Assessment of Latvian RDP 2014-2020 impacts on fostering the competitiveness in agriculture with PSM-DiD method

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Latvian RDP 2014 - 2020

Outline

RDP overview (CEQ 27 context)
• Intervention Logic - Sector indicators related to CEQ 27 for using the method
• Level of uptake by priority and focus area

Evaluation purpose and questions
• Background of the evaluation
• Evaluation questions, judgment criteria and indicators used

Evaluation approach
• Steps in evaluation
• Data situation
• Preliminary findings
• Strengths and weaknesses

Lessons learnt and recommendations
Latvian RDP 2014 - 2020

Intervention Logic - Sector indicators related to CEQ 27

I.01 Agricultural entrepreneurial income  I.02 Agricultural factor income  I.03 Total factor productivity in agriculture

RD Priority 1 (knowledge transfer)

RD Priority 2 (viability & competitiveness) 35%

FA 2A
- M04.1
- M04.3
- M06.3
- M16

FA 2B
- M06.1

RD Priority 3 (food chain) 5%

FA 3A
- M04.2
- M09

FA 3B
- M05
- M17.1

Primary impact

Secondary impact

FA 1A
- M01.1

FA 1C
- M02.1

FA 3A
- M04.2

FA 3B
- M05

P4
- M13

FA 5B
- M04.1

FA 5C
- M05

FA 5D
- M04.1

FA 6B
- M07.2

FA 1A
- M02.1

FA 1C
- M01.1

FA 2A
- M19

FA 5B
- M04.1

FA 5C
- M06.4

FA 6B
- M19

M04.2
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Level of uptake by priority and focus area (total uptake 37%)

Good Practice Workshop: “Approaches to Assess Socio-Economic and Sector Related RDP Impacts in 2019”
Warsaw (PL) 24 – 25 October 2018
Latvian RDP 2014 - 2020
Evaluation purpose

Rural Development Evaluation Division (LAND), AREI
• Contracted by MA to assess impact indicators for Latvian RDP
• Possibility to use the same approach for ex-post evaluation

Evaluation purpose
• Answer to the CEQ 27: To what extent has the RDP contributed to the CAP objective of fostering the competitiveness of agriculture?

Indicative timeline for AIR 19
• Start: October 2018
• Current situation:
  o revision of necessary information for AIR19 indicators,
  o FADN data panel 2013-2017 updated by November 2018
  o RDP measures results update by January 2019
## Latvian RDP 2014 - 2020

### Evaluation questions, judgment criteria and indicators used

<table>
<thead>
<tr>
<th>Evaluation questions</th>
<th>Judgment criteria</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common evaluation question 27</strong></td>
<td>Agricultural entrepreneurial income has increased</td>
<td>I.01 Agricultural entrepreneurial income</td>
</tr>
<tr>
<td>To what extent has the RDP contributed to the CAP objective of fostering the competitiveness of agriculture?</td>
<td>Agricultural factor income has increased</td>
<td>I.02 Agricultural factor income</td>
</tr>
<tr>
<td></td>
<td>Total factor productivity in agriculture has improved</td>
<td>I.03 Total factor productivity in agriculture</td>
</tr>
<tr>
<td><strong>Additional evaluation questions:</strong></td>
<td></td>
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</tr>
<tr>
<td>To what extent has the RDP contributed to the change in the share of family labor in farm income?</td>
<td>Family farm income per family work unit has increased</td>
<td>Family farm income per family work unit</td>
</tr>
<tr>
<td>To what extent has the RDP contributed to the labor productivity in agriculture?</td>
<td>Farm net value added per Annual Work Unit has increased</td>
<td>Farm net value added per Annual Work Unit</td>
</tr>
<tr>
<td></td>
<td>Total output per Annual Work Unit has increased</td>
<td>Total output per Annual Work Unit</td>
</tr>
<tr>
<td>To what extent has the RDP contributed to the land productivity in agriculture?</td>
<td>Total output per unit of land has increased</td>
<td>Total output per unit of land</td>
</tr>
<tr>
<td>To what extent has the RDP contributed to the farming efficiency?</td>
<td>The share of costs in output has declined</td>
<td>Costs as % of output</td>
</tr>
<tr>
<td>To what extent has the RDP contributed to the improvement of farm competitive position without subsidies?</td>
<td>The share of subsidies in farm net income has declined</td>
<td>Subsidies as % of farm net income</td>
</tr>
</tbody>
</table>
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Evaluation approach

