

Using leading indicators to forecast real estate returns

Deze methode

Welke richting volgt het rendement?

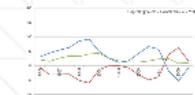
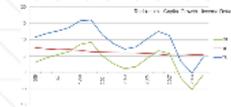
80 % accuraat

6 tot 10 kwartalen forecast

Theoretisch verantwoord

Statistisch correct

Maar hoe?



4 Statistisch correct
 - Niet significant
 - 1. Eigen bijdrake niet nul
 - 2. Niet significant
 - 3. Niet significant
 - 4. Niet significant

Statistisch correct
Logistische regressie
 - Toekomstige groei van 10 maanden
 - 10 maanden
 - 10 maanden
 - 10 maanden
 - 10 maanden

Theoretisch verantwoord



1 Lange termijn trend eruit halen



2 Transformatie naar binaire variabelen

Yield shift
 2 positieve veranderingen
 2 negatieve veranderingen / negatief
 Resultaat

3 Univariate logistische regressie

Welke variabelen zijn significant?
 Hoe ver kun je etrems vooruit kijken?

Model	Variable	Significant
Model 1	Yield shift	Yes
	Capital growth	No
	Rental value growth	No
	Economic leading indicators	No
Model 2	Yield shift	Yes
	Capital growth	Yes
	Rental value growth	No
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4 Multivariate logistische regressie

Model	Variable	Significant
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Het resultaat



Accuraat

Model	Accuracy
Model 1	80%
Model 2	80%

In de praktijk...

- Bijhouden van huidige bezit
- Asset allocation
- Combineren met 'gevoel'



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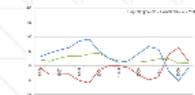
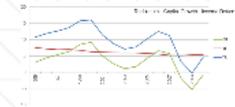
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Theoretisch verantwoord

Statistisch correct

Maar hoe?



4 Statistisch correct
 - Model is correct
 - 1. Eigen indicatoren zijn relevant
 - 2. Relatie met andere variabelen
 - 3. Relatie met andere variabelen
 - 4. Relatie met andere variabelen

Statistisch correct
Logistische regressie
 - Toekomstige waarde van 0 of 1
 - "Bijvoorbeeld" logistische regressie voor het voorspellen van de kans op een succesvolle verkoop van een vastgoedobject
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Dashboard



