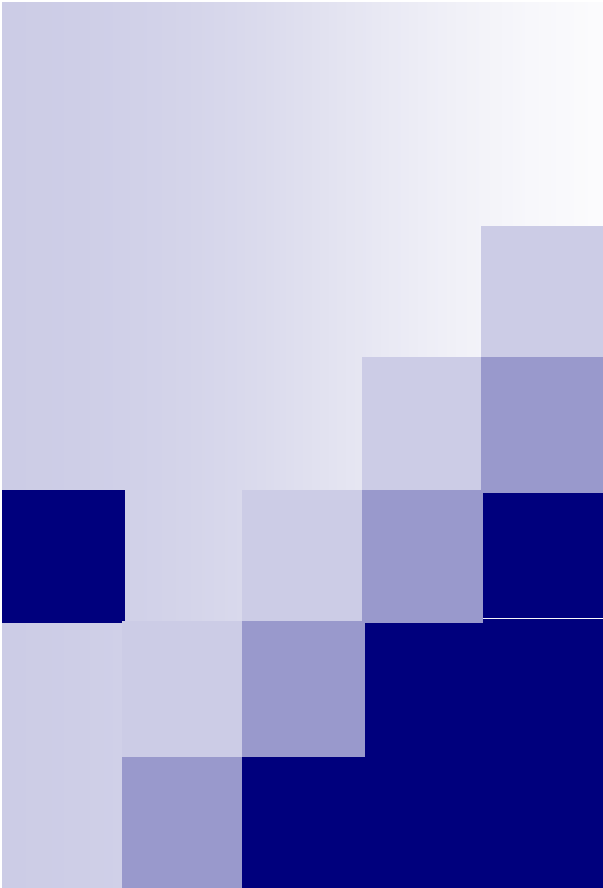




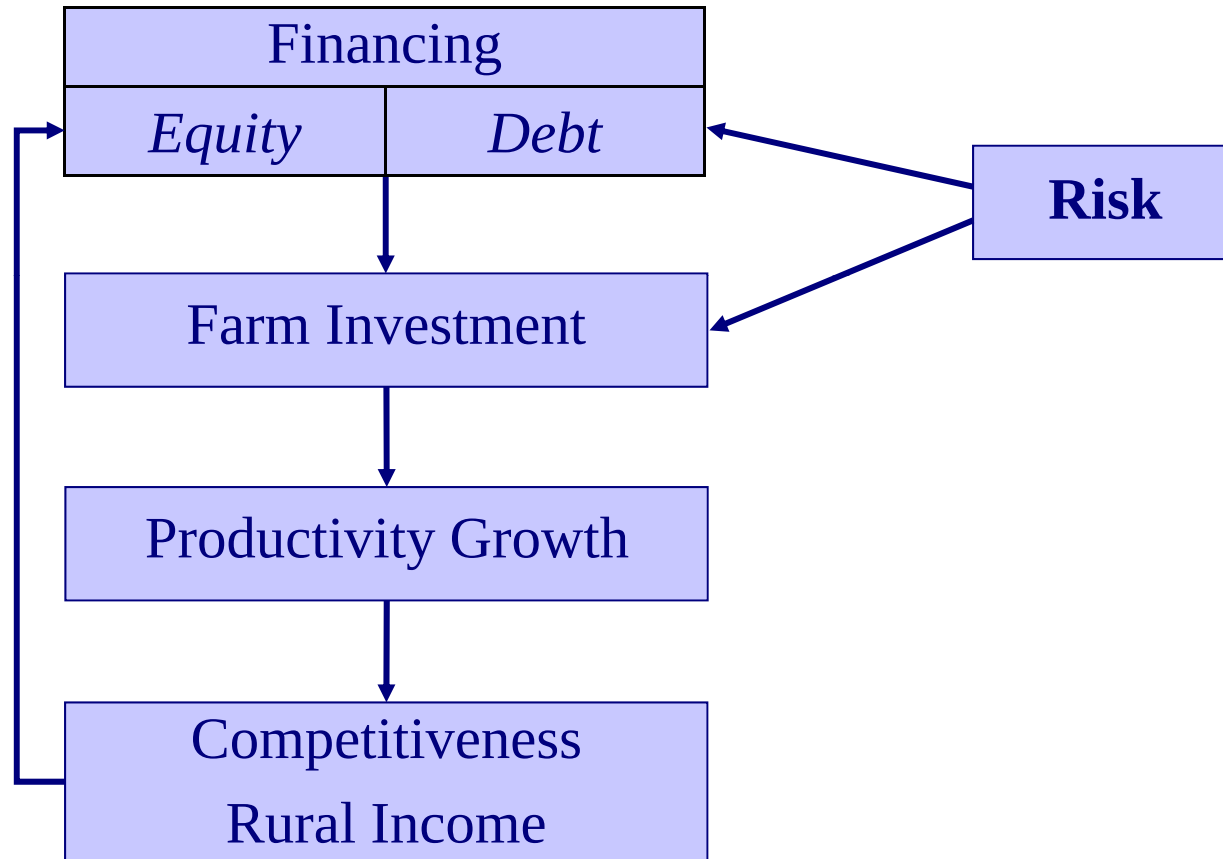
Index-based-Insurance in Agriculture:

