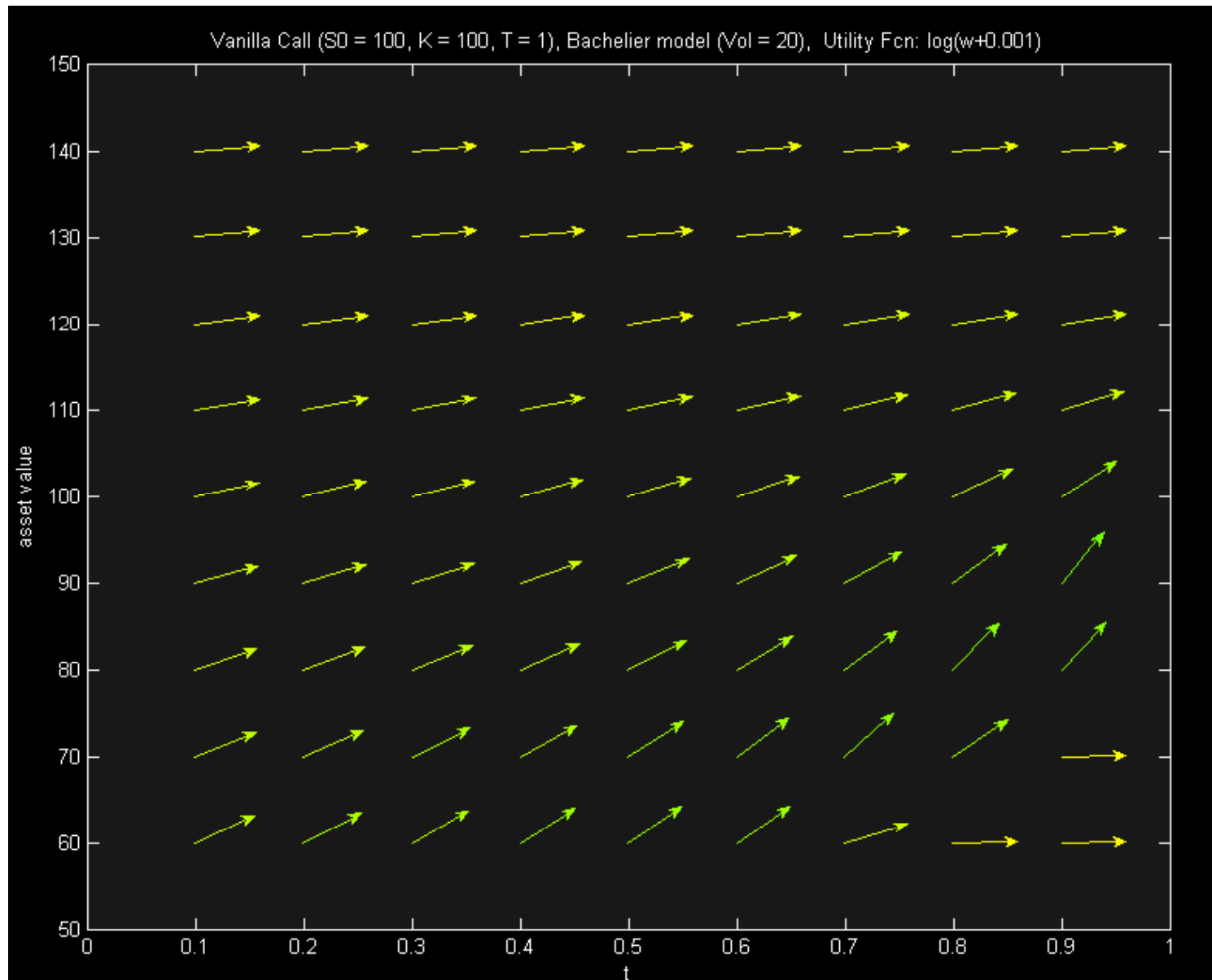
$$g(X_T) = f(X_0) + \int_0^T \Delta_x f(X_t) dx_t$$

