AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Drivers of risk balancing behavior in the EU–15

Yann de Mey, Frankwin van Winsen, Erwin Wauters, Mark Vancauteren, Ludwig Lauwers, Steven Van Passel

2013 Annual Meeting of the SCC-76 "Economics and Management of Risk in Agriculture and Natural Resources" Group, March 14-16, Pensacola, Florida

universiteit hasselt

KNOWLEDGE IN ACTION

Introduction: Risk Balancing

- Seminal paper by Gabriel and Baker (1980)
- Strategic adjustments in FR in response to changes in BR
  - *Business Risk*
    - Market/price risk
    - Production risk
    - Institutional risk

$$BR = CV(NOI) = \frac{\sigma_{NOI}}{\mu_{NOI}}$$

  - *Financial Risk*
    - Financing
    - Liquidity / solvability

$$FR = \frac{\sigma_{NOI}}{\mu_{NOI}} \frac{I}{\mu_{NOI} - I} = BR \,.\, \frac{I}{\mu_{NOI} - I}$$

  - *Total Risk*
    - BR +/× FR

$$TR = CV(NOI - I) = \frac{\sigma_{NOI-I}}{\mu_{NOI} - I}$$

universiteit hasselt KNOWLEDGE IN ACTION

Introduction: Risk Balancing

Profitability strategy

Risk balancing paradox (Featherstone et al., 1988)

universiteit hasselt KNOWLEDGE IN ACTION

Introduction: Risk Balancing

Risk management strategy

universiteit hasselt KNOWLEDGE IN ACTION

Introduction: Risk Balancing

Author	Year	Type	Theoretical/empirical	Case/data	Methodology	Confirmation
Gabriel and Baker	1980	Journal	Theoretical	Aggregate US data		n.a.
			Empirical (prelim)		Linear regression	Yes
Collins	1985	Journal	Theoretical	n.a.	n.a.	Yes, conditional
Featherstone et al	1988	Journal	Theoretical	n.a.	n.a.	Yes
Turvey and Baker	1989	Journal	Theoretical	n.a.	Expected utility model of optimal hedging	No
Moss et al	1990	Journal	Empirical	Aggregate US data	Autoregressive conditional heteroskedastic model	Yes
Featherstone et al	1990	Journal	Empirical	US Crop-hog farm	Discrete stochastic programming model	?
Ahrendsen et al	1994	Journal	Empirical	US dairy farm data (110)	Econometric models	Yes
Jensen et al	1996	Journal	Empirical	US Kansas farm data (552)	Tobit regression on panel data	Yes
Ramirez et al	1997	Journal	Theoretical + example	n.a.	Reformulate the Collins (1985) risk balancing model	Yes
Escalante and Barry	2001	Journal	Empirical	Representative US grain farm	Optimization in a simulation framework	Yes, conditional
Escalante and Barry	2003	Journal	Empirical	80 US grain farms	Econometric, Regression Analysis using (i) longitudinal data and (ii) cross-sectional time series	Yes, conditional
Escalante and Rejesus	2008	Journal	Empirical	Representative US grain farm	Simulation-optimization	Yes, conditional
Turvey and Kong	2009	Journal	Empirical	Chinese smallholders	Regression	Yes

universiteit hasselt KNOWLEDGE IN ACTION

Introduction: Risk Balancing

- My research
  - European evidence
  - # countries
  - # farm typologies
  - Large scale: FADN dataset (154.957 farms, 1995-2008, unbalanced, 755.310 observations)
- 2 papers
  - Farm-level evidence on risk balancing behavior in the EU-15
    - Historical evidence of risk balancing
  - Drivers of risk balancing behavior in the EU–15
    - Determinants of risk balancing behavior

universiteit hasselt KNOWLEDGE IN ACTION

Farm-level evidence on risk balancing behavior in the EU-15

2013 Annual Meeting of the SCC-76 "Economics and Management of Risk in Agriculture and Natural Resources" Group, March 14-16, Pensacola, Florida

universiteit hasselt

KNOWLEDGE IN ACTION

Farm-level evidence on risk balancing behavior in the EU-15

- Historical evidence of risk balancing
- Methodology
  - Linear fixed effects regression (Gabriel and Baker, 1980)