1. Quantitative assessment at micro-level: propensity score matching (PSM) and difference in differences (DiD)

2. Quantitative assessment at macro-level: bottom-up approaches upscaling micro level findings

3. Qualitative assessment: survey of beneficiaries and non-beneficiaries

Reasons for choosing this approach

• Immediate access to Latvian FADN panel data
• Previous experience with the RDP 2007-2013 ex-post evaluation and AIR 2017
• Complexity of qualitative survey design with respect to specific accountancy indicators
• Partial robustness, validity, transparency & credibility
• Practicability & Cost effectiveness
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Evaluation approach - steps in evaluation (1)

1. **Micro-level assessment**: *PSM combined with DiD*

   - **Step 1**: Elaboration of a beneficiary list with client numbers, public financing amount in primary target focus areas and secondary target focus areas (binary variable) on 12.31.2018 from data files supplied by PA.

   - **Step 2**: Calculation of all relevant indicators necessary for calculation of common and additional indicators for all panel data units using FADN and Eurostat data in base year (2010), a year before (2013 or 2014) and after (2017) the intervention.

GOOD PRACTICE WORKSHOP: “APPROACHES TO ASSESS SOCIO-ECONOMIC AND SECTOR RELATED RDP IMPACTS IN 2019”
WARSAW (PL) 24 – 25 OCTOBER 2018
Primary impacts

• **Step 3**: Construction of treatment and control groups from FADN data panel. Only those units with support in measures with primary targets in P2 and P3 mentioned above are selected for treatment group. All units unsupported in any of measures are selected for controls.

• **Step 4**: Estimation of RDP direct effects on supported units at a micro-level (ATT) on Agricultural entrepreneurial income, Agricultural factor income and Total factor productivity in agriculture.

• **Step 5**: Estimation of RDP direct effects on un-supported units at a micro-level (ATU) on Agricultural entrepreneurial income, Agricultural factor income and Total factor productivity in agriculture.
Secondary impacts

• **Step 6**: Construction of treatment and control groups from FADN data panel. All units with support in measures with primary targets other than P2 and P3 with secondary targets in P2 or P3 are selected. All units unsupported in any of measures are selected for controls.

• **Step 7**: Estimation of RDP direct effects on **supported units** at a micro-level (ATT) on Agricultural entrepreneurial income, Agricultural factor income and Total factor productivity in agriculture.

• **Step 8**: Estimation of RDP direct effects on **un-supported units** at a micro-level (ATU) on Agricultural entrepreneurial income, Agricultural factor income and Total factor productivity in agriculture.
Indirect effects

- **Step 9**: Calculation of deadweight effects at a micro-level with Total Taxes paid
- **Step 10**: Calculation of substitution effects at a micro-level with Total income
- **Step 11**: Calculation of displacement effects at a micro-level with Employment
2. **Macro-level assessment**: Bottom-up approaches upscaling micro level findings

- **Step 12**: Aggregation of results and calculation of RDP effects at a sector level.
  - Estimated direct primary and secondary impacts at a micro level on Agricultural entrepreneurial income and Agricultural factor income are multiplied by number of beneficiaries and non-beneficiaries, respectively, out of total number of farms in 2013.
  - Estimated direct primary and secondary impacts at a micro level on Total factor productivity in agriculture are multiplied by AWU in beneficiaries and non-beneficiaries, respectively, and weighted against sector total factor productivity in agriculture.
Latvian RDP 2014 - 2020