Collection of
conditional holdings
of the underlying

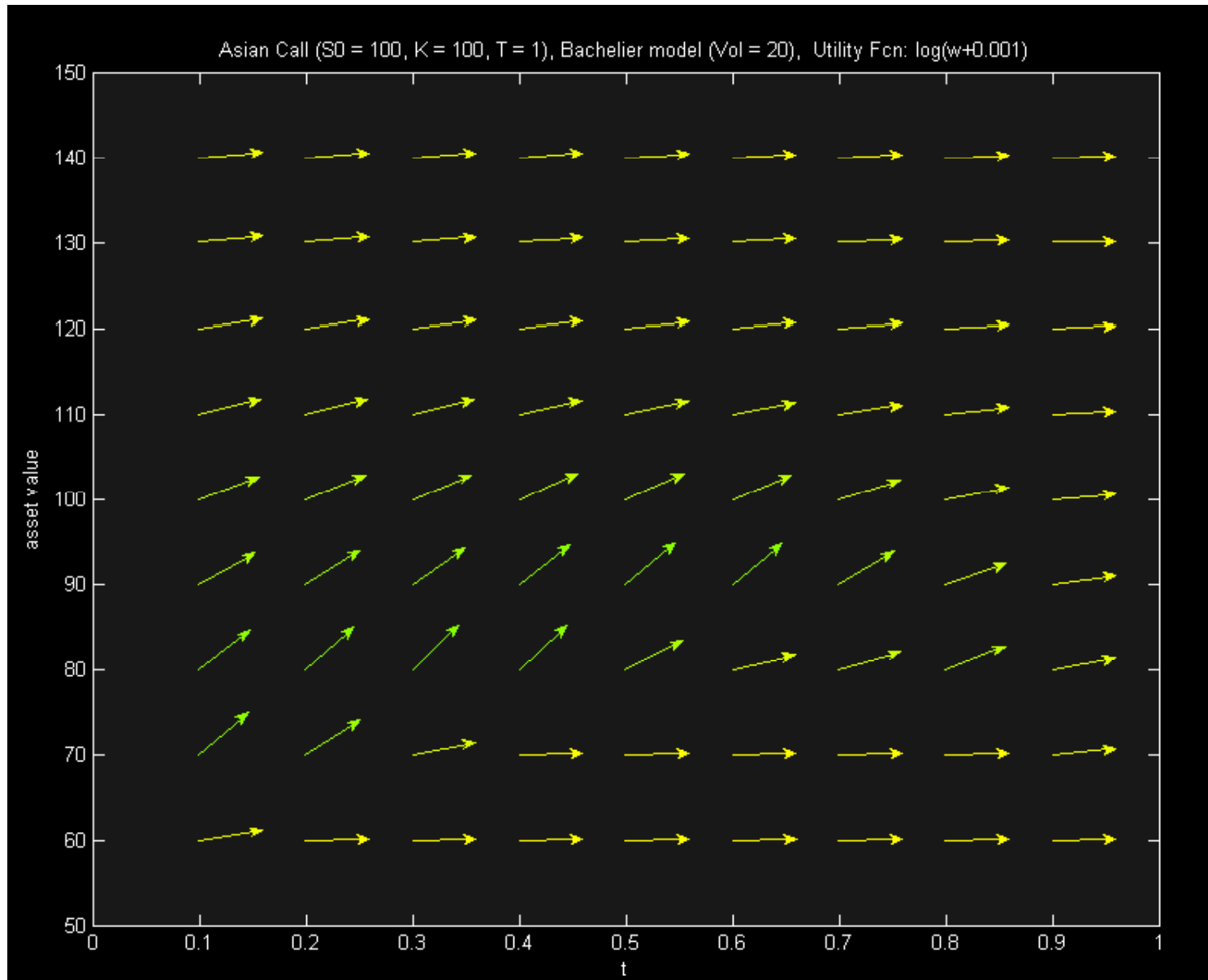


Collection of