A suitable Production Risk Management Tool for ECA?

Martin Odening, Oliver Mußhoff,
Roman Shynkarenko, Federica Angelucci

Presentation prepared for the EastAgri 2008 Annual
Meeting, Paris

Background

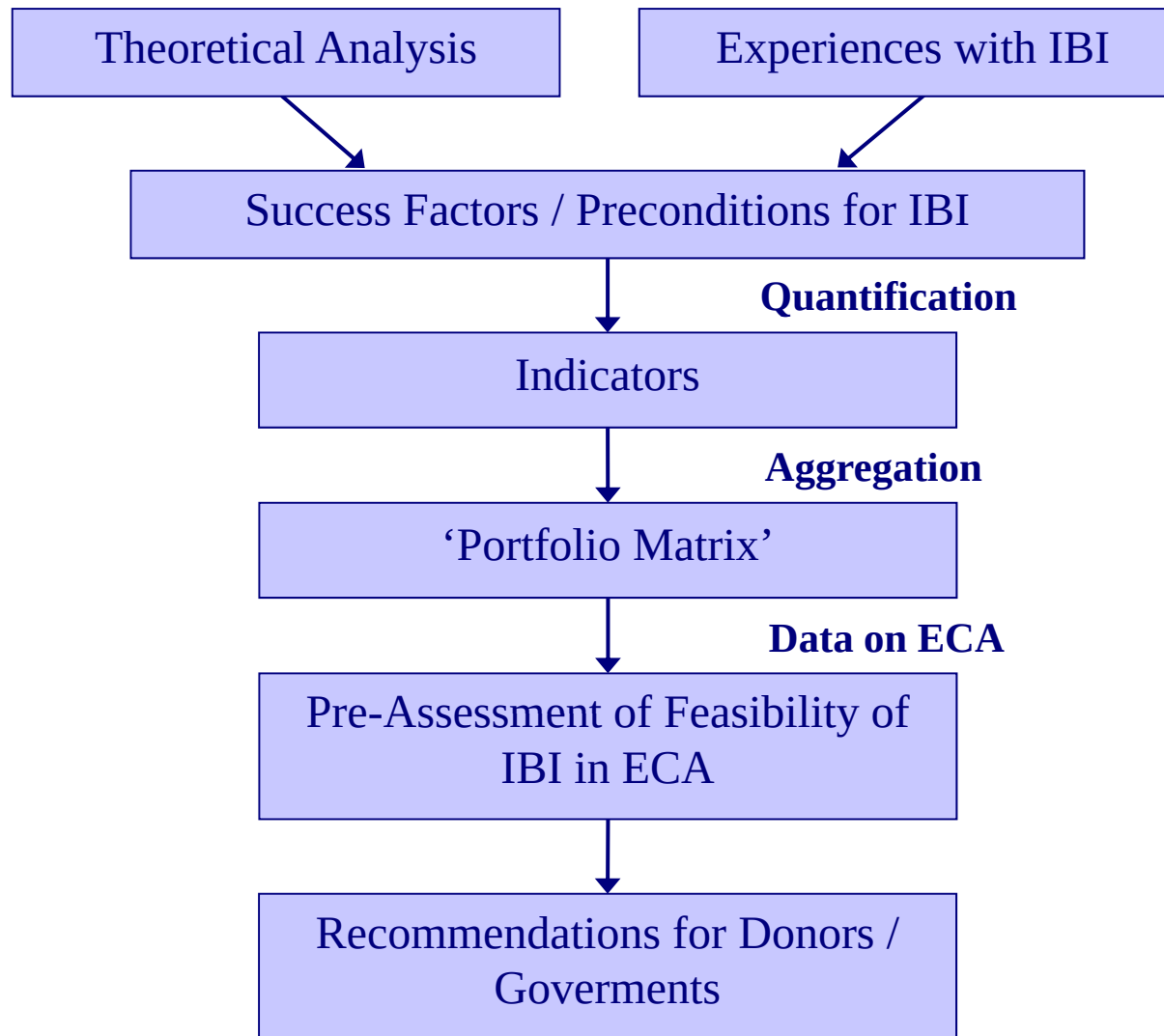




Objectives of the Study

- Analysis of (Dis) Advantages of Index-based Insurance (IBI)
- For which ECA countries are IBI suitable risk management tools?

