How resilient are farms in Germany?
An ex-post analysis of accountancy data

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Background and motivation (i)

Farmers face multiple uncertainties and risks

- Volatile prices for inputs (fertilizer or energy) and agricultural products
- Reforms of the (agricultural) political and regulatory framework
- Climate change brings more extreme weather events (heatwaves, intense rain etc.)
- Outbreaks of (new) animal diseases such as African swine fever or avian flu
- COVID-19 pandemic: breaking off sales channels and shortage of (seasonal) workers
- Market disruptions as a consequence of trade and military conflicts

Background and motivation (ii)

Resilience of farms is a major concern in (EU) agricultural policy

… however, it is a broad term with many aspects.

Following the OECD (2020, p.8):

Resilience is "the ability to prepare and plan for, absorb, recover from, and more successfully adapt and transform in response to adverse events."

But how can we quantify farm resilience, what increases it, and do we see differences across farm types and over time?

Outline

Methodological approach

- How to specify and measure farm resilience?

Data basis

- German FADN data for twenty accountancy years

Results

- On-farm indicators of resilience and changes over time

Summary and conclusions

- … and next working steps

Methodological approach

European Review of Agricultural Economics Vol **49** (**1**) (2022) pp. 121–150
doi:https://doi.org/10.1093/erae/jbab042
Advance Access Publication 13 October 2021

Quantifying the resilience of European farms using FADN

Thomas Slijper[†,‡,*], **Yann de Mey**[†], **P. Marijn Poortvliet**[‡] **and Miranda P. M. Meuwissen**[†]

[†]*Business Economics, Wageningen University & Research, The Netherlands;* [‡]*Strategic Communication, Wageningen University & Research, The Netherlands*

According to Slijper et al (2022) farm resilience comprises the capacities of

i. Robustness

→ extent of income drops, shocks and recovery rate

ii. Adaptability

→ Changes in farming practices, output and input composition (and intensity)

iii. Transformability

→ Major shifts in farm structure (here, changing farm type, switching to part-time farming, converting to organic farming or developing other gainful activities)

Methodological approach

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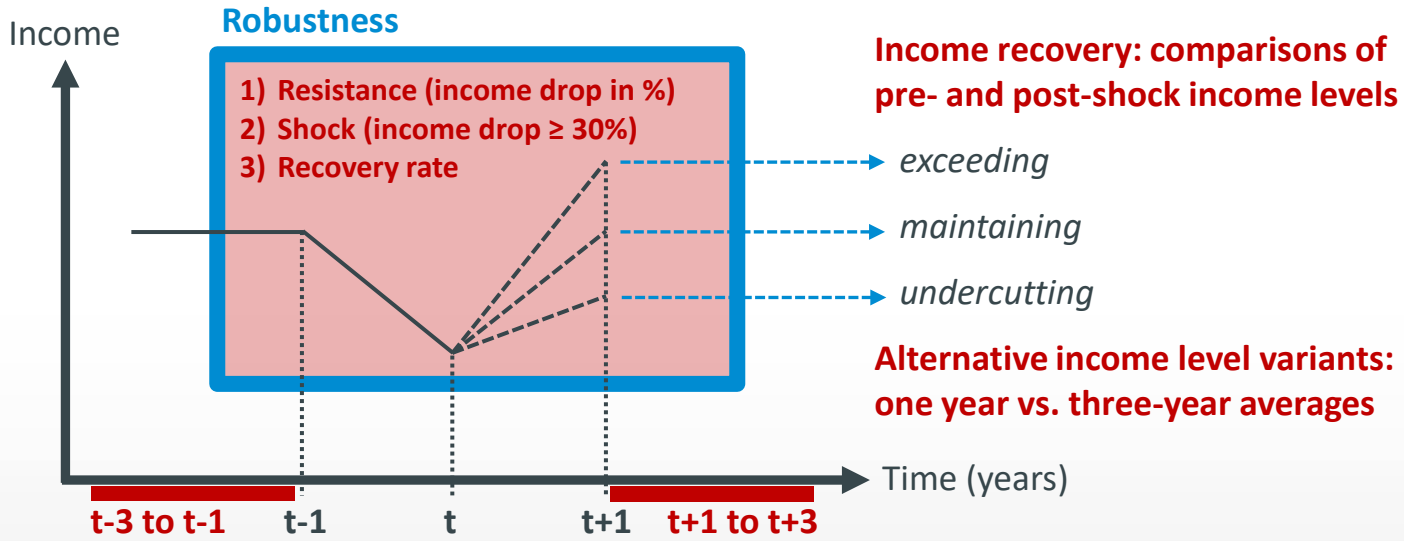
Methodological approach (following Slijper et al. 2022)



Source: According to Sauer (2022), Slijper et al. (2022) and Conway et al. (2010).

