Deriving the True Value of Crop Farming

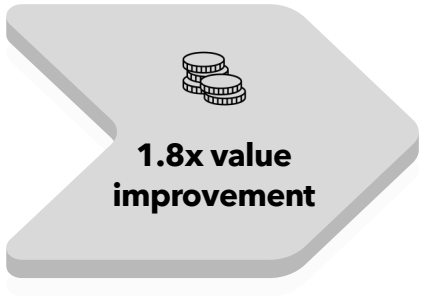
LIVING MANAGEMENT
CASE RSM

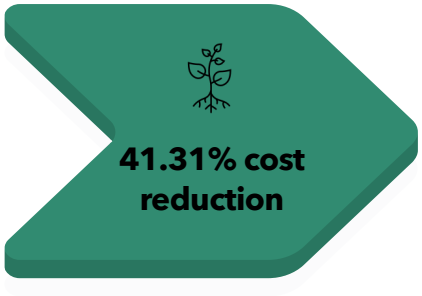
Executive Summary

Research question: *What are the most pressing issues for sustainable farming in the Netherlands, how do these affect creditors and how can we incorporate them to derive the true value of Dutch farms?*

Financial Value

There is a large incentive to move to organic farming from a financial perspective.



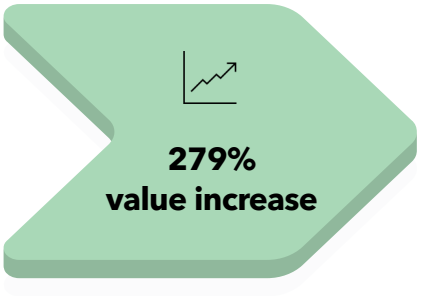


Environmental Value

We find large environmental costs, even when merely considering the four most pressing environmental issues. These costs are not valued in traditional banking.

Integrated Value

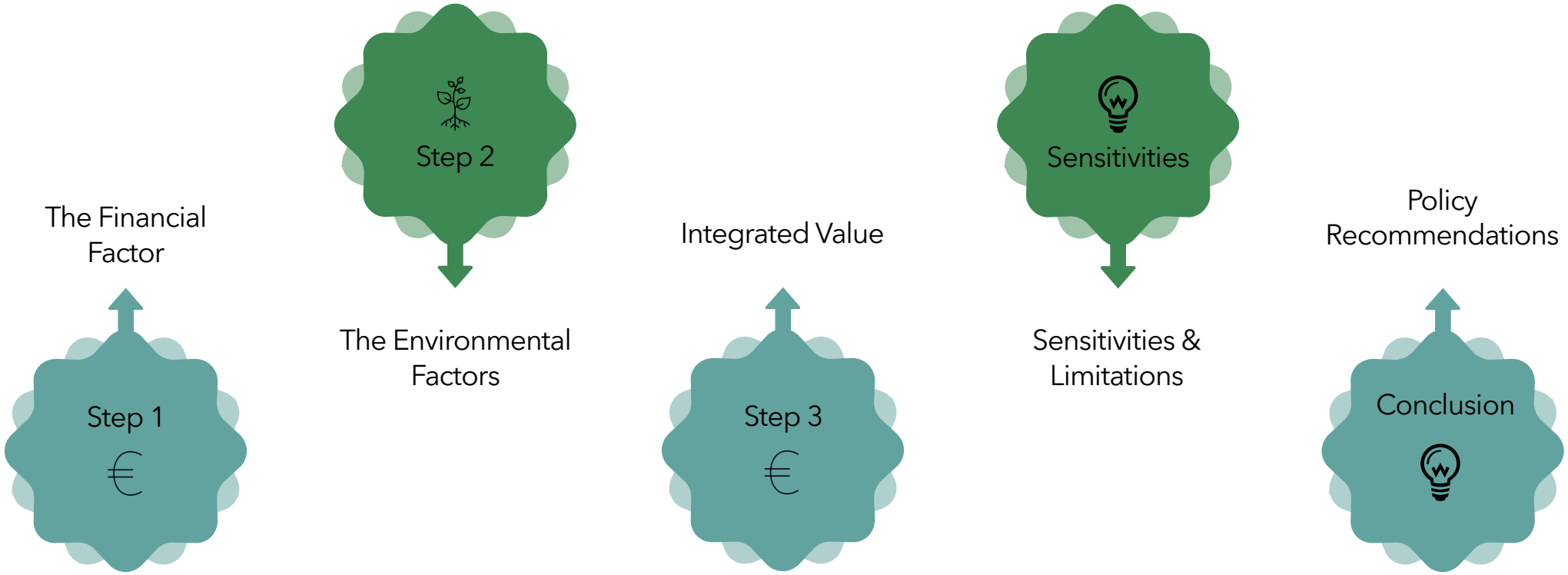
All cases show an increase in integrated value when switching to organic farming.