Methods and Data Sources

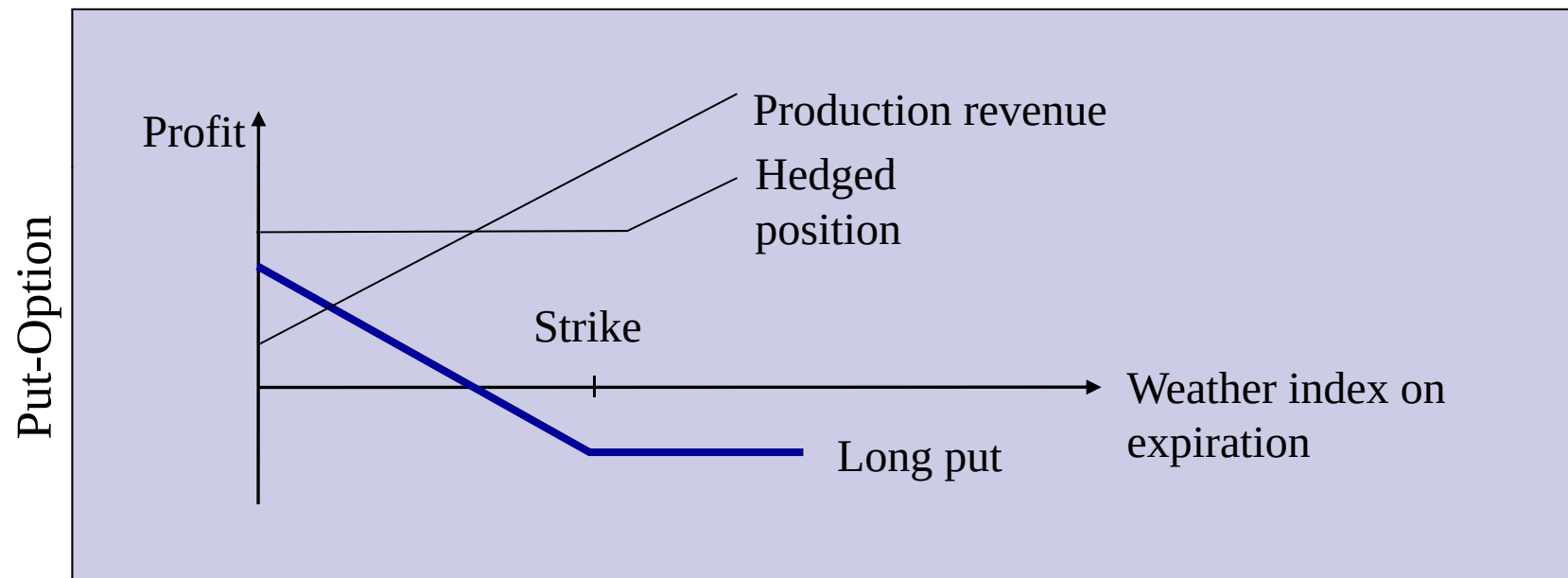




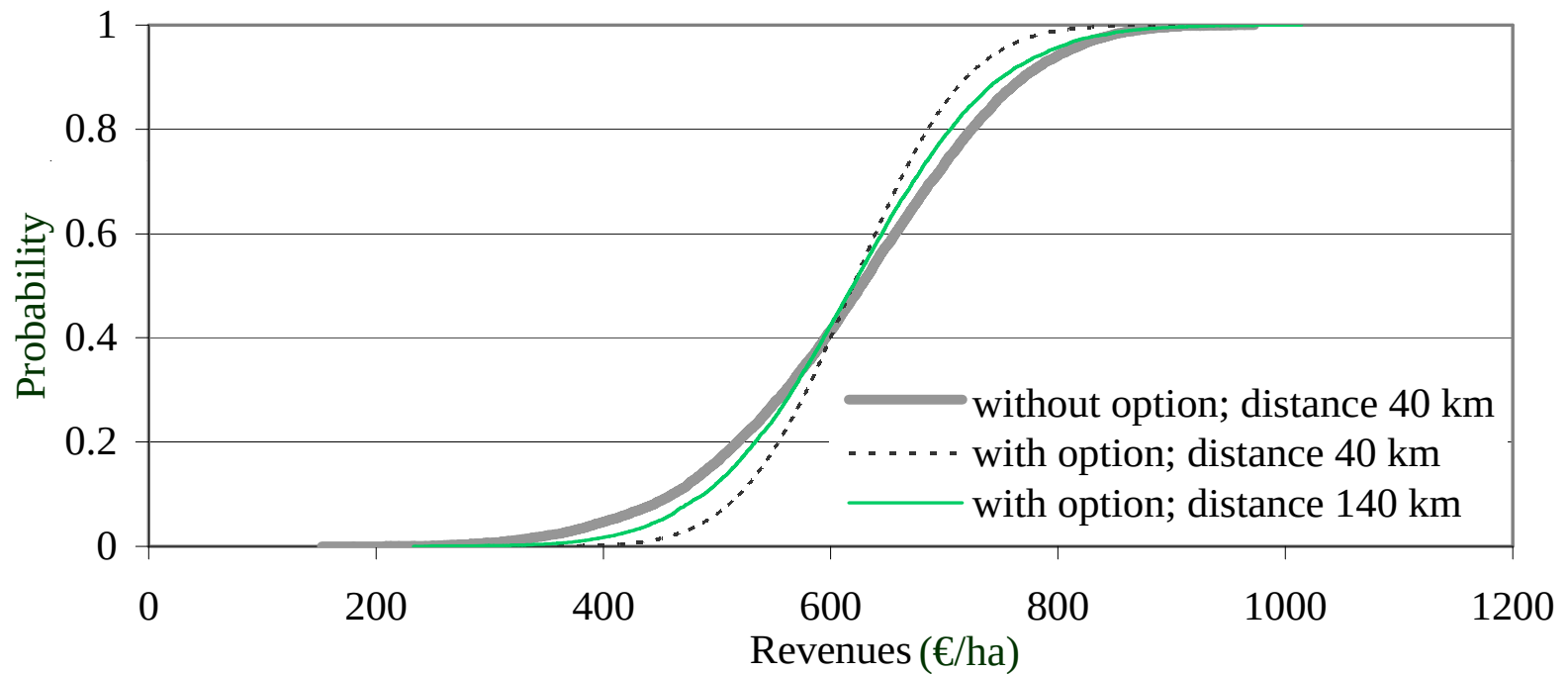
Index-based Insurance

- Definition: Indemnity payments are not directly related to actual losses but to the value of a predefined index
- Possible indexes: Weather (rainfall, temperature), livestock mortality, area yield 
- Potential advantages: no moral hazard, no adverse selection, low transaction costs for loss adjustments, prompt indemnity payments
- Potential disadvantages: high basis risk, unfamiliarity with the concept 