Data basis

Farm accountancy data

- German FADN includes more than 8.000 farms per year (⚠ but declining number)

Observation period

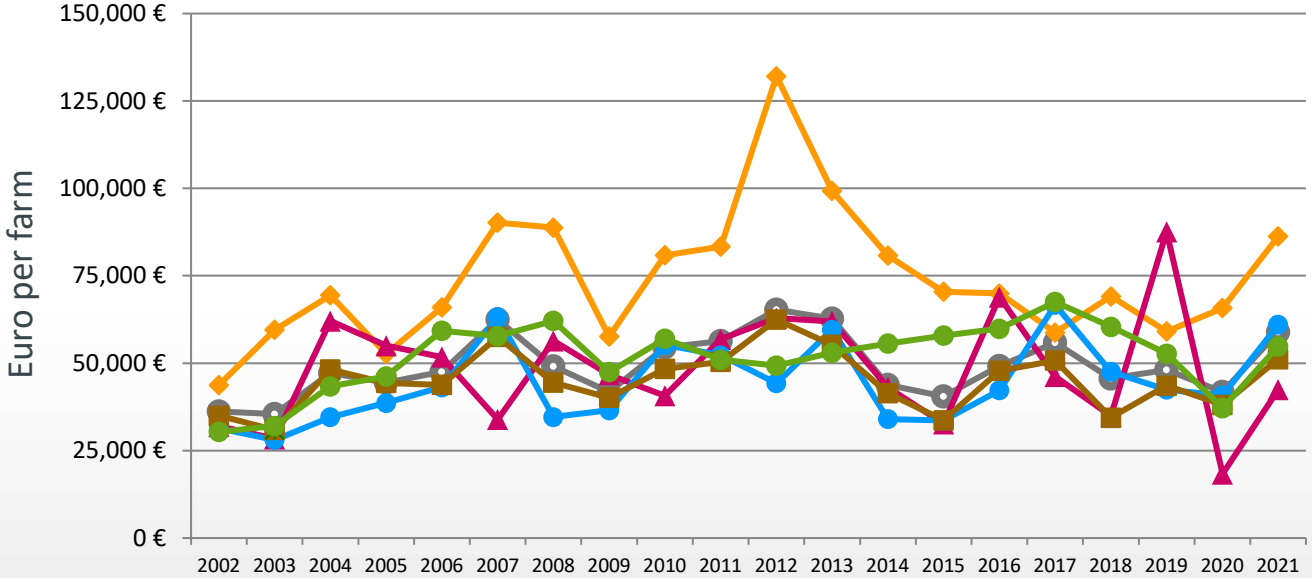
- Accountancy years 2002/03 to 2021/22 (denoted as “2002” to “2021” in the following)

Sample selection

- Full-time family farms (exclusion of part-time farms and legal persons)
- Analysis of same (“identical”) farms, which have records in each year
- → 1.298 farms: 203 crop, 452 dairy, 110 pig and poultry, 162 mixed
  and 42 organic farms

German farm income development

- ✓ *Mixed farms with the lowest, pig and poultry with the highest income variation.*
- ✓ *Crop and dairy farms show a similar income variation, but a different income level.*



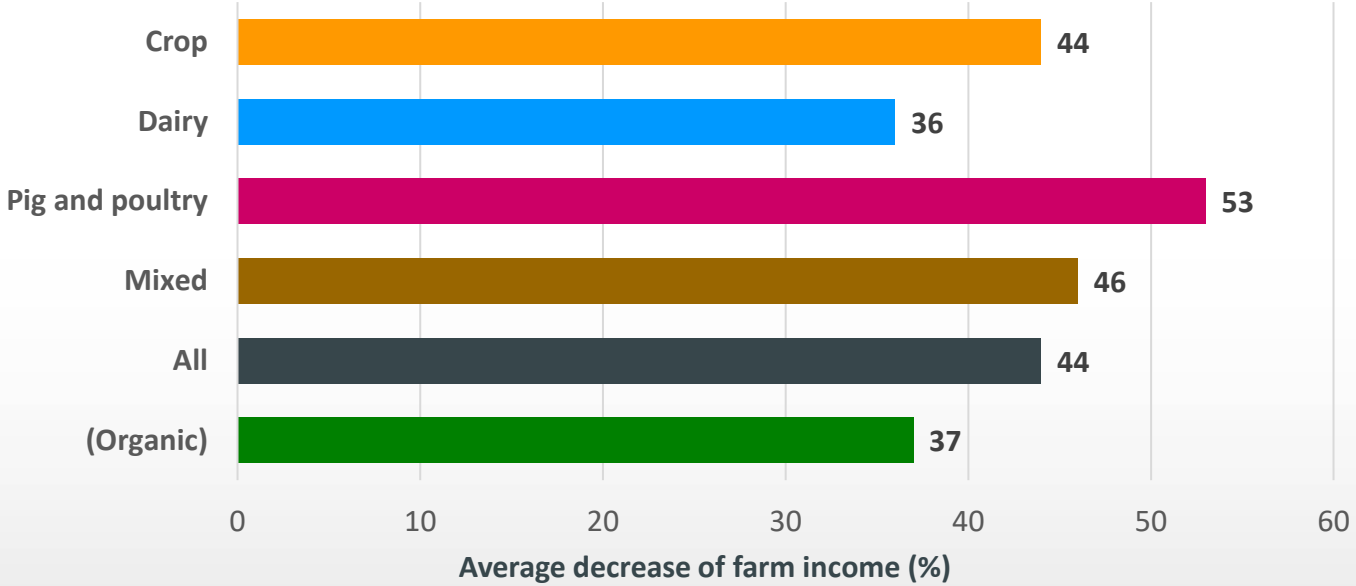
Farm type	Coefficient of variation (%)
Crop	26 %
Dairy	25 %
Pig and poultry	32 %
Mixed	18 %
All	17 %
(Organic)	19 %