Policy Recommendations

More drastic measures and regulatory changes from the government and banks are required to circumvent huge environmental costs.

Agenda


Step 1
The Financial Factor
Step 2
The Environmental Factors
Step 3
Integrated Value
Sensitivities
Sensitivities & Limitations
Conclusion
Policy Recommendations

The Financial Factor

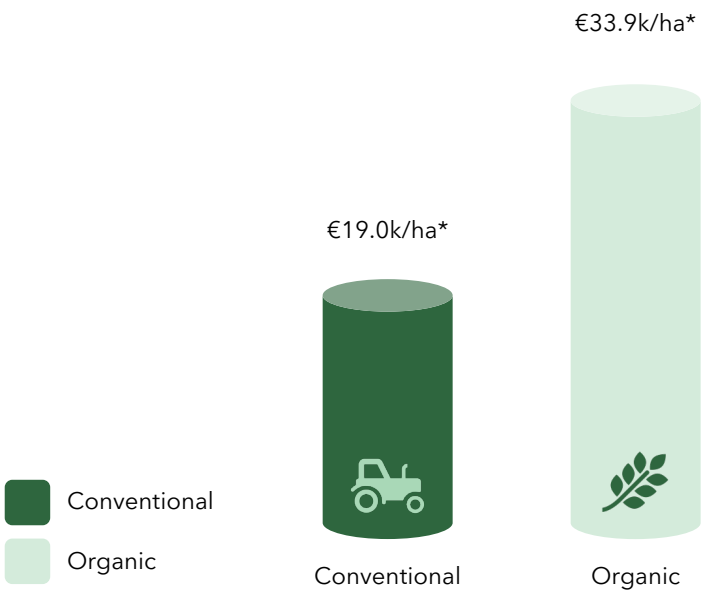
Financial Value – Overview

The switch from conventional to organic farming leads to a significant improvement in financial value and land utilization.

Value improvement of

x1.8

when moving from conventional to organic



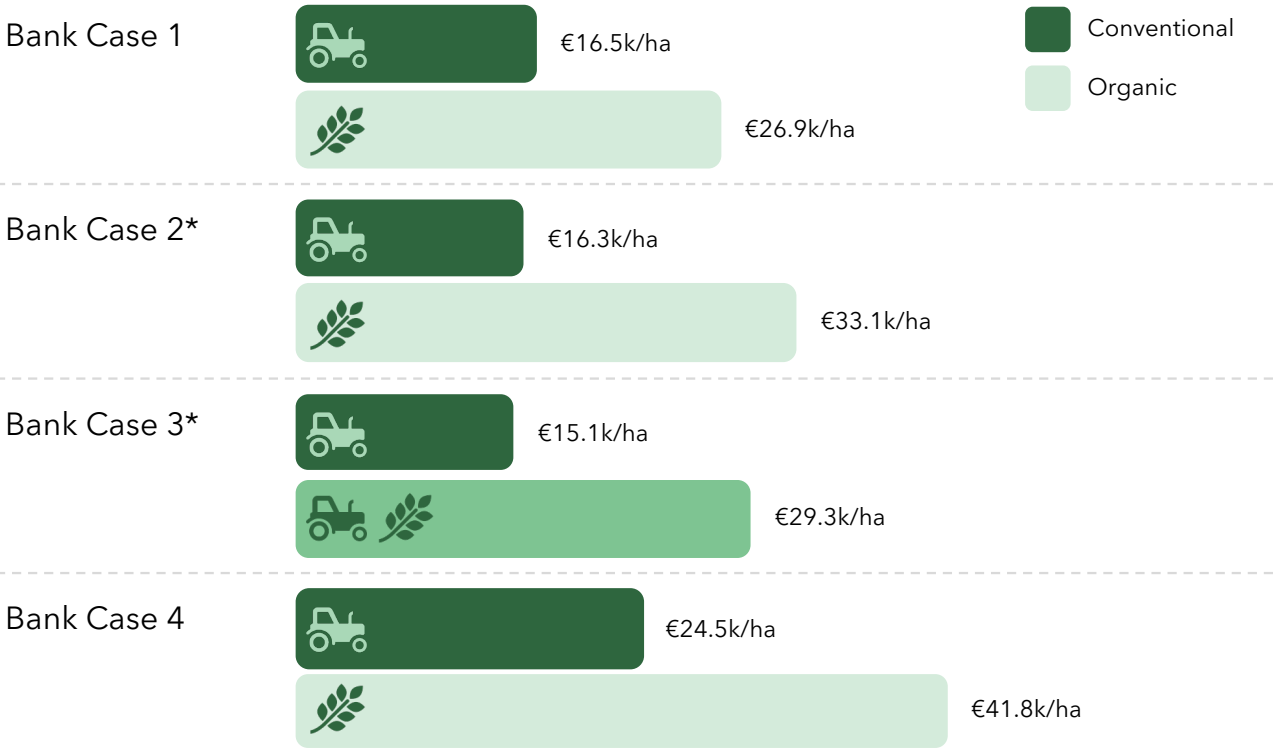
- The average value* increases by a factor of 1.8 from €19.0k to €33.9k per ha when switching from conventional to organic farming.
- Although producing organic crops is more expensive, the additional revenue that the farm generates due to higher prices creates more value.
- From a financial perspective, it seems that the switch from conventional to organic farming leads to a more profitable utilization of the farmland.