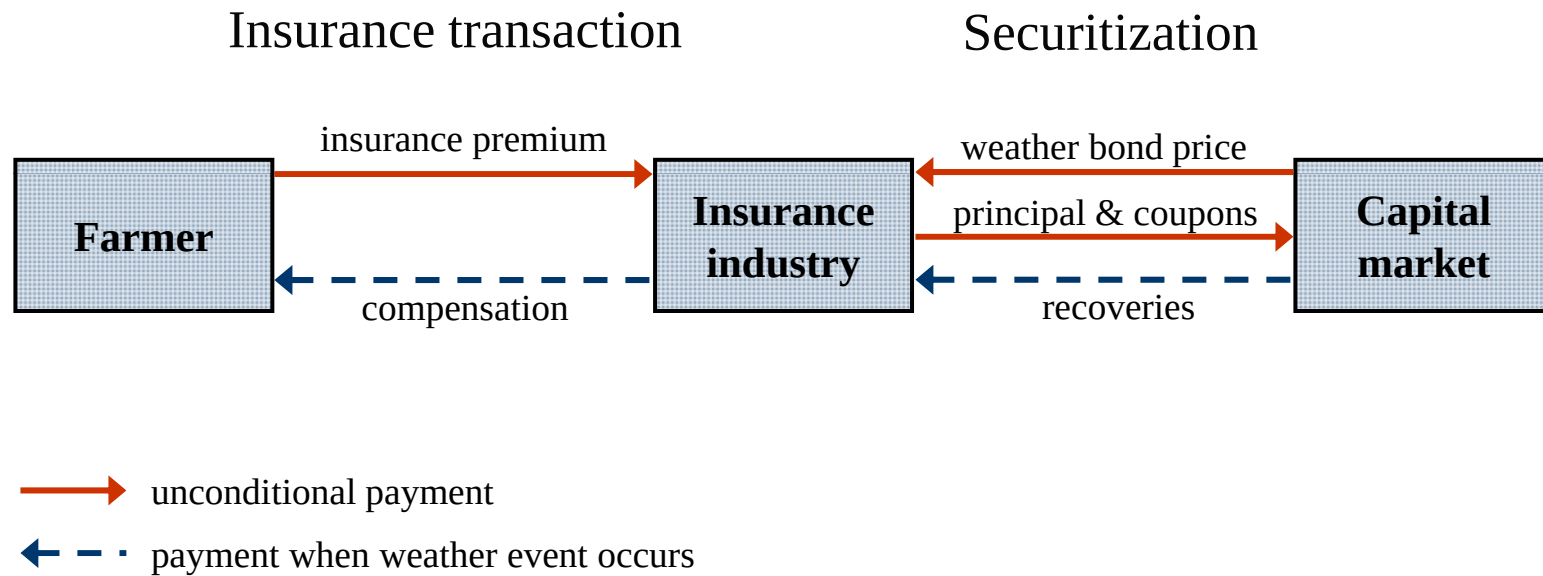
Hedging Strategy Using Weather Derivatives



