Rationally irrational or irrationally rational? Risk perceptions and their influence in the investment process

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[1]The views expressed are those of the author and do not necessarily represent those of the Bank of Lithuania.

What is the normative relationship between risk and return?

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Traditional financial economic theory postulates a **positive** relationship between *expected* or *ex-ante* return and *expected* or *ex-ante* risk.

▶ This may hold in highly liquid and informationally (semi-) efficient markets such as the equity or bond market

▶ Direct real estate markets are notorious for their lack of the above mentioned characteristics - autocorrelated returns lead to much higher degrees of predictability

Academic Research - expected vs. realized returns

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Focused on equity markets

▶ Shefrin (2001) shows investors perceive expected return to be **negatively** related to expected risk; analysts and portfolio managers somewhat less (cross-sectional analysis).

▶ Moreover individual investors suffer from the extrapolation bias while equity analysts from the "gambler's fallacy" - these relations show the time-series structure of returns expectations.

▶ Vissing-Jorgensen (2003) builds upon the UBS/Gallup Index of Investor optimism - they find that individual investors extrapolate returns (form naive expectations) and a more optimistic assessment of macroeconomic conditions coincides with higher expected returns and lower expected volatility.

▶ Kempf et al. (2012) indicate that financial literacy will mitigate the bias leading to a negative relation between

How can this be?

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Behavioral economics offers some useful insights

▶ Finucane et al. (2000) identify the **affect heuristic** as a potential culprit for the observed behavior.

▶ People attach to a given prospect/item/situation either a positive or a negative label. This will cause both the benefit and the hazard of the prospect/item/situation to be evaluated by the *emotion* attached to it and not by a rational comparison of benefits and hazard.

▶ Items that carry a positive emotion are seen as good *AND* safe whereas negative labels will project a feeling of bad *AND* risky.

▶ Shefrin's and Kemp's et al. studies shows that people perceive good companies as companies having good returns (high returns). The affect heuristic will drive them to also identify them as safe - thus the negative relation

Research Question of the present study

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The main interest of the present study is to understand if the (cross-sectional) expectations of real estate institutional investors conform with the normative predictions of economic theory.

▶ Are expectations influenced by the extrapolation bias?

▶ Does the anchoring bias affect the formation of expectations?

▶ Can we observe a positive relation between return and risk in the expectations of real estate investors?

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A survey of Swiss institutional investors' expectations

- ▶ Took place around March 2010[2].
- ▶ Online run with anonymous answers; some 35 participants answered, all based in Switzerland.
- ▶ Survey: Identification Section, Transactions Section and an Expectations Section.

Identification - The Participants

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- ▶ 65% Institutional, 14% Listed Company, 9% Developers, 5% Corporate Real Estate, 9% Private Company
- ▶ Median Allocation: 63% Residential, 24% Office, 4% Commercial, 10% Retail, 10% Other
- ▶ Average Vacancy: 1.86% Residential, 5.12% Office, 3.3% Commercial, 1.67% Retail, 6.6% Other
- ▶ Financing: Mostly Equity
- ▶ Average Portfolio Cap Rate: 4.92%; St. Dev.: 0.55%

Transactions - Summary

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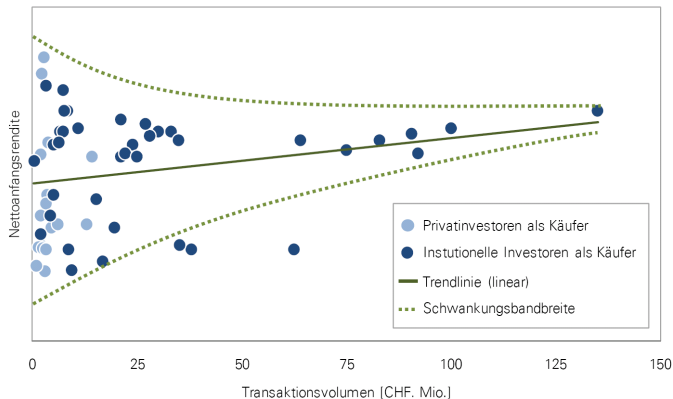investment process

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Transactions - Summary II

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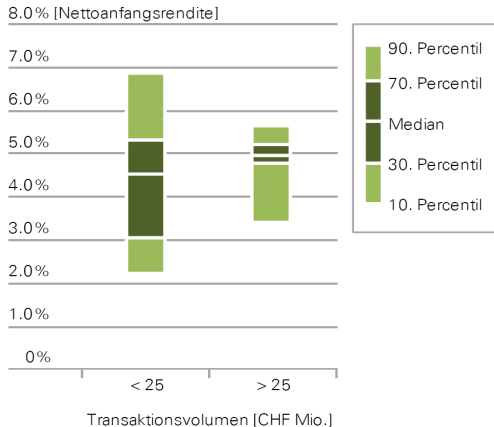investment process

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Three sets of questions elicited the expectations of the participants with
respect to *changes* in rents, vacancy rate and cap rates across regions
and industries.
A fourth set of questions asked the opinion of the participants with
respect to the price level across regions and asset types.