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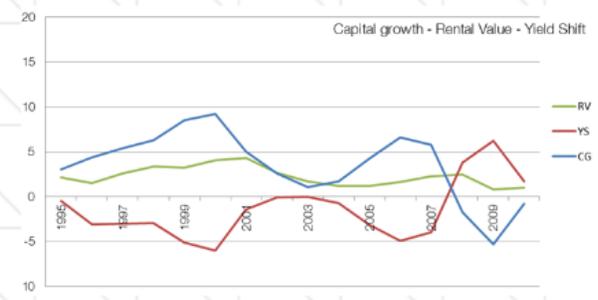
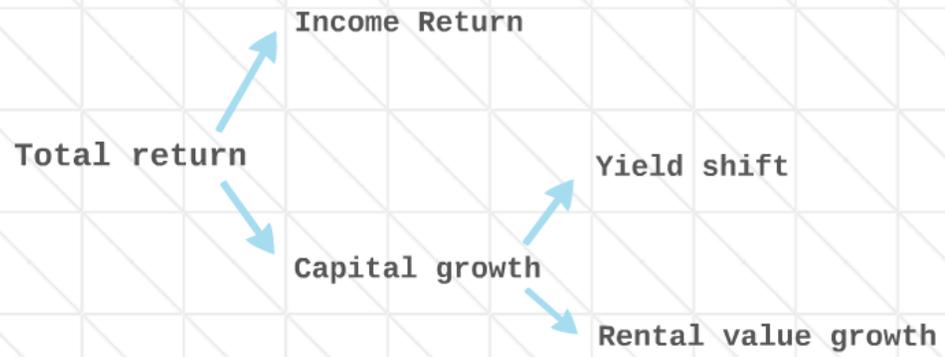
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Variable	Coefficient	Standard Error	z-Statistic	Probability > z
Constant	0.000	0.000	0.000	1.000
Yield shift	0.000	0.000	0.000	1.000
Rental value	0.000	0.000	0.000	1.000
Yield shift * Rental value	0.000	0.000	0.000	1.000
Yield shift squared	0.000	0.000	0.000	1.000
Rental value squared	0.000	0.000	0.000	1.000
Yield shift * Yield shift squared	0.000	0.000	0.000	1.000
Rental value * Rental value squared	0.000	0.000	0.000	1.000
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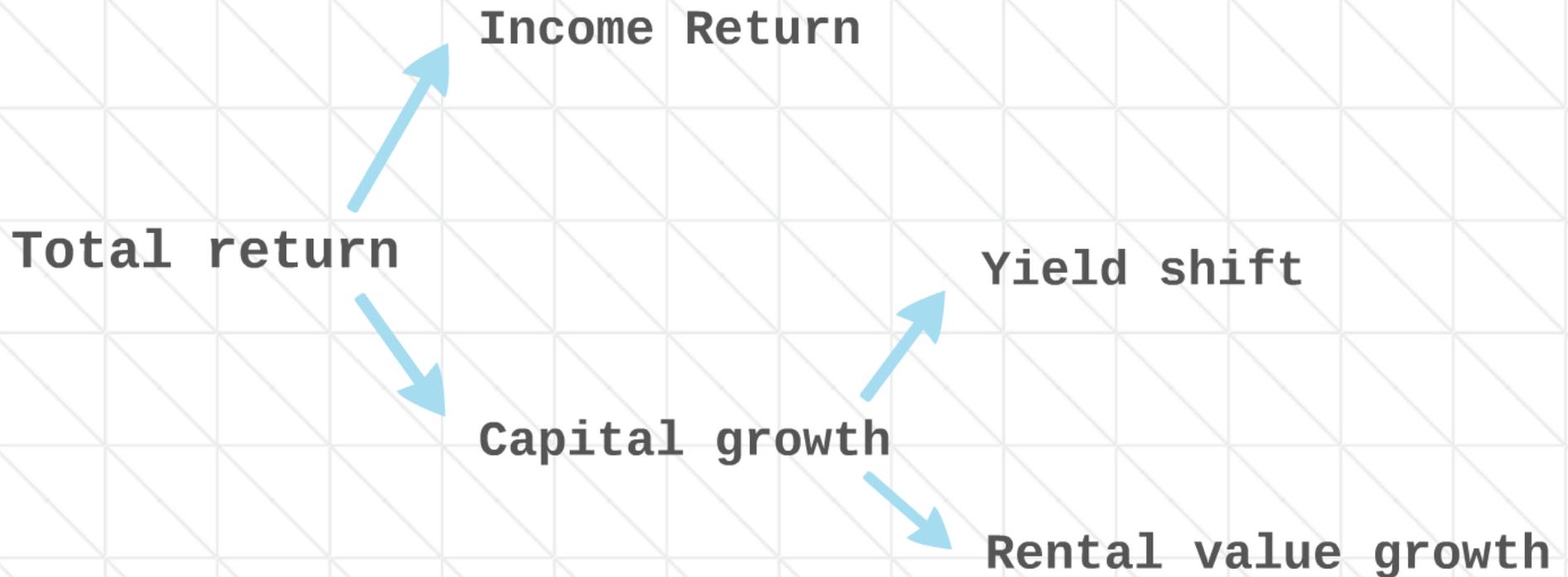
Het resultaat

RETURN

Maar hoe?