Source: Own calculations based on German FADN data.

Robustness – indicator “resistance”

Percentage decrease of income (only farms with income drops)

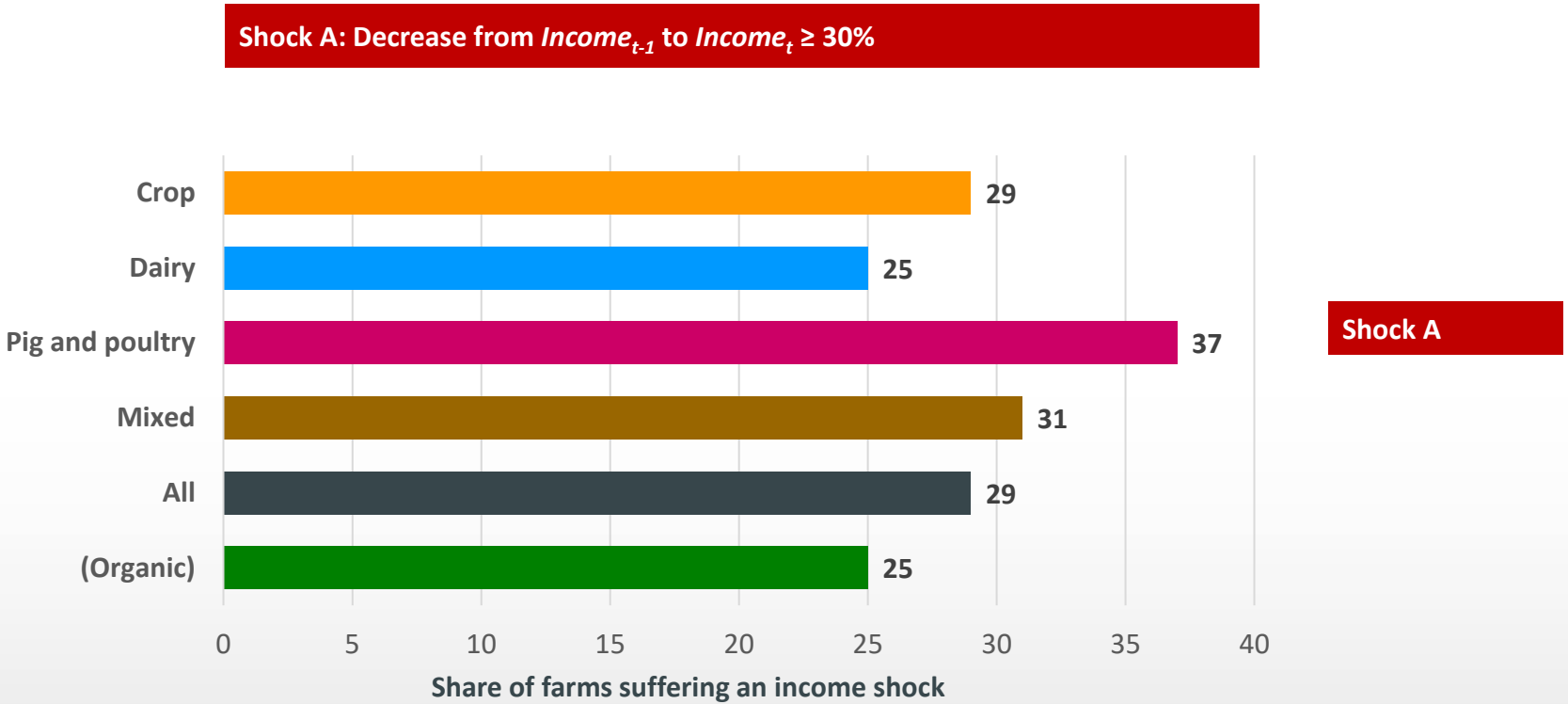
- ✓ ***Pig and poultry have the highest, dairy farms the lowest income decreases.***
- ✓ ***Mixed farms show higher income decreases than crop and dairy farms.***



Source: Own calculations based on German FADN data.