$$\ln(FR)_{i,t} = \alpha_i + \beta_1 \ln(BR)_{i,t-1} + \beta_2 \ln\left(\frac{I}{D}\right)_{i,t-1} + \beta_3 \ln\left(\frac{NOI}{A}\right)_{i,t-1} + \beta_4 \ln(Area)_{i,t} + \beta_5 (Age)_{i,t} + \sum_{k=1}^{K-1} \delta_k Type_k + \sum_{m=1}^{M-1} \theta_m Country_m + \sum_{t=1}^{T-1} \varphi_t Year_t + \varepsilon_{i,t}$$

  - Risk balancing correlation measures (Escalante and Barry, 2003)

$Corr(FR_t, BR_{t-1})$

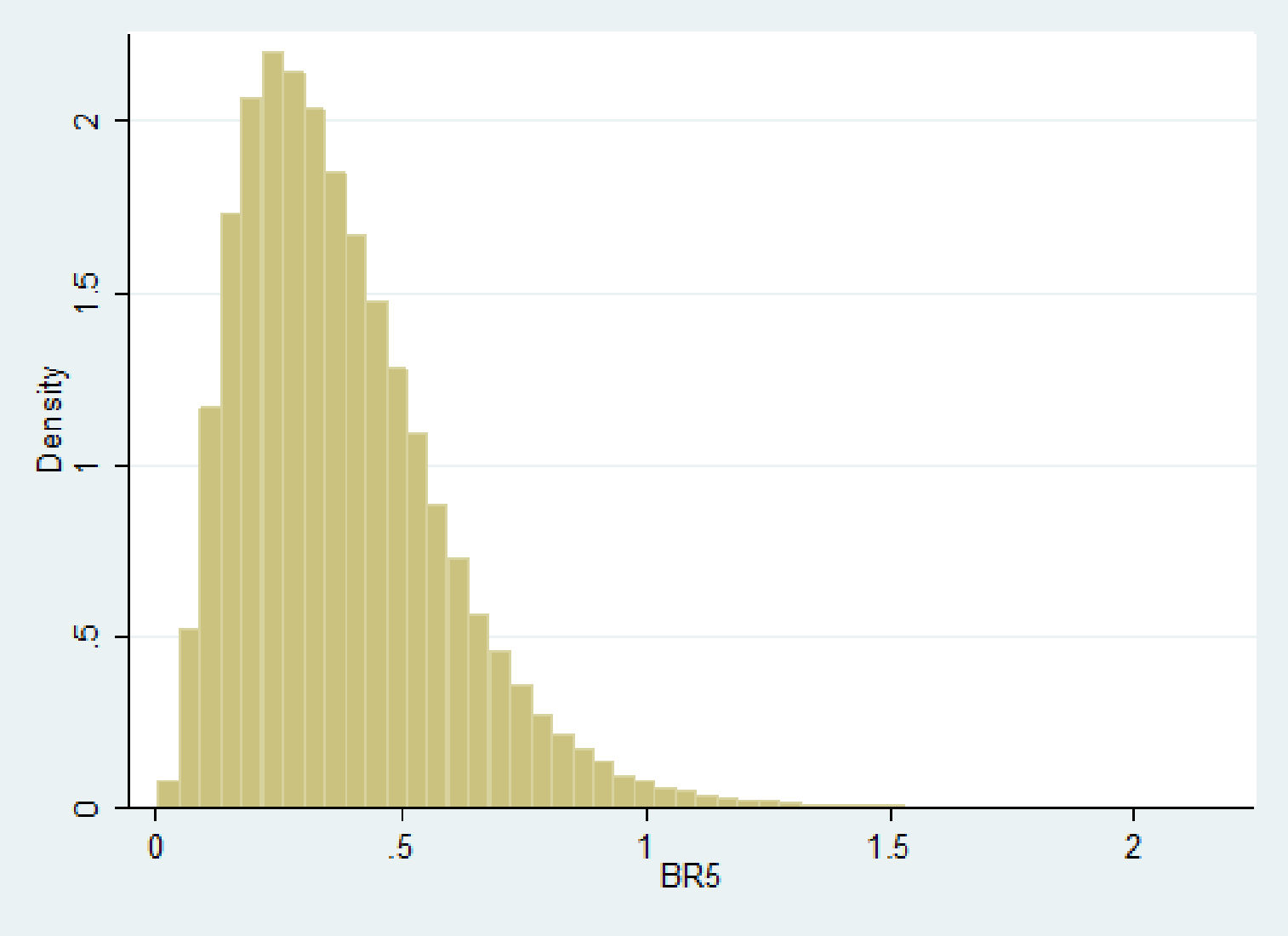
universiteit hasselt KNOWLEDGE IN ACTION