▶ Question: "How do you expect the rent(vacancy/cap rate) to
  change by the end of 2010 for market x/asset y"

▶ Possible Answers: strong decrease, decrease, remain constant,
  increase, strong increase.

▶ Question: "How do you perceive the price level in 2010 for market
  x"

▶ Possible Answers: strongly undervalued, undervalued, fair,
  overvalued, strongly overvalued.

Answers on rents are used as a proxy for the growth in rents; Current
opinion on prices as a proxy for expected one period returns.

Extrapolation Bias

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Opinions about the price level

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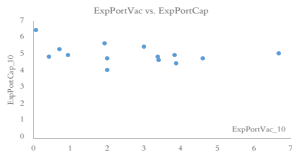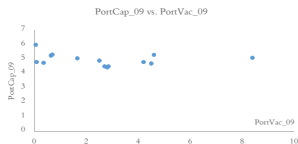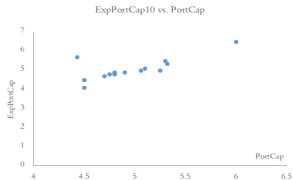their influence in the
investment process

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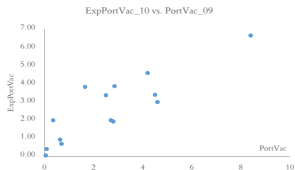Constantinescu

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Asking Price Changes (%)_Zurich ['97-'13]			
	Residential	Office	Industrial	Retail
Average	1.77%	1.09%	0.81%	0.92%
St.Dev.	3.84%	4.03%	6.23%	5.49%
Assessment of Market Price [2010]			
1	0.0%	0.0%	0.0%	0.0%
2	0.0%	9.1%	0.0%	0.0%
3	8.3%	9.1%	75.0%	40.0%
4	25.0%	72.7%	25.0%	50.0%
5	66.7%	9.1%	0.0%	10.0%
Actual Development of Asking Price			
2008	4.7%	5.2%	3.5%	3.9%
2009	5.3%	0.9%	-9.1%	5.7%
2010	2.1%	2.6%	2.1%	0.7%
2011	1.3%	-3.4%	1.2%	1.1%
2012	5.4%	1.3%	0.0%	10.2%

Asking Rent Changes _Zurich ['00-'13]			
	Residential	Office	Industrial	Retail
Average	1.0%			
St.Dev.	1.2%			
Assessment of Market Rent [2010]			
1	0.0%	0.0%	0.0%	0.0%
2	7.7%	76.9%	70.0%	33.3%
3	23.1%	7.7%	10.0%	58.3%
4	61.5%	7.7%	20.0%	8.3%
5	7.7%	7.7%	0.0%	0.0%
Actual Development of Market Rent			
2008	3.6%			
2009	2.6%			
2010	0.7%			
2011	0.4%			
2012	0.1%			

Opinions about the price level

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Asking Price Changes (%)_Basel ['97–'13]			
	Residential	Office	Industrial	Retail
Average	0.7%	0.9%	0.1%	-0.7%
St.Dev.	2.9%	3.3%	6.7%	6.6%
Assessment of Market Price [2010]			
1	0.0%	0.0%	0.0%	0.0%
2	9.1%	20.0%	12.5%	20.0%
3	63.6%	40.0%	62.5%	40.0%
4	18.2%	40.0%	25.0%	40.0%
5	9.1%	0.0%	0.0%	0.0%
Actual Development of Asking Price			
2008	3.4%	2.4%	-4.0%	11.8%
2009	2.9%	2.5%	6.1%	-8.0%
2010	2.1%	0.8%	9.0%	-7.4%
2011	2.8%	-3.0%	-8.5%	3.9%
2012	1.0%	7.0%	-9.1%	8.5%

Asking Price Changes (%)_Geneva ['97–'13]			
	Residential	Office	Industrial	Retail
Average	4.5%	3.0%	0.8%	3.2%
St.Dev.	4.5%	6.3%	8.3%	7.0%
Assessment of Market Price [2010]			
1	0.0%	0.0%	0.0%	0.0%
2	0.0%	0.0%	0.0%	0.0%
3	10.0%	0.0%	42.9%	44.4%
4	30.0%	77.8%	57.1%	44.4%
5	60.0%	22.2%	0.0%	11.1%
Actual Development of Asking Price			
2008	1.7%	-2.4%	0.9%	7.1%
2009	7.3%	11.8%	-12.6%	-0.9%
2010	8.6%	5.5%	10.9%	14.3%
2011	6.0%	-8.3%	3.0%	14.7%
2012	11.3%	11.6%	-1.0%	5.2%

The rational model as benchmark

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The DCF model is a good framework to understand how the affect heuristic might distort the relations between expectations.