Robustness – indicator “shock”

Share of farms with income drops of at least 30%

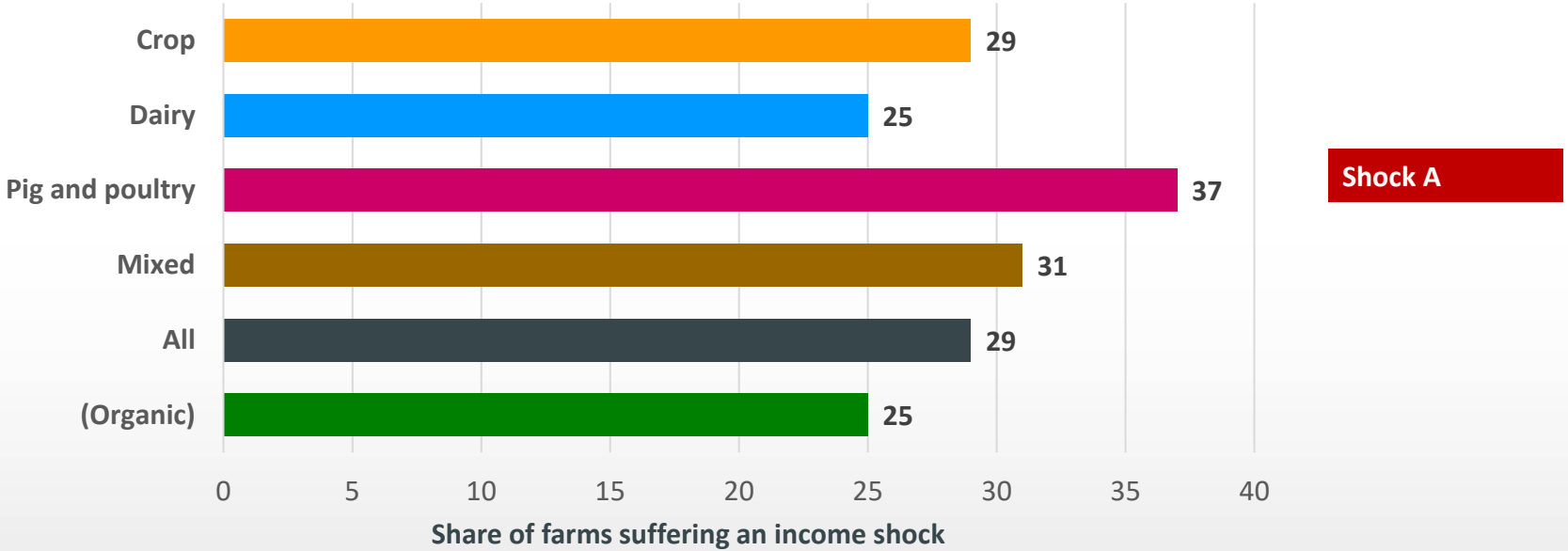


Source: Own calculations based on German FADN data.

Robustness – indicator “shock”

Share of farms with income drops of at least 30%

- ✓ ***Most often, pig and poultry farms experience income shocks***
- ✓ ***… while dairy farmers are the least affected.***



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Robustness – indicator “shock”