conditional drift

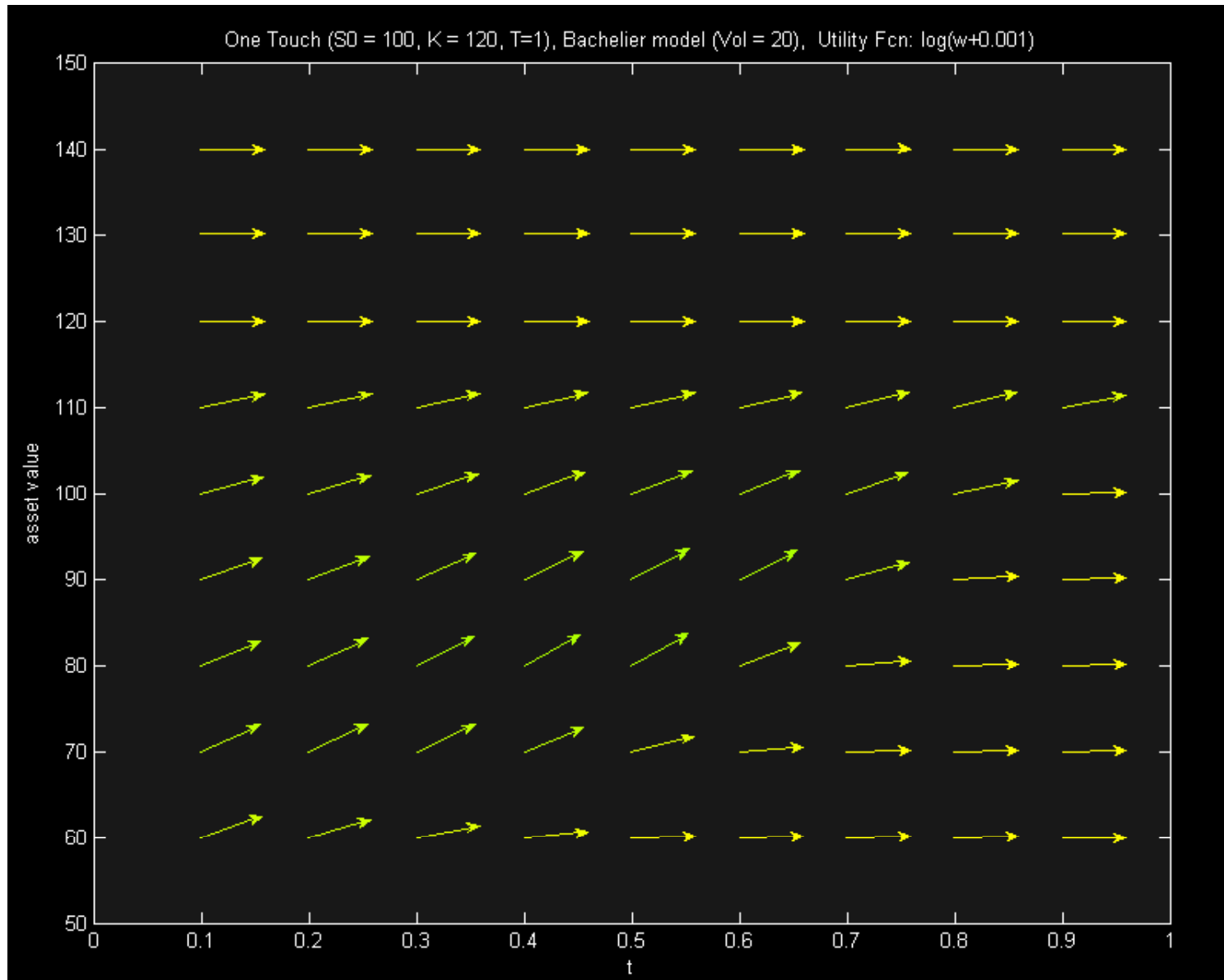
Vanilla Call



Asian Call



One Touch



Slalom