▶ The periodic returns will be equal to the discount rate as long as there is no change in expectations of either cash-flows, growth rate, risk-free rate or risk-premium.

$$
\begin{aligned}
P_t &= \frac{D_{t+1}^e}{1 + d^e} + \frac{D_{t+1}^e(1 + g^e)}{(1 + d^e)^2} + \frac{D_{t+1}^e(1 + g^e)^3}{(1 + d^e)^3} + ... \\
R_{t+1} &= \frac{D_{t+1} + P_{t+1}}{P_t} \text{ then we observe} \\
R_{t+1} &= 1 + d^e \iff D^e, d^e, g^e \text{ are constant over time}
\end{aligned}
$$

Moreover we can use the cap rate as a short-cut

$$
C_t \equiv \frac{D_{t+1}}{P_t} = d^e - g^e
$$

The Campbell-Shiller dynamic DCF

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Let r_{t+1} be the log return at time $t+1$ and p_t be the log price at time t:

$$
\begin{aligned}
r_{t+1} &\equiv log(P_{t+1} + D_{t+1}) - log(P_t) \\
&= p_{t+1} - p_t + log(1 + exp(d_{t+1} - p_{t+1})) \\
r_{t+1} &\approx k + \rho p_{t+1} + (1 - \rho)d_{t+1} - p_t
\end{aligned}
$$

where k and ρ are parameters of the linearization, ρ being the long-run average of $P/(P + D)$ (slightly lower than 1).

The cap rate in the dynamic DCF

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If we rearrange the previous formula for the periodic return we can obtain an approximation for the cap rate

$$
\begin{aligned}
r_{t+1} &\approx k + \rho p_{t+1} + (1 - \rho)d_{t+1} - p_t \text{ to obtain} \\
r_{t+1} &\approx k + (d_{t+1} - p_t) - \rho(d_{t+2} - p_{t+1}) + \rho(d_{t+2} - d_{t+1}) \text{ to obtain} \\
r_{t+1} &\approx k + c_t - \rho c_{t+1} + \rho g_{t+2}
\end{aligned}
$$

where $c_t = log(D_{t+1}/P_t)$ and $g_{t+2} = log(D_{t+2}/D_{t+1})$. Conditioning on time t information we have the relation needed between the expectations of the variables of interest

$$
\begin{aligned}
\mathbb{E}_t[r_{t+1}] &\approx k + c_t - \rho \mathbb{E}_t[c_{t+1}] + \rho \mathbb{E}_t[g_{t+2}] \\
\rho \mathbb{E}_t[c_{t+1}] - c_t &\approx k - \mathbb{E}_t[r_{t+1}] + \rho \mathbb{E}_t[g_{t+2}]
\end{aligned}
$$

The Data on Expectations

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The answers regarding expectations and price level were coded with 1="strong decrease" to 5="strong increase". The data was then aggregated across the 7 regions and the 4 asset types to produce a reasonable sample-size.

▶ Does the aggregation influence the result?

▶ Yes, but only the size of the regression parameter and not the sign.

What will be tested? Changes in the cap rate are negatively related to changes in prices and positively related to changes in dividends

$$\rho \, \mathbb{E}_t[c_{t+1}] - c_t \approx k - \mathbb{E}_t[r_{t+1}] + \rho \, \mathbb{E}_t[g_{t+2}]$$

Preliminary results

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The ordered logit model was estimated with explanatory variables given
by the implicit expectations of periodic returns and expectations of
changes in rents:

$$Cap = Price + Rent$$

- ▶ Cap = {1,...,5}={strongly decrease,...,strongly increase} -
  expected changes in cap rates
- ▶ Price = {1,...,5}={strongly undervalued,...,strongly overvalued} -
  expected changes in periodic returns
- ▶ Rent = {1,...,5}={strongly decrease,...,strongly increase} -
  expected changes in rents

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Proportional Odds Logistic Model of Cap ~ Price + Rent

Coefficients:

	Value	Std. Error	t value
Price	0.515	0.159	3.22
Rent	0.708	0.169	4.18

Intercepts:

	Value	Std. Error	t value
1|2	-1.066	0.823	-1.29
2|3	3.222	0.643	5.00
3|4	5.026	0.696	7.22
4|5	8.042	0.892	9.01

Residual Deviance: 553.32

AIC: 565.3

Q&A

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