Revenue Distribution with and without Hedging



ART at Different Risk Layers



Overview about Practical Experiences with IBI

Country	Index type	Risk level	Status	Comments
USA	Area based crop yield	Farmer level	Marketed	Subsidized by the government
USA	Area average crop revenue	Farmer level	Marketed	Facilitated by commodity markets
Canada	Area based crop yield	Farmer level	Marketed	
India	Area based crop yield	Farmer level	Marketed	Subsidized Mandatory if linked to credit
India	Cumulative rainfall	Farmer level	Piloted and marketed	Linked with credit
Mongolia	Area average livestock mortality rate	Farmer level	Piloted	Governmental intervention on the certain trigger of herd loss
Mexico	Cumulative rainfall	Public reinsurance program	Piloted and marketed	
Mexico	Vegetation	National level	Marketing stage	Purchased by the government
Ethiopia	Cumulative rainfall	National level	Piloted	Financed by the World Food Program
Malawi	Cumulative rainfall	Farmer level	Piloted	Linked with credit
Uganda	Cumulative rainfall	Farmer level	Contracts are actually designed	
Kenya	Cumulative rainfall	Farmer level	Contracts are actually designed	
Tanzania	Cumulative rainfall	Farmer level	Contracts are actually designed	
Nicaragua, Honduras, Guatemala	Cumulative rainfall	National level	Contracts are actually designed	Not adopted
Vietnam	Cumulative temperature / Flood level	Farmer level	Contracts are actually designed	Not adopted
Ukraine	Soil moisture / Air moisture	Farmer level	Piloted and discontinued	
Peru	ENSO ¹ based	Farmer level	Contracts are actually designed	
Morocco	Cumulative rainfall	Farmer level	Piloted	Not adopted

¹ ENSO – El Nino Southern Oscillation is the index measuring the Pacific sea surface temperature



Preconditions and Success Factors of IBI in Agriculture

- Factors determining the *demand* for IBI
 - Risk exposure of the farms
 - Hedging effectiveness of the instrument
 - Risk attitude of the decision maker
 - (Non) Existence of effective alternative risk reduction instruments
 - Transparency of insurance products
 - Cost of insurance
 - Policy environment



Preconditions and Success Factors of IBI in Agriculture

- Factors determining the *supply* of IBI
 - Cost of insurance product development
 - Cost of delivery
 - Cost to control adverse selection and moral hazard
 - Cost of loss adjustment
 - Market potential and volume
 - Risk premium
 - Political, legal and institutional factors

Indicators for the Potential of IBI in ECA Countries (1)

Aspect	Indicator	Rationale
Importance of agriculture	• Share of agriculture in GDP • Value of agricultural production • Share of agricultural labor	What is at stake?
Structure of agriculture and agricultural production	• Number of farms • Number of commercial farms • Average farm size and distribution • Acreage and value of the 3 or 4 most important crops • Number of 2-3 most important livestock	Size and fragmentation of demand side; Identification of most important products; Diversification potential
Yield risk	• Average, range and volatility of per hectare yields of the top 3 products based on time series (at least 10 years) of yield data at lowest regional level	Assessment of yield risk exposure
Weather risk	• Average, range and volatility of rainfall sum (annual or during main vegetation period) based on time series of at least 10 years	Assessment of weather risk
Spatial heterogeneity of weather	• Number of (micro)climate zones	Estimation of geographical basis risk

Indicators for the Potential of IBI in ECA Countries (2)

Aspect		Indicator	Rationale
Data	yield	• Products • Regional level (country, state, region) • Length of time series	Informational basis for construction of indexes
	weather	• Type of weather data • Length of time series • Number of weather stations	
Financial sector		• Number of banks / branch banks • Financial depth (money supply to GDP) • Financial leverage in agriculture (debt / total assets) • Farm capital per hectare	Potential interest in IBI Vulnerability w.r.t. risk
Insurance sector		• Number of (re)insurance companies • Insurance premia to GDP • Agricultural insurance programs in place	Penetration of insurance and infrastructure for supplying policies; Potential interest in IBI
Legal environment and agricultural policy		• Existence of (agricultural) insurance law • Share of subsidies in farm income • Existence of direct payments	Income stabilization by alternative measures