Maar hoe



Income Return

Total return

Capital growth





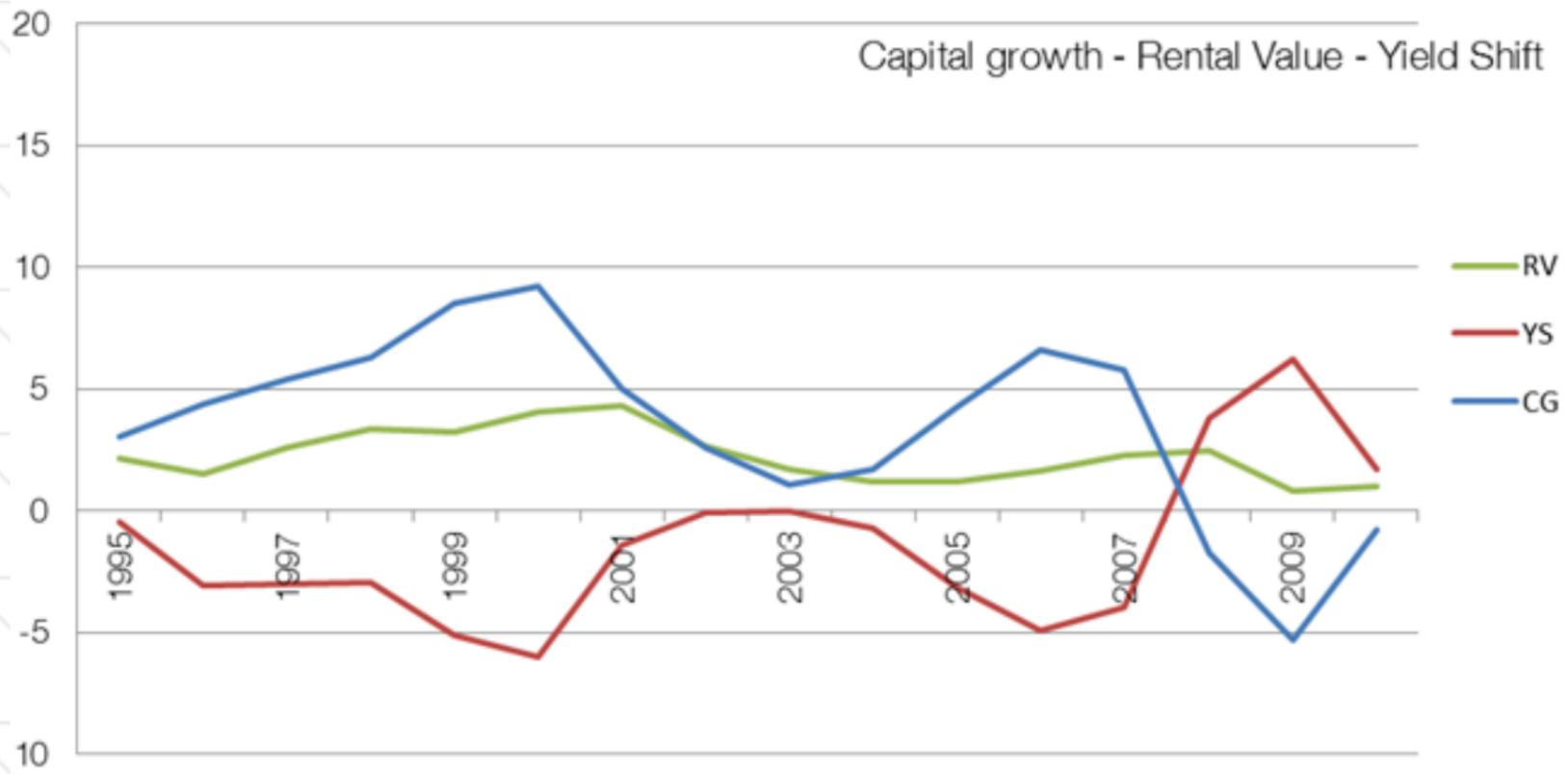
Income Return

Yield shift

Capital growth

Rental value growth





Theoretisch verantwortlich

Yield shift

Rental value growth

Economic leading indicators

Variables	
Real T-Bond yield	Capital flow (Cap rate ratio)
Risk spread (Moody's & 10 year t-bond)	Risk free rate (10 year Treasury)
Investor sentiment	Changes in rent
Supply constraints	GDP
Sales volume	Stock Total Return Index

Office market	Retail market	Industrial market	Housing market
Absorption rate	Retail sales	Past rents	Natural vacancy rate
New construction orders	Past rent	Construction costs	Vacancy rate
Vacancy rate	Cost of producing	Available floor space	
Total stock of space	Vacancy rate	GDP	
Occupied stock of space		Past growth GDP	
Office employment			
Replacement costs			
Interest rates			
Employment growth			
Natural vacancy rate			
Construction costs			
Operating costs			
GDP			

Variables
Consumer confidence
Share prices: total index
Money supply, M2
Order books: level (manufacturing)
Production: future tendency (manufacturing)
Finished goods stocks: level (manufacturing)
Orders inflow: tendency (manufacturing)
Ifo business climate indicator for Germany

Variables

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ors

Statistisch correct

Logistische regressie

Voorbeeld: het gooien van 10 munten

"Normale" regressie: exacte aantal keer kop (3,7)

Logistische regressie: kans dat er zeven of meer keer kop gegooid zal worden (81.8 %)

Waarom?