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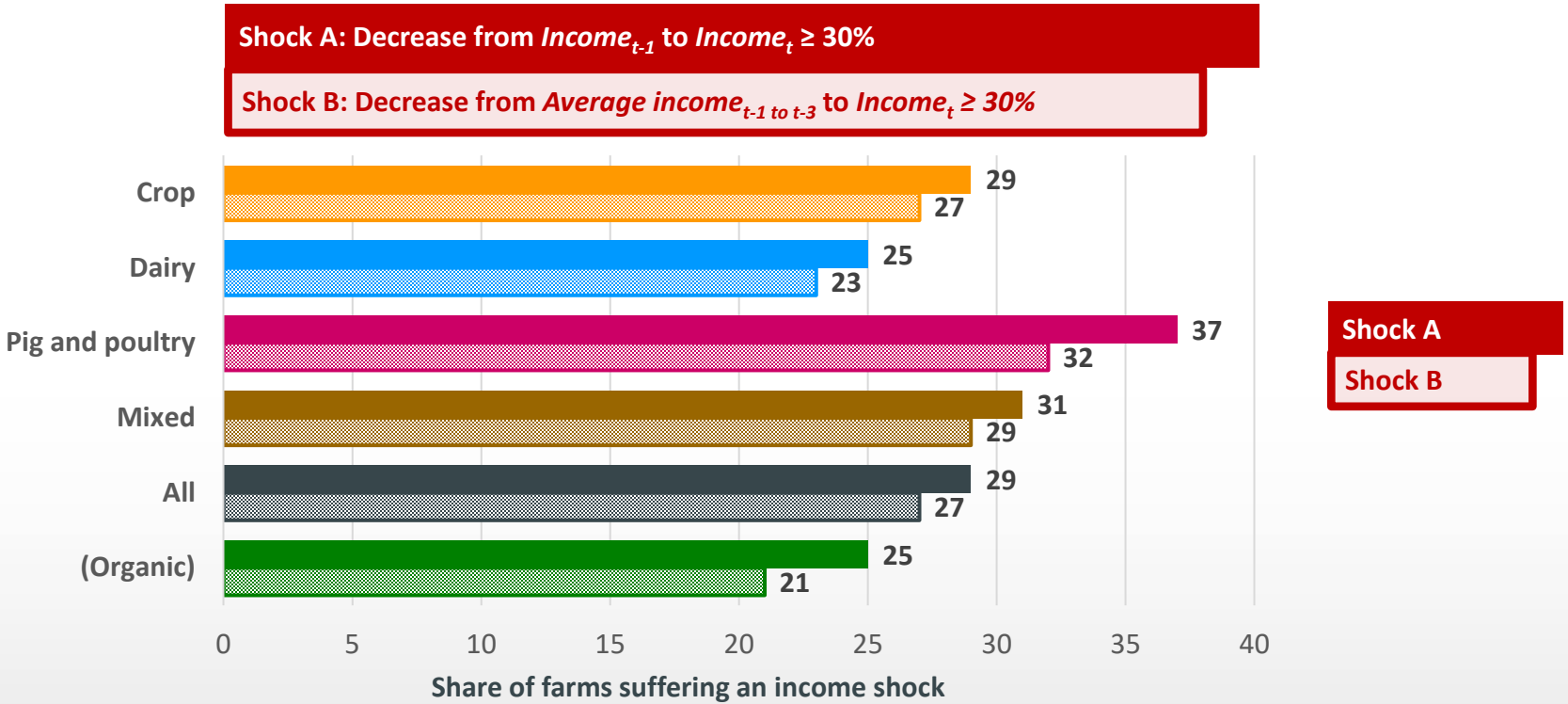
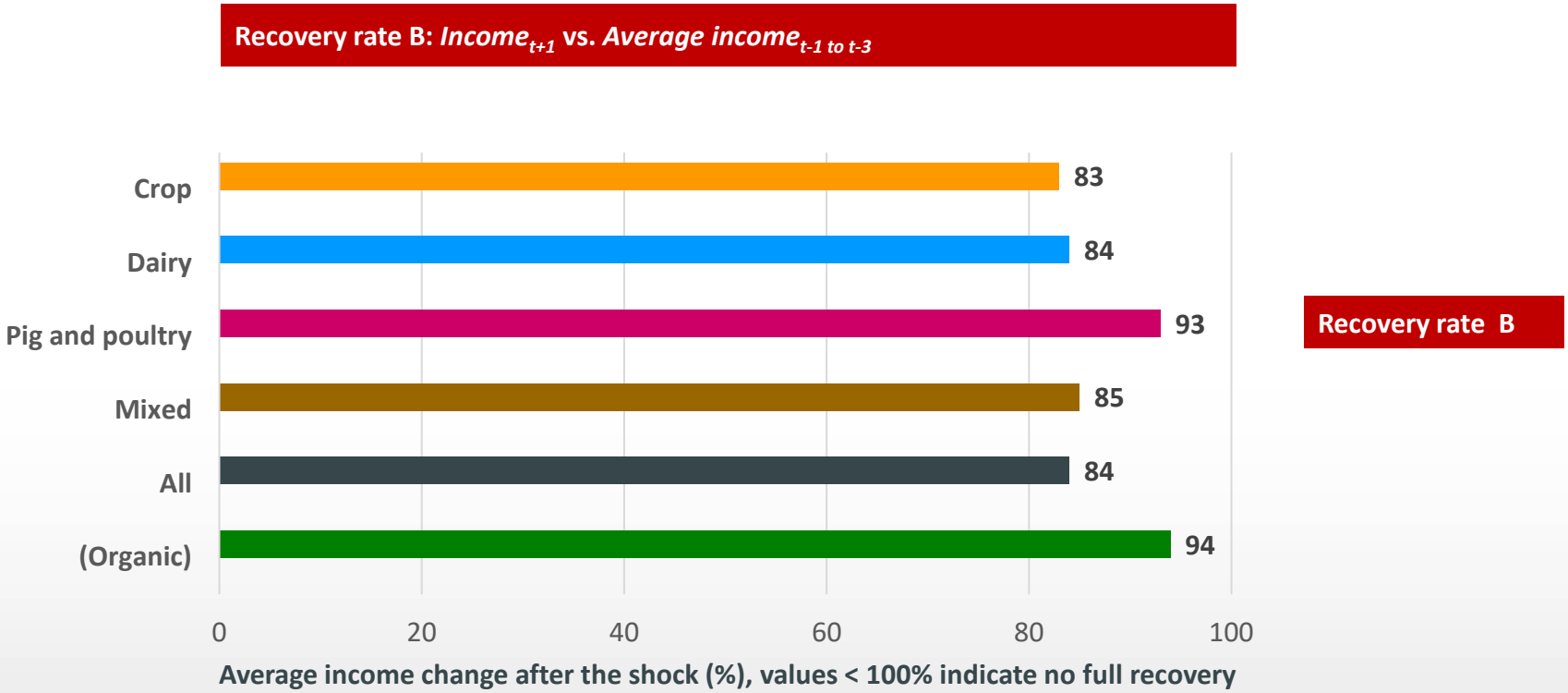


Source: Own calculations based on German FADN data.