Example of a Country Profile

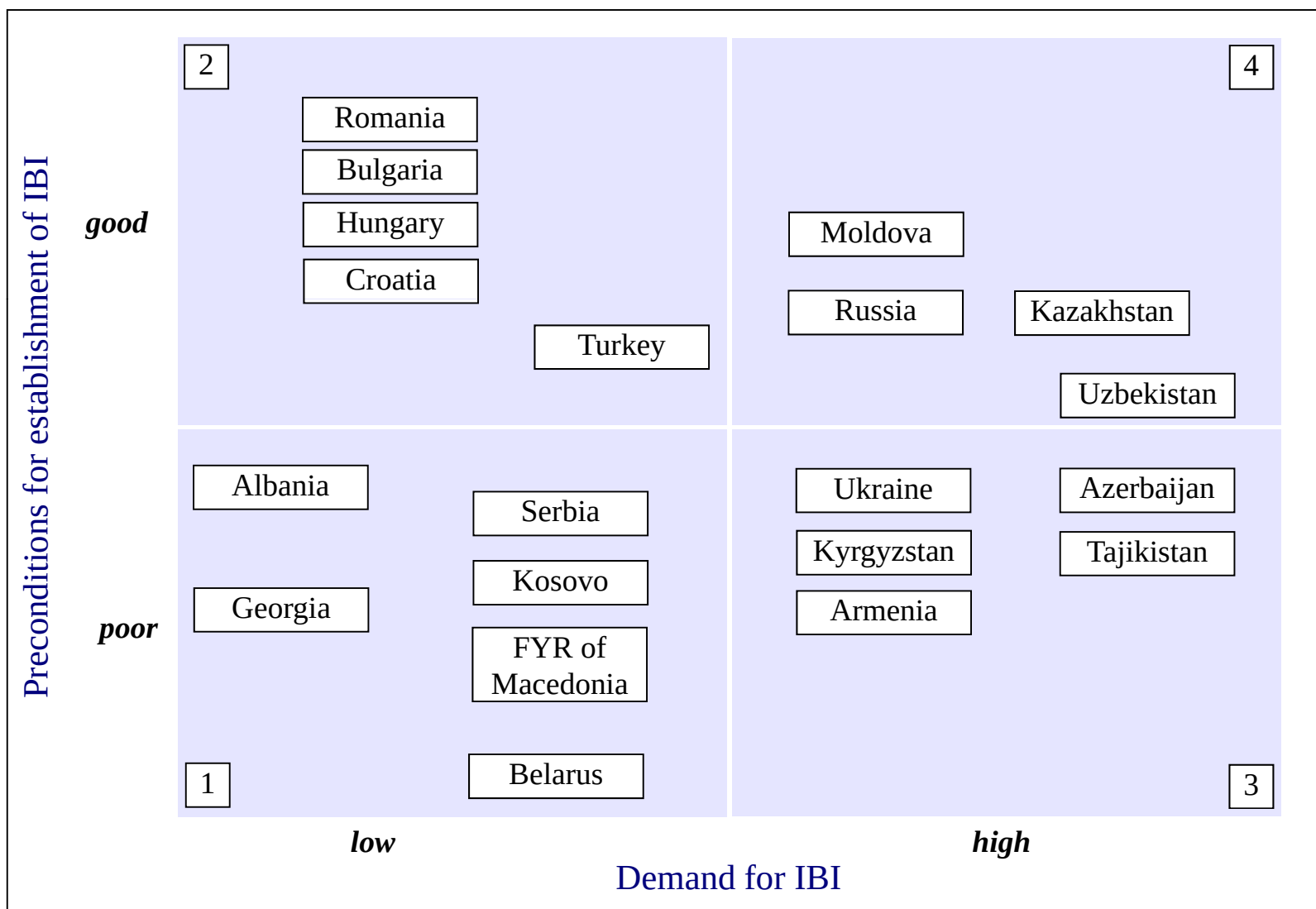
Country profile - Kazakhstan -

Aspect	Indicator	Value
Importance of agriculture	Share of agriculture in GDP	7%
	Value of agricultural production	5.4 billion USD
	Share of agricultural labor	34%
Structure of agriculture and agricultural production	Number of farms	2,160,000
	Number of commercial farms:	
	- Peasant farms	156,000
	- Corporate farms	4,600
	Average farm size	0.1 ha (household plots) 56.5 ha (peasant farms) 2,809 ha (corporate farms)
	Acreage, value and value share of the 3 most important crops:	
	- Wheat	11,785,551 ha; 1,73 mil.USD; 32%
	- Potatoes	168,200 ha; 366 million USD; 7%
	- Barley	1,642,380 ha; 151 million USD; 3%
Yield risk	Mean, variance and coefficient of variation (hectare yield of wheat)	8.95
		6.48
		0.28
Weather risk	Mean, variance and coefficient of variation (rainfall sum)	261 mm
		1,077
		0.13
Spatial heterogeneity of weather	Number of ecological zones	4 (temperate steppe / prairie, temperate desert, temperate mountain, boreal mountain)
Data weather	Area	2,717,300 sq km
	Number of weather stations	327
	Density	8309
Financial sector	Number of banks / branch banks	34
	Financial depth (money supply to GDP)	Bank loans 2% of GDP
Insurance sector	Number of (re)insurance companies	41
	Insurance premia/GDP	1.36%
	Agricultural insurance programs in place	(Subsidized) mandatory crop insurance (since 2004); mutual insurance
	Existence of (agricultural) insurance law	n.a.
Legal environment and agricultural policy	Existence of direct payments	n.a.
	ECA policy reform index	5.8

Factors Influencing the Potential of IBI in ECA Countries

Country	Importance of agriculture	Fragmentation of agriculture	Yield risk	Weather risk	Spatial heterogeneity of weather	Availability of weather data	Development of financial & Insurance sector	Legal environment
Albania	High	Highly fragmented	Low	Low	High	Good	Medium	Moderate