- Data niet normaal verdeeld
- Geen lineaire relaties
- Geen intentie om precieze rendementen te voorspellen



4

Statistisch correct

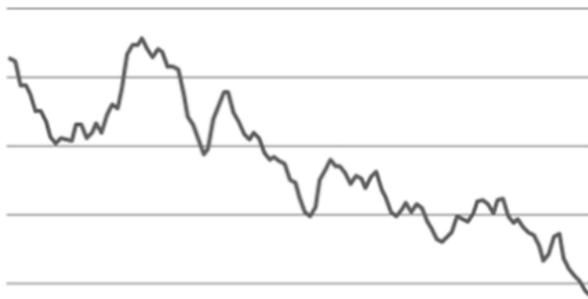
- stappen method

1. Lange termijn trend eruit halen
2. Transformatie naar binaire variabelen
3. Univariante logistische regressie om significantie te bepalen
4. Multipiele regressie om beste combinatie van variabelen te bepalen

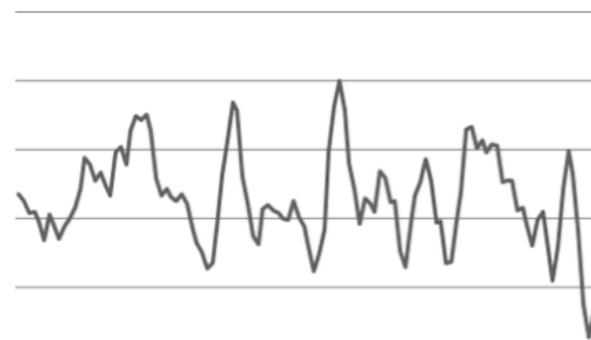
1

Lange termijn trend eruit halen

Interest rate



Interest rate, de-trended



Augmented Dickey Fuller test
Logaritme & jaarlijkse groei

2

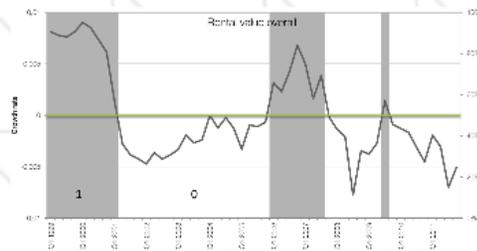
Transformatie naar binaire variabelen

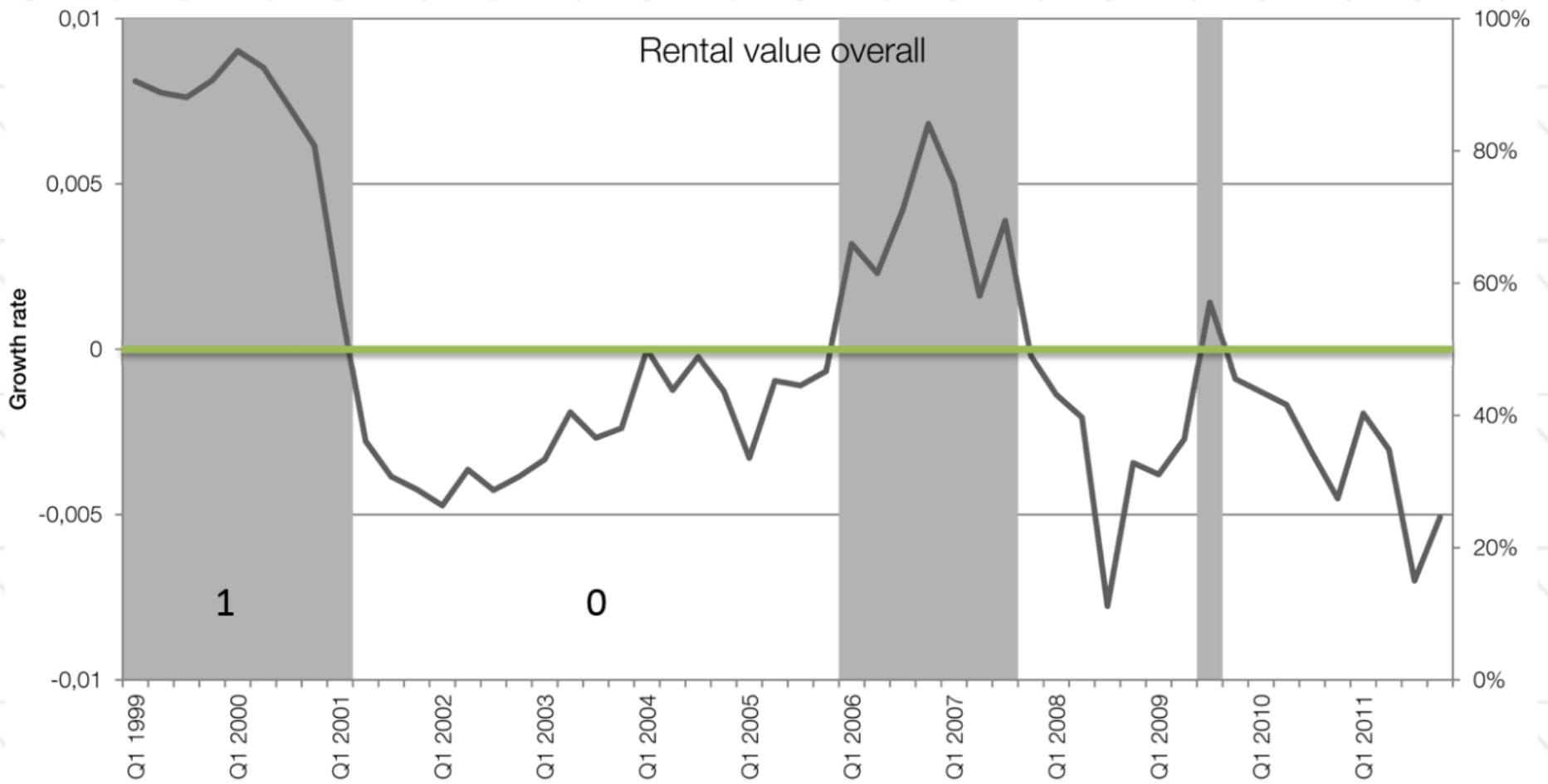
Yield shift

1 positieve yield shift
0 yield shift blijft neutraal / negatief

Rental value

1 groei van de real rental value
0 real rental value blijft neutraal / negatief





3

Univariate logistische regressie

Welke variabelen zijn significant?
Hoe ver kan ik ermee vooruit kijken?

Rental Value Overall	Rental Value Retail	Rental Value Industrial	Rental Value Office
Building permits (4)	Building permits (7)	Building permits (5)	Building permits (4)