Robustness – indicator “recovery rate”

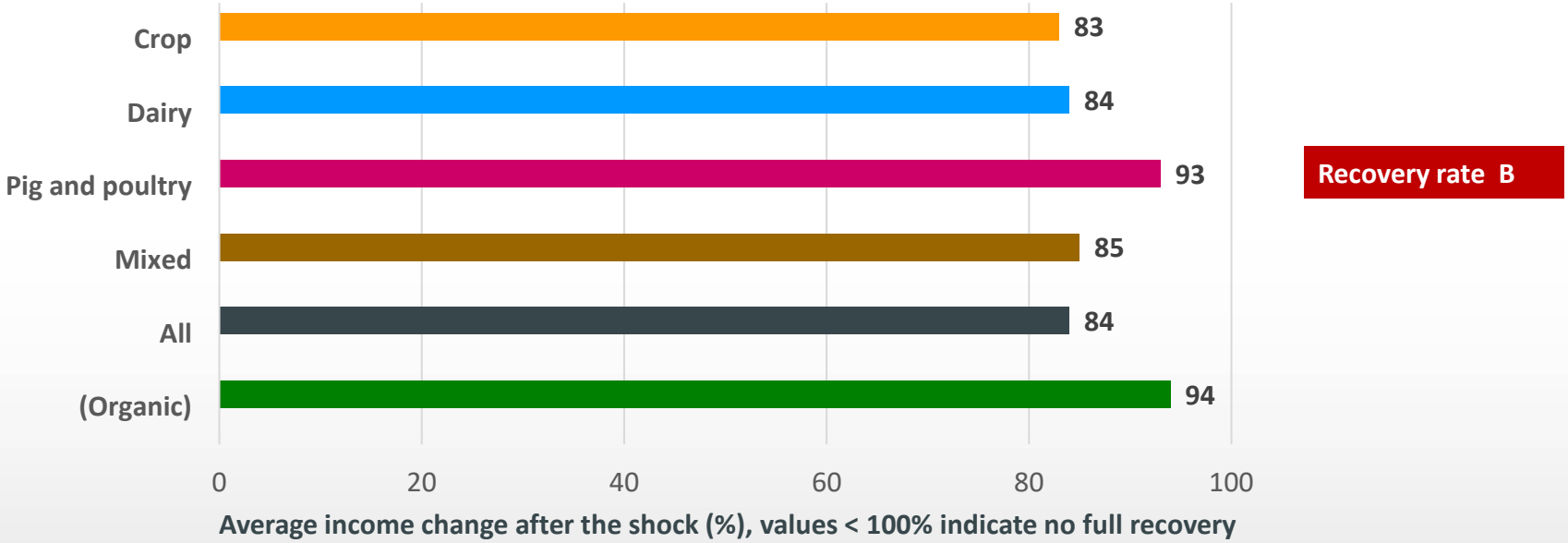
Average income change after a shock



Source: Own calculations based on German FADN data.