Armenia	High	Highly fragmented	Moderate	High	Moderate	Good	Medium	Moderate
Azerbaijan	Medium	Highly fragmented	High	High	High	Good	Medium	Moderate
Belarus	Medium	Collectivized	Moderate	Moderate	Low	Medium	Medium	Bad
Bulgaria	Medium	Sharply dual	Moderate	Moderate	High	Medium	High/Medium	Good/Moderate
Croatia	Medium	Highly fragmented	Low/Moderate	Moderate	High	Good	High/Medium	Good/Moderate
Georgia	High	Highly fragmented	Moderate/High	Low	High	Good	Medium	Moderate
Hungary	Medium	Sharply dual	Moderate	Moderate	Low	Good	High/ Medium	Good
Kazakhstan	Medium	Sharply dual	High	High	High	Bad	Medium	Moderate
Kosovo	High	Highly fragmented	Moderate	Moderate	High	n.a.	Medium	Moderate
Kyrgyzstan	Very high	Normal	Moderate	High	Moderate	Bad	Medium	Moderate
Macedonia	High	Highly fragmented	Moderate	Moderate	High	Medium	Medium	Moderate
Moldova	High	Sharply dual	High	High	Moderate	Good	Medium	Moderate
Romania	Medium	Normal	Moderate	Moderate	High	Good	Medium	Moderate
Russia	Medium	Sharply dual	High	High	High	Bad	Medium	Moderate
Serbia	High	Highly fragmented	Moderate	Moderate	High	n.a.	Medium	Moderate
Tajikistan	High	Sharply dual	High	High	Low	Medium	Medium/Low	Moderate
Turkey	High	Normal	Moderate	Moderate	High	Good	High/Medium	Moderate
Ukraine	Medium	Sharply dual	High	High	High	Medium	Medium	Moderate
Uzbekistan	High	Sharply dual	High	High	Moderate	Bad	Medium	Moderate

Portfolio Analysis for ECA Countries





Recommendations

1. Rigorous ex post assessment of IBI
2. In-depth feasibility studies in selected countries ▶
3. Dissemination of study results $\Rightarrow$ policy dialogue
4. Support to the introduction of IBI
 - Improvements in legal and regulatory environment
 - Improvement in data collections
 - Assistance in product development
 - Knowledge transfer and educational efforts
 - Financial support for the coverage of catastrophe losses

Portfolio Analysis for ECA Countries