Farm-level evidence on risk balancing behavior in the EU-15

Year	FR	NOI	σ(NOI)	μ(NOI)	BR_t	BR_{t-1}	FR_t	RB_3	RB_4	RB_5
1999	0.176	39,878								
2000	0.120	49,996								
2001	0.110	49,059	5,591	46,311	0.121					
2002	0.079	61,598	6,985	53,551	0.130	0.121	0.079			
2003	0.088	54,195	6,304	54,951	0.115	0.130	0.088			
2004	0.042	70,598	8,214	62,130	0.132	0.115	0.042	-0.891		
2005	0.060	42,789	13,979	55,861	0.250	0.132	0.060	-0.733	-0.528	
2006	0.033	71,200	16,232	61,529	0.264	0.250	0.033	0.659	0.537	0.588
2007	0.026	59,844	14,300	57,944	0.247	0.264	0.026	0.995	0.798	0.691
2008	0.034	45,720	12,765	58,921	0.217	0.247	0.034	0.987	0.994	0.808

universiteit hasselt KNOWLEDGE IN ACTION

Farm-level evidence on risk balancing behavior in the EU-15



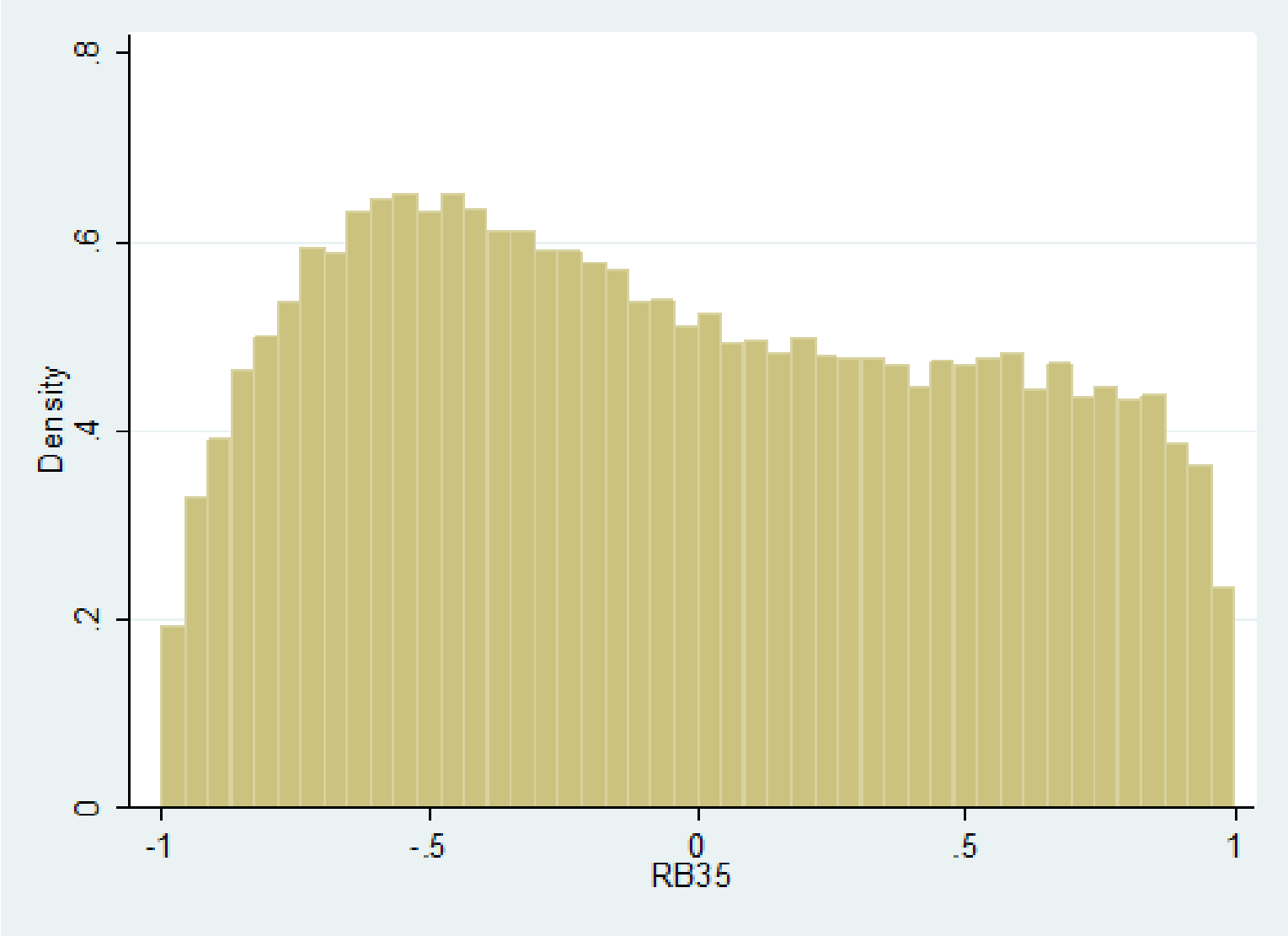
universiteit hasselt KNOWLEDGE IN ACTION