Robustness – indicator “recovery rate”
Average income change after a shock

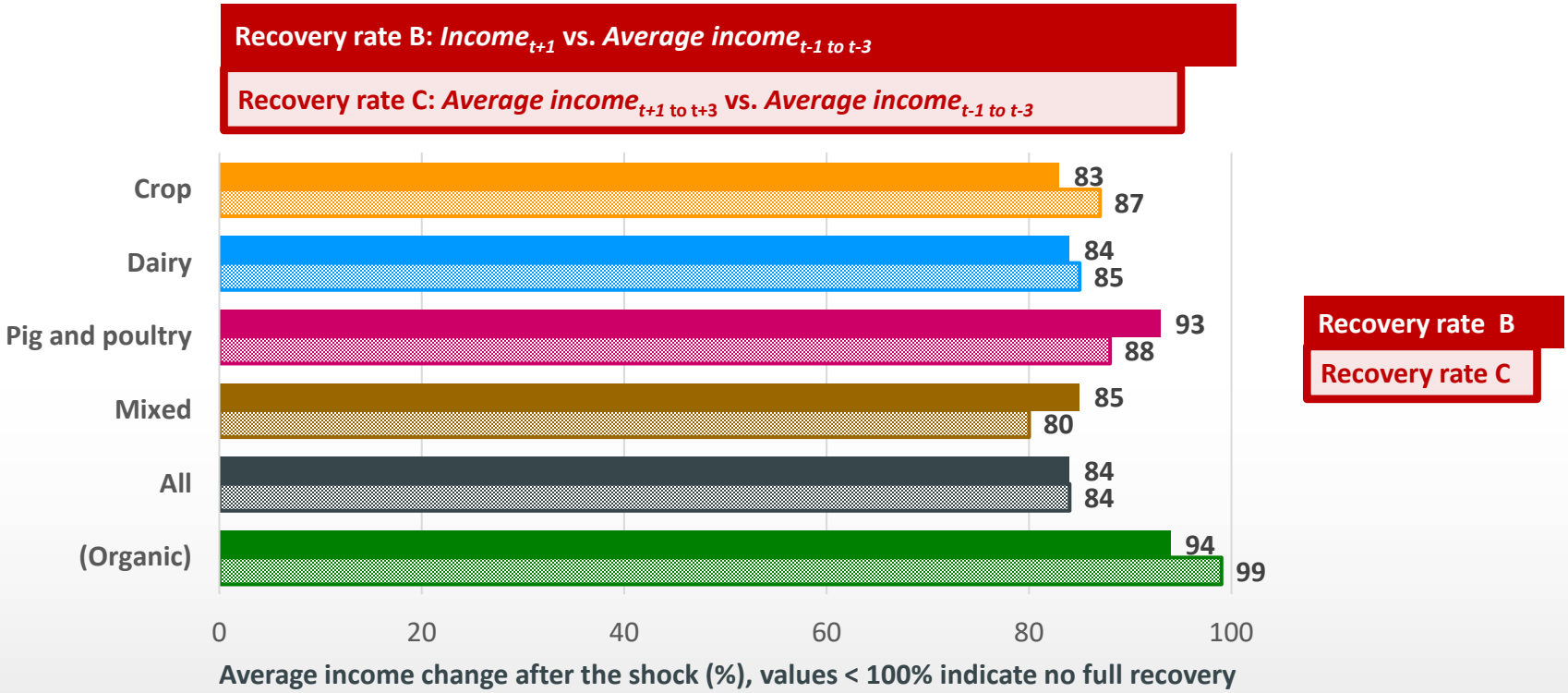
✓ ***Income recovery tend to be a bit higher in pig and poultry farms (and these farm type is most often affected by income shocks).***



Source: Own calculations based on German FADN data.

Robustness – indicator “recovery rate”

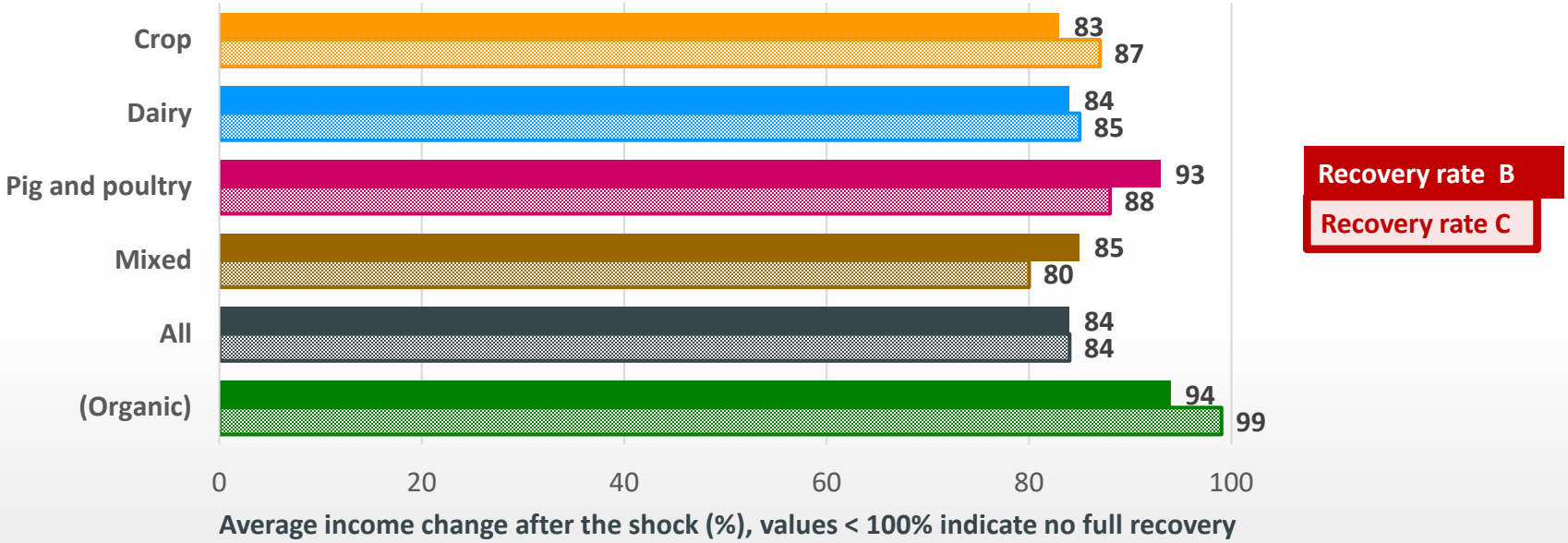
Average income change after a shock



Source: Own calculations based on German FADN data.