Interest rate (1)	Interest rate (6)	Interest rate (1)	Interest rate (1)
Employment growth (10)	GDP growth (6)	Employment growth (10)	Employment growth (10)
GDP growth (1)	Economic leading index (1)	GDP growth (2)	GDP growth (2)
Retail sales (2)	Investor sentiment (1)	Retail sales (2)	Retail sales (2)
Economic leading index (1)	Listed real estate (1)	Economic leading index (1)	Economic leading index (2)
Risk spread (10)	Global trade (10)	Risk spread (9)	Risk spread (6)
Investor sentiment (9)	Consumer confidence (1)	Investor sentiment (10)	Investor sentiment (10)
Corporate bond index (1)	Total share prices (1)	Corporate bond index (1)	Corporate bond index (2)
Yield spread (10)	Money supply, M2 (10)	3-month Gov. Bond (1)	3-month Gov. Bond (1)
Global trade (9)	Order book volume (1)	Yield spread (10)	Yield spread (10)
Consumer confidence (1)	Future production (3)	Consumer confidence (1)	Money supply, M2 (2)
Total share prices (9)	Level of finished goods (1)	Total share prices (1)	Order book volume (10)
Money supply, M2 (1)	Exp. order inflow (3)	Money supply, M2 (2)	
	German BCI (1)	Order book volume (10)	

rijken?