Farm-level evidence on risk balancing behavior in the EU-15

Year	FR	NOI	σ(NOI)	μ(NOI)	BR_t	BR_{t-1}	FR_t	RB_3	RB_4	RB_5
1999	0.176	39,878								
2000	0.120	49,996								
2001	0.110	49,059	5,591	46,311	0.121					
2002	0.079	61,598	6,985	53,551	0.130	0.121	0.079			
2003	0.088	54,195	6,304	54,951	0.115	0.130	0.088			
2004	0.042	70,598	8,214	62,130	0.132	0.115	0.042	-0.891		
2005	0.060	42,789	13,979	55,861	0.250	0.132	0.060	-0.733	-0.528	
2006	0.033	71,200	16,232	61,529	0.264	0.250	0.033	0.659	0.537	0.588
2007	0.026	59,844	14,300	57,944	0.247	0.264	0.026	0.995	0.798	0.691
2008	0.034	45,720	12,765	58,921	0.217	0.247	0.034	0.987	0.994	0.808

universiteit hasselt KNOWLEDGE IN ACTION

Farm-level evidence on risk balancing behavior in the EU-15



universiteit hasselt KNOWLEDGE IN ACTION

Farm-level evidence on risk balancing behavior in the EU-15

Year	FR	NOI	σ(NOI)	μ(NOI)	BR_t	BR_{t-1}	FR_t	RB_3	RB_4	RB_5
1999	0.176	39,878								
2000	0.120	49,996								
2001	0.110	49,059	5,591	46,311	0.121					
2002	0.079	61,598	6,985	53,551	0.130	0.121	0.079			
2003	0.088	54,195	6,304	54,951	0.115	0.130	0.088			
2004	0.042	70,598	8,214	62,130	0.132	0.115	0.042	-0.891		
2005	0.060	42,789	13,979	55,861	0.250	0.132	0.060	-0.733	-0.528	
2006	0.033	71,200	16,232	61,529	0.264	0.250	0.033	0.659	0.537	0.588
2007	0.026	59,844	14,300	57,944	0.247	0.264	0.026	0.995	0.798	0.691
2008	0.034	45,720	12,765	58,921	0.217	0.247	0.034	0.987	0.994	0.808