Evaluation approach - steps in evaluation (6)

3. **Qualitative assessment**: Survey of beneficiaries and non-beneficiaries
   - **LAND survey**: April 2016
   - **Objective**: obtaining of the information necessary for the qualitative assessment of the indicators selected for the answers to evaluation questions
   - **Survey population**: 24,703 clients of the Paying Agency with e-mail addresses including both beneficiaries and non-beneficiaries of Latvian RDP 2014-2010
   - **Survey method**: mixed survey with three blocks - binary, 5-point Likert semi-quantitative scale, 5-point Likert ordinal scale
   - **Survey sample**: 867 respondents (275 beneficaries, 592 non-beneficaries)
   - **Analysis of responses**: comparisons of responses provided by beneficiaries and non-beneficiaries. ANOVA regression for testing statistical significance of differences in sub-sample means
   - **Conclusions**: indicative assessment of the Programme impact without causality

**Final step**: Triangulation of quantitative and qualitative results. Aggregation of results and calculation of RDP effects at a sector level.
## Latvian RDP 2014 - 2020

### Data situation - FADN

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Code</th>
<th>FADN variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>I01, I02, I03</td>
<td>SE010</td>
<td>Total labour input in full time equivalents</td>
</tr>
<tr>
<td>I03</td>
<td>SE025</td>
<td>UAA in hectares</td>
</tr>
<tr>
<td>I01, I02, I03</td>
<td>SE135</td>
<td>Total Output crops and crop production</td>
</tr>
<tr>
<td>I01, I02, I03</td>
<td>SE206</td>
<td>Total Output livestock and livestock products</td>
</tr>
<tr>
<td>I03</td>
<td>SE256</td>
<td>Other Output</td>
</tr>
<tr>
<td>I01, I02, I03</td>
<td>SE275</td>
<td>Total intermediate consumption</td>
</tr>
<tr>
<td>I01, I02, I03</td>
<td>SE360</td>
<td>Depreciation</td>
</tr>
<tr>
<td>I01</td>
<td>SE365</td>
<td>Total external factors (wages, rents and interest paid)</td>
</tr>
<tr>
<td>I01, I02</td>
<td>SE600</td>
<td>Balance current subsidies and taxes</td>
</tr>
</tbody>
</table>
### Latvian RDP 2014 - 2020

**Data situation - Eurostat**

<table>
<thead>
<tr>
<th>Database</th>
<th>Product code</th>
<th>Product</th>
<th>FADN code</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price indices of agricultural products, output (2010 = 100) - annual data [apri_pi10_outa]</td>
<td>1000000</td>
<td>Crop output price index, including fruits and vegetables</td>
<td>SE135</td>
<td>Crop Production</td>
</tr>
<tr>
<td></td>
<td>130000</td>
<td>Animal output price index</td>
<td>SE206</td>
<td>Livestock Production</td>
</tr>
<tr>
<td></td>
<td>140000</td>
<td>Agricultural output price index</td>
<td>SE256</td>
<td>Other Output</td>
</tr>
<tr>
<td>Agricultural labour input statistics: absolute figures (1 000 annual work units)[aact_ali01]</td>
<td></td>
<td>Salaried</td>
<td>SE010</td>
<td>Labour in AWU</td>
</tr>
<tr>
<td>Economic accounts for agriculture - values at current prices[aact_eaa01]</td>
<td>23000</td>
<td>Compensation of Employees</td>
<td>SE010</td>
<td>Labour in AWU</td>
</tr>
<tr>
<td>Price indices of the means of agricultural production, input (2010 = 100) - annual data [apri_pi10_ina]</td>
<td>200000</td>
<td>Goods and services currently consumed in agriculture (Input 1)</td>
<td>SE275</td>
<td>Total intermediate consumption</td>
</tr>
<tr>
<td></td>
<td>210000</td>
<td>Goods and services contributing to agricultural investment (Input 2)</td>
<td>SE360</td>
<td>Depreciation</td>
</tr>
<tr>
<td>Agricultural land prices by region - historical data (until 2009)[apri_lprc_h]</td>
<td></td>
<td>Utilized agricultural area</td>
<td>SE025</td>
<td>UAA in hectares</td>
</tr>
</tbody>
</table>
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Data situation - Eurostat