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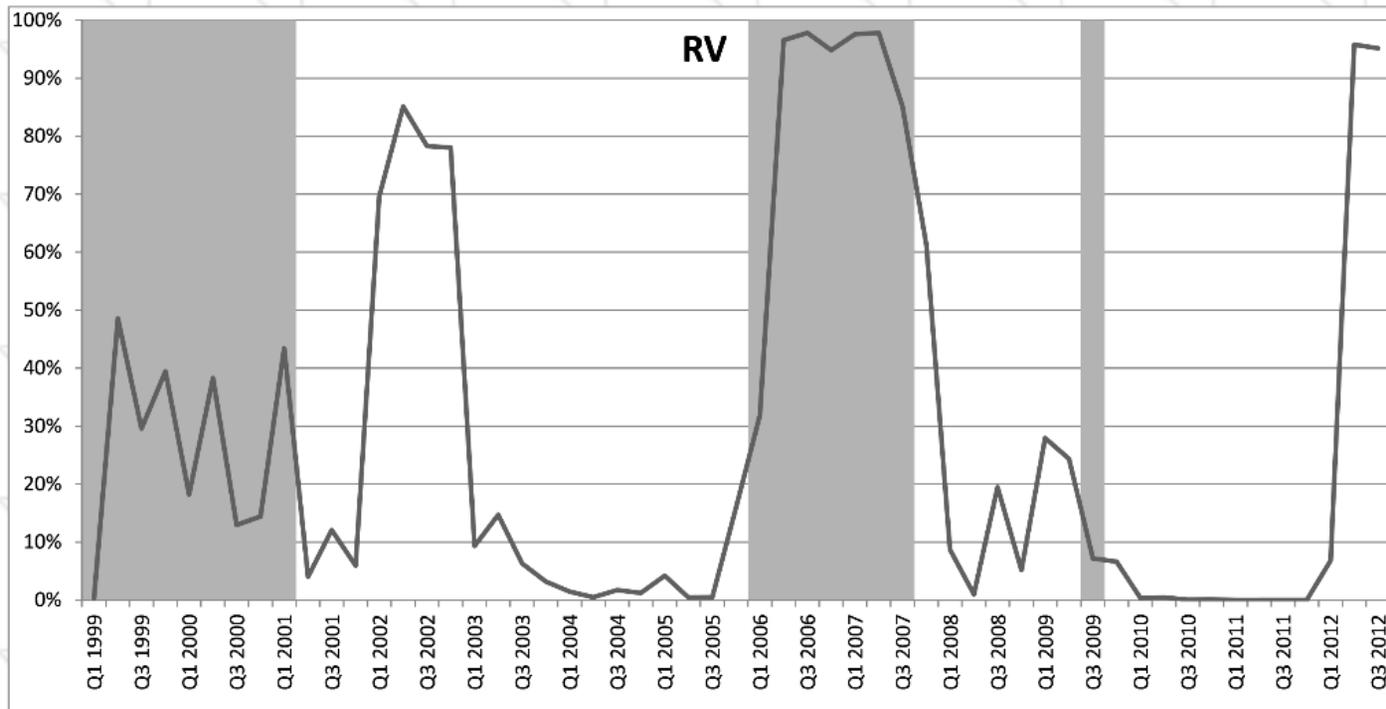
4

Multivariate logistische regressie

Dependent variable	Variable	Coefficient	Significance	McFadden R2	Observations
Yield shift overall	Employment growth (10)	-435,55	0,036	0,80	34
	Money supply, M2 (1)	142,213	0,037		
	Constant	-1,336	0,426		
Yield shift retail	Consumer confidence (6)	-0,159	0,004	0,66	39
	Level of finished goods (6)	419,212	0,017		
	Constant	-1,163	0,159		
Yield shift industrial	Building permits (7)	17,536	0,099	0,81	34
	Employment growth (10)	-757,818	0,023		
	Constant	0,447	0,614		
Yield shift office	Employment growth (10)	-1002,878	0,015	0,88	34
	Constant	1,843	0,086		