universiteit hasselt KNOWLEDGE IN ACTION

Farm-level evidence on risk balancing behavior in the EU-15

Country	Proportion (%)	Average coefficient risk balancers	Average coefficient non-risk balancers
Belgium	54.8*	-0.47	0.47
Denmark	55.6*	-0.49	0.48
Germany	54.8*	-0.47	0.46
Greece	50.2	-0.46	0.50
Spain	54.3*	-0.47	0.49
France	56.9*	-0.47	0.46
Ireland	53.1*	-0.45	0.47
Italy	55.2*	-0.47	0.48
Luxembourg	52.7	-0.49	0.51
The Netherlands	49.5	-0.46	0.48
Austria	51.3*	-0.46	0.48
Portugal	48.6	-0.47	0.50
Finland	52.1*	-0.49	0.47
Sweden	55.5*	-0.47	0.48
United Kingdom	54.9*	-0.45	0.49
Farm type			
Fieldcrops	54.7*	-0.47	0.47
Horticulture	55.8*	-0.46	0.48
Wine	56.8*	-0.46	0.47
Other permanent crops	52.5*	-0.47	0.48
Milk	59.9*	-0.50	0.45
Other grazing livestock	53.6*	-0.47	0.48
Granivores	58.0*	-0.47	0.46
Mixed	55.0*	-0.46	0.46
Overall	**54.2***	**-0.47**	**0.47**

universiteit hasselt KNOWLEDGE IN ACTION

Drivers of risk balancing behavior in the EU–15

2013 Annual Meeting of the SCC-76 "Economics and Management of Risk in Agriculture and Natural Resources" Group, March 14-16, Pensacola, Florida

universiteit hasselt

KNOWLEDGE IN ACTION

Drivers of risk balancing behavior in the EU–15

- Determinants of risk balancing behavior
- Methodology
  - Probit regression

$$P(RBdum_{i,t+1} = 1 | \overline{X_{i,t}}) = \Phi\left(\begin{array}{c} \alpha + \sum_{k=1}^{6} \beta_k \overline{X_{k,i,t}} + \sum_{k=7}^{14} \beta_k \ln(\bar{X}_{k,i,t}) \\ + \sum_{m=1}^{7} \delta_m T_m + \sum_{n=1}^{14} \theta_n C_n + \sum_{t=1}^{13} \varphi_t Y_t + \varepsilon_{i,t} \end{array} \right)$$

  - Linear fixed effects regression

$$RB_{i,t+1} = \alpha_i + \sum_{k=1}^{6} \beta_k \bar{X}_{k,i,t} + \sum_{k=7}^{14} \beta_k \ln(\bar{X}_{k,i,t}) + \sum_{m=1}^{7} \delta_m T_m + \sum_{n=1}^{14} \theta_n C_n + \sum_{t=1}^{13} \varphi_t Y_t + \varepsilon_{i,t}$$

universiteit hasselt KNOWLEDGE IN ACTION

Drivers of risk balancing behavior in the EU–15

- Farm operator related factors
  - Age (+)
  - Level of risk loving (-)
- Farm related factors
  - Total risk (+)
  - Area (+)
  - Tenure ratio (-)
  - Operating efficiency (+)
  - Leverage (+/-)
  - Cost of debt (+/-)
  - Asset profitability (+/-)
  - Subsidies (+/-)
- Risk management strategies
  - Insurance (+/-)
  - Diversification (+/-)

universiteit hasselt KNOWLEDGE IN ACTION

Drivers of risk balancing behavior in the EU–15

Probit model results [RB versus non-RB]