Prices of agricultural land

- Eurostat series (annual data): End with 2009
- Eurostat methodology changes: 2010
- National Statistics series (annual data): Begin with 2011
- Base year for Eurostat price indices: 2010

Possible solutions

- Change of a base year: 2011 (simply divide all indices by 2011 index)
- Multiple imputations: Impute 2010 from panel data (from next slide)

The most accurate way to measure changes in volume from one year to another is to use the most recent base year available. This approach guarantees that weightings are relatively up-to-date and avoids problems, therefore, linked to weighting products that are no longer produced and new products that have emerged. It is for this reason that the EAA/EAF measures changes in volume using the weightings for the preceding year.*

Information gathered from Eurostat for adjustment of individual panel units data:
SE135 (Crop Production); SE206 (Livestock Production); SE256 (Other Output); SE010 (Salaried Labour); SE275 (Working Capital); SE360 (Fixed Capital)

Missing Eurostat information

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<tbody>
<tr>
<td>Output</td>
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<tr>
<td>SE025</td>
<td>UAA price</td>
<td>EUR/ha</td>
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<td></td>
<td></td>
<td>870</td>
<td>1,585</td>
<td>1,998</td>
<td>2,323</td>
<td>2,501</td>
<td>2,771</td>
<td>2,831</td>
<td></td>
</tr>
<tr>
<td>SE025</td>
<td>UAA</td>
<td>Price index (2010=100)</td>
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</tbody>
</table>
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Strengths and weaknesses of the approach

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Established data panel</td>
<td>Panel size</td>
</tr>
<tr>
<td>Rigour: exact findings; causality established</td>
<td>Drop-out of the units from the panel</td>
</tr>
<tr>
<td>Reliability: quality of data</td>
<td>Insufficient controls due to a large share of participants</td>
</tr>
<tr>
<td>Robustness: stable and resilient findings to changes</td>
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<tr>
<td>Validity: sound conclusions</td>
<td>Incomplete data series for a number of units</td>
</tr>
<tr>
<td>Transparency: clear and transparent assignment rules</td>
<td>Lack of opportunities to use units with incomplete data series (two year averages for start and finish years)</td>
</tr>
<tr>
<td>Credibility: findings which can be trusted by stakeholders</td>
<td></td>
</tr>
<tr>
<td>Practicability: application without adverse consequences</td>
<td></td>
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<tr>
<td>Cost-effectiveness: sound evaluation findings with spending less resources</td>
<td></td>
</tr>
<tr>
<td>Previous experience: other evaluations, research papers</td>
<td>High imbalance, model dependence and bias*</td>
</tr>
</tbody>
</table>

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Lessons learnt and recommendations

• **Availability of data from PA:** finalized data on beneficiaries - end of April

• **Costs of approach:** about 2 weeks - one month depending upon the availability and/or already prepared FADN data panel

• **Preparation of survey:** would be of little use considering the specification of FADN variables necessary for evaluation, e.g., turnover, income, employment

• **Contract the evaluator well in advance:** would be important if evaluators lack and expertise in application of PSM-DiD so they need to hire the outside experts

• **Structure adequately the evaluation framework:** this is by default an important issue irrespective to evaluation scope and context

• **Software requirements:** STATA procedures and commands pscore, psmatch2 and mhbounds are well suited for evaluation purposes
Thank you

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Further information:
• https://gking.harvard.edu/files/gking/files/psnot.pdf
• https://ec.europa.eu/eurostat/documents/3859598/5854389/KS-27-00-782-EN.PDF/e79eb663-b744-46c1-b41e-0902be421beb