The optimal long-term asset allocation with illiquid assets

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Motivation & Conceptualization

The share of illiquid assets in investors’ portfolios is large.

- Kaplan and Violante (2010) show individuals hold the majority of their wealth in illiquid assets.
- Share of illiquid assets in portfolios of institutional investors has increased over the last 20 years (e.g. Global Pension Asset Study 2015).

The literature distinguishes three concepts of illiquidity:

- Restriction on the price (Constantinides (1986)).
- Restriction on the traded quantity (Longstaff (2001)).
- **Restriction on the trading time** (Diamond (1982)).

My notion: *an illiquid asset is an asset that cannot be traded for a time period of uncertain duration.*
The optimal consumption problem of the investor equals:

$$\max_{\{\theta_s, \Delta X_s, C_s\}} \mathbb{E}_0 \left[ \sum_{s=0}^T e^{-s \beta} \frac{C_s^{1-\gamma}}{1-\gamma} \right]$$

subject to the two budget constraints (1) and (2), where the transfer from or to the illiquid risky asset can only be non-zero ($\Delta X_s \neq 0$) if a trading opportunity arises at time $s$.

$$W_s = (W_{s-h} - \Delta X_{s-h} - C_{s-h})(1 + r^f + \theta_{s-h}(R_s^S - r^f)) \quad (1)$$

$$X_s = (X_{s-h} + \Delta X_{s-h})(1 + R_s^X) \quad (2)$$
Results - the allocation towards the illiquid asset is affected in a consumption problem only if illiquid wealth can be liquidated at $T$ for sure.

1. Consumption problem

2. Final wealth problem
Results - the allocation towards the illiquid asset is affected in both a consumption and final wealth problem if illiquid wealth will be liquidated at $T$ with probability $p$.

1. Consumption problem

2. Final wealth problem
Results - optimal consumption & the allocation towards the liquid risky asset decrease if the actual allocation towards the illiquid asset is above its optimum.

1. Optimal consumption
2. Optimal allocation liquid risky asset
Model implications for pension funds

Model shows illiquidity has little effect on the optimal asset allocation in case:

- The investor has a long-investment horizon.
- The fraction of total payout relative to total wealth is small.

Total payout pension fund:

- Pension payments.
- Cash flows arising from interest rate and currency derivatives.
Extension - positive correlation between $R^X_s$ and the probability to trade $p_s$ reduces the allocation towards the illiquid asset compared to the baseline model.

1. Positive correlation

2. Negative correlation
Future research

- Calculating the certainty equivalent wealth (CEW) in order to derive liquidity premiums.
- Include dividend-paying illiquid asset.
- Specify more accurately the correlation between $R^X_s$ and $p_s$. 