Variable	RBdum$_3$		RBdum$_4$		RBdum$_5$	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Δ3 Age	0.003***	(0.001)	0.002*	(0.001)	0.001	(0.001)
Δ3 Ln BR/I	-0.176***	(0.017)	-0.103***	(0.023)	0.020	(0.032)
Δ3 Ln TR$_{3/4/5}$	0.307***	(0.017)	0.277***	(0.025)	0.205***	(0.034)
Δ3 Ln Area	-0.012	(0.014)	0.006	(0.017)	0.013	(0.022)
Δ3 Tenure	-0.096***	(0.032)	-0.118***	(0.041)	-0.150***	(0.052)
Δ3 Ln OPRAT	0.085**	(0.037)	0.028	(0.047)	-0.013	(0.060)
Δ3 Ln D/A	-0.064***	(0.008)	-0.057***	(0.011)	-0.051***	(0.014)
Δ3 Ln i/D	-0.060***	(0.012)	-0.039**	(0.016)	-0.010	(0.020)
Δ3 Ln NOI/A	-0.008	(0.016)	-0.019	(0.021)	-0.028	(0.027)
Δ3 Sub/A	0.015	(0.015)	0.012	(0.020)	0.008	(0.026)
Δ3 Ln I/A	-0.186***	(0.021)	-0.105***	(0.029)	0.003	(0.038)
Δ3 Div$_{ent}$	-0.029	(0.060)	-0.064	(0.076)	-0.121	(0.096)
Δ3 Div$_{crops}$	-0.013	(0.043)	-0.024	(0.055)	-0.067	(0.069)
Δ3 Div$_{animal}$	-0.208***	(0.052)	-0.150**	(0.066)	-0.144*	(0.085)
Constant	-0.212	(0.144)	-0.028	(0.188)	0.243	(0.245)
Year/Country/Typology dummies (omitted for brevity)						
R^2 Pseudo	0.014		0.011		0.012	
Log-Likelihood	-20,804		-13,605		-8,928	
Chi^2	612.05***		307.89***		212.49***	
N	30,543		19,986		13,160	

universiteit hasselt KNOWLEDGE IN ACTION

Drivers of risk balancing behavior in the EU–15

Linear FE model results [extent of RB effect]

Variable	RB_3		RB_4		RB_5	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Δ3 Age	0.004**	(0.002)	0.003*	(0.001)	0.003***	(0.001)
Δ3 Ln BR/I	-0.155***	(0.024)	-0.057***	(0.021)	0.008	(0.025)
Δ3 Ln $TR_{3/4/5}$	0.203***	(0.030)	0.180***	(0.018)	0.129***	(0.023)
Δ3 Ln Area	-0.033	(0.042)	-0.057	(0.043)	-0.068*	(0.039)
Δ3 Tenure	-0.084**	(0.037)	-0.103**	(0.050)	0.020	(0.046)
Δ3 Ln OPRAT	0.063	(0.087)	0.059	(0.071)	-0.020	(0.092)
Δ3 Ln D/A	-0.074***	(0.013)	-0.086***	(0.012)	-0.096***	(0.009)
Δ3 Ln i/D	-0.047***	(0.016)	-0.048**	(0.022)	-0.011	(0.017)
Δ3 Ln NOI/A	-0.047*	(0.026)	-0.061**	(0.024)	-0.071***	(0.022)
Δ3 Sub/A	-0.087**	(0.034)	-0.111***	(0.021)	-0.148***	(0.016)
Δ3 Ln I/A	-0.138***	(0.040)	-0.047***	(0.018)	-0.010	(0.016)
Δ3 Div_{ent}	0.113	(0.090)	0.050	(0.080)	0.065	(0.077)
Δ3 Div_{crops}	0.032	(0.101)	0.077	(0.065)	0.148**	(0.069)
Δ3 Div_{animal}	-0.175	(0.119)	0.025	(0.122)	0.028	(0.176)
Constant	-0.481	(0.426)	0.409*	(0.235)	0.746**	(0.304)
Year/Country/Typology dummies (omitted for brevity)						
R^2 Within	0.021		0.019		0.017	
F-test Statistic	10690.11***		45.55***		2.53	
N	30,543		19,986		13,160	

universiteit hasselt KNOWLEDGE IN ACTION

Conclusions

- Historical evidence on risk balancing in EU-15
- Differences between countries and typologies
- Drivers occurrence/extent very similar
- Determinants: Age, risk loving, total risk, tenure, leverage, costs of debt, alternative risk management strategies
- Influence of window of calculation BR or RB limited
- Future research: risk management versus profitability strategy

universiteit hasselt KNOWLEDGE IN ACTION

Drivers of risk balancing behavior in the EU–15

Questions?

yann.demey@uhasselt.be

2013 Annual Meeting of the SCC-76 "Economics and Management of Risk in Agriculture and Natural Resources" Group, March 14-16, Pensacola, Florida

universiteit hasselt

KNOWLEDGE IN ACTION