Dependent variable	Variable	Coefficient	Significance	McFadden R2	Observations
Rental value overall	Investor sentiment (9)	47,123	0,06	0,68	34
	Money supply, M2 (1)	130,36	0,012		
	Constant	-5,829	0,005		
Rental value retail	Building permits (7)	12,446	0,01	0,40	42
	Money supply, M2 (10)	-95,452	0,006		
	Constant	2,6112	0,029		
Rental value industrial	Consumer confidence (1)	0,266	0,019	0,61	34
	Constant	-0,579	0,503		
Rental value office	Consumer confidence (1)	0,266	0,019	0,61	34
	Constant	-0,579	0,503		

Het resultaat



Accuraat

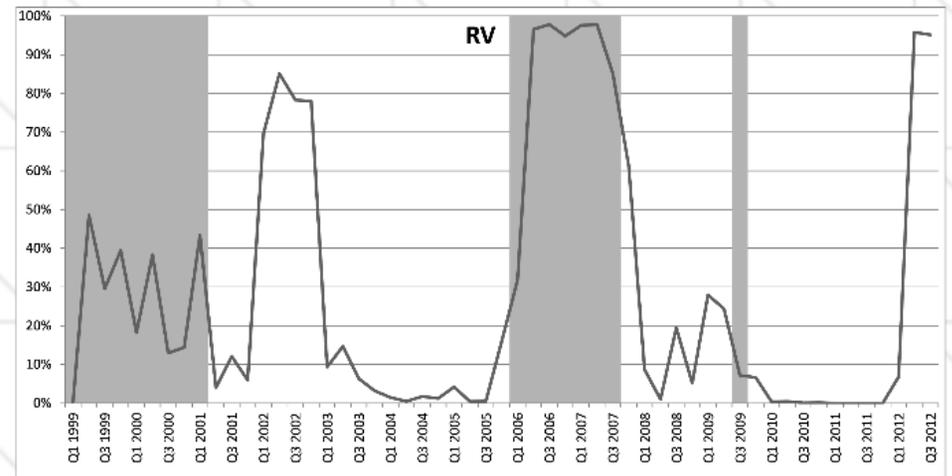
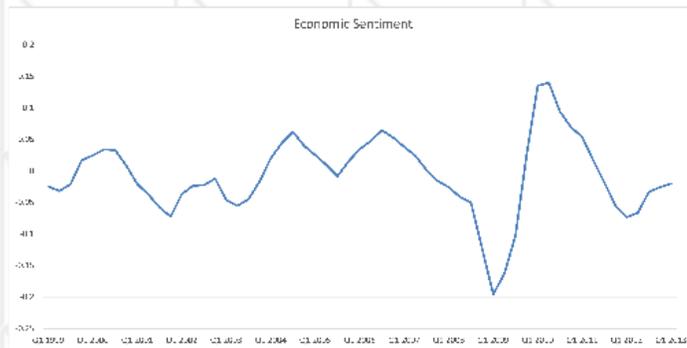
Model	Cutoff point	Cor. pred. naïve model (%)	Cor. pred. model (%)	Gain (%)
Yield Shift Overall	0,67	47,3	72,7	25,5
Yield Shift Retail	0,52	56,4	84,6	28,3
Yield Shift Industrial	0,45	60,0	81,8	21,8
Yield Shift Office	0,57	63,6	70,9	7,3
Rental Value Overall	0,29	69,1	79,2	10,2
Rental Value Retail	0,47	56,4	80,0	23,6
Rental Value Industrial	0,26	80,0	89,1	9,1
Rental Value Office	0,26	74,5	94,3	19,8

Zowel voor Nederland, U.K. en U.S.

In de praktijk...

- Bijhouden van huidige bezit
- Asset allocation
- Combineren met "gevoel"

Dashboards



Asset allocation

Land	Rental Value	Yield Shift
Nederland	+	-
U.K.	-	+
U.S.	-	-

Sector	Rental Value	Yield Shift
Winkels	+	-
Industrie	-	+
Kantoren	-	+

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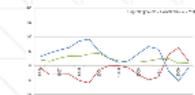
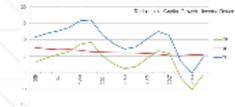
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Statistisch correct
Logistische regressie
 - Toekomstige groei van 10 punten
 - 100% correcte voorspelling van de toekomstige groei
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