Robustness – indicator “recovery rate”
Average income change after a shock

✓ ***Crop farms (and organic) show more a “slow” recovery pattern, while pig and poultry farms (and mixed) have a “fast” recovery pattern.***



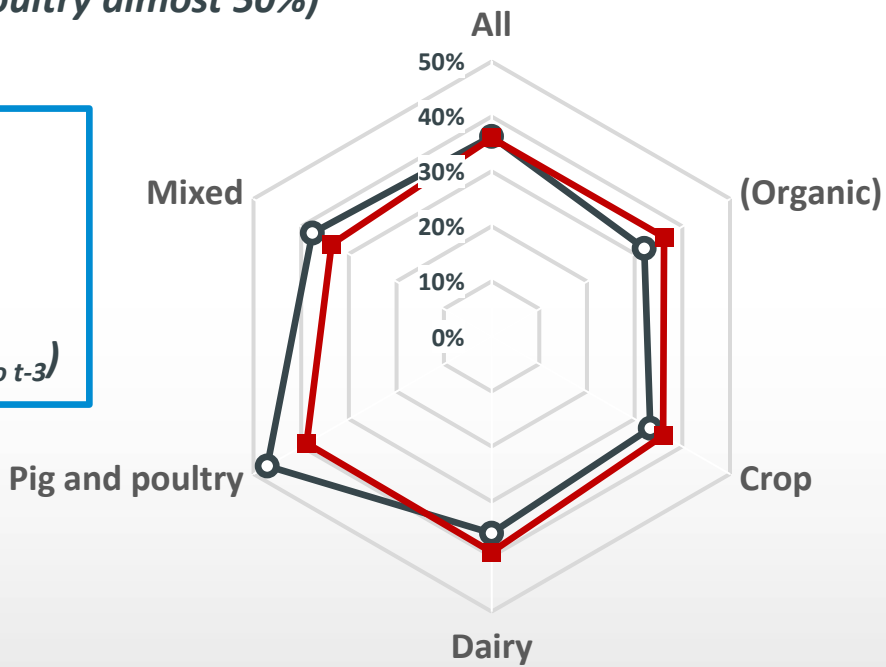
Source: Own calculations based on German FADN data.

Share of farms that fully recover
All farms and per farm type

✓ ***Between 30 to 40% of the farms have fully recovered after an income shock (pig and poultry almost 50%)***

Share of farms (Recovery "B")
(→ Income change → I_{t+1} vs. $I_{t-1\ to\ t-3}$)

Share of farms (Recovery "C")
(→ Income change → $I_{t+1\ to\ t+3}$ vs. $I_{t-1\ to\ t-3}$)



Source: Own calculations based on German FADN data.

Comparisons of subperiods
All farms

	Subperiod 1 2002 to 2011	Subperiod 2 2012 to 2021	Whole period
Resistance *Income decrease* → I_t vs. I_{t-1}	**42%**	**46%**	**44%**
Shock A *Share of farms* → I_t vs. I_{t-1}	**27%**	**30%**	**29%**
Shock B *Share of farms* → I_t vs. $I_{t-1\ to\ t-3}$	**23%**	**33%**	**27%**
Recovery rate A *Income change* → I_{t+1} vs. I_{t-1}	**77%**	**67%**	**73%**
Recovery rate B *Income change* → I_{t+1} vs. $I_{t-1\ to\ t-3}$	**90%**	**76%**	**84%**
Recovery rate C *Income change* → $I_{t+1\ to\ t+3}$ vs. $I_{t-1\ to\ t-3}$	**96%**	**73%**	**84%**

Source: Own calculations based on German FADN data.

Summary and conclusions

- The three robustness indicators proposed by *Slijper et al. 2022* offer broad insights into farm income dynamics in the context of adverse events.
- Average “robustness” of farms tends to decrease in recent years.
  … or the frequency and extent of adverse events has increased.
- Analysis only indicates which farms are more resilient than others (based on the three robustness indicators defined), and farm exits can not be analyzed.
- For some farm types the sample is (too) small and the number of “identical” farms declines the longer the observation period is.
- Non-farm activities and income can not be considered, but have certainly an impact on how farms cope with risks and uncertainties.

Next working steps and research questions

- **How (much) does the various adaptation indicators affect the occurence of income shocks and the recovery rate of farms?**

  → Detecting relationships using multiple linear regression tools

- **Which farm types have transformed (change in farm type or conversion to organic farming) … and how "successful" was the transformation?**

  → Comparison of pre- and post-transformation income levels

Answers will follow (hopefully) at the next PACIOLI-workshop!

Thank you and stay resilient! ☺

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