Please note that the analyses on all farms only include the revenues generated by crops. All other revenue streams are excluded from this analysis.

**The average calculation excludes Bank Case 3, given that the farmer did not intent to switch entirely to organic farming but only appr. 50% of the operations.*

Financial Value of Cases at Hand

The financial value is reasonably consistent across the cases, showing a significant increase when switching to organic farming.



The following assumptions are applied:

- 2% long-run growth rate.
- 5% discount rate.
- Extrapolation of Bank Case 2 on…
  - ❑ revenue growth rates.
  - ❑ cost of goods sold rates.
  - ❑ operational cost rates.

**Bank Case 2 is the financed case, whereas Bank Case 3 is the not-financed one. Bank Case 3 transitions from conventional to a mix of conventional and organic.*

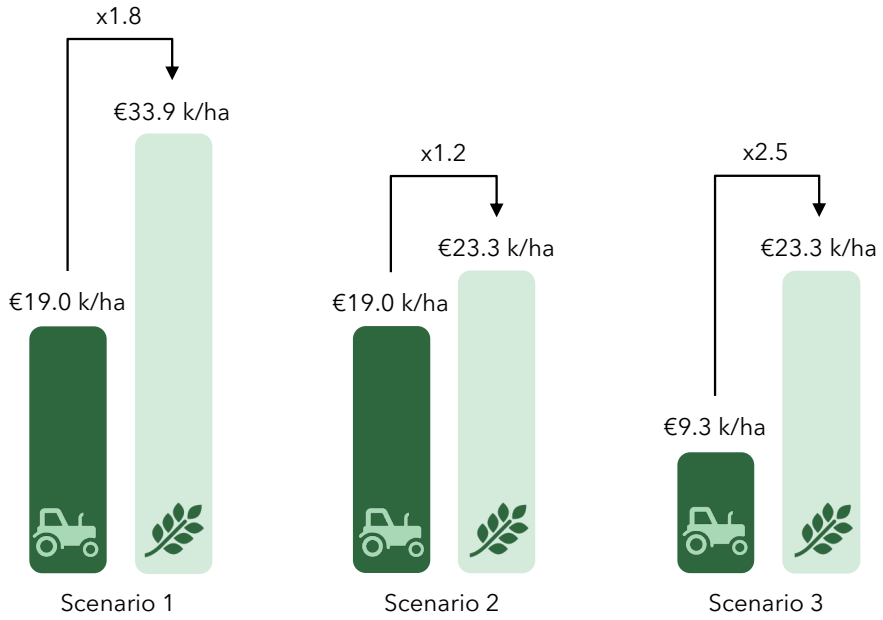
Financial Value Variability

The demand for organic products is key to allow for a switch to organic farming.

Value improvement of

x1.2 – x2.5

when moving from conventional to organic



Scenario 1:

- All organic products can be sold at higher prices.
- All conventional products can be sold at current market prices.
- Degradation of soil, the accompanying lower yield and revenue, is ignored.

Scenario 2:

- 50% of organic products can be sold after the two-year gap, where the demand is increased straight-line after that.
- No adjustments are made to the conventional case.

Scenario 3:

- 50% of organic products can be sold after the two-year gap, where the demand is increased straight-line after that.
- The growth rate for conventional products is set to -1%.


The Environmental Factors

The Environmental Factors

The integrated value calculation incorporates the four most important environmental concerns in crop farming.

Nitrogen

Nitrogen leaching is especially harmful to the environment due to marine eutrophication.

Phosphorous

Phosphorous leaching is especially harmful to the environment due to marine eutrophication.

Pesticides

Pesticide residues and their metabolites result in toxicity in the water as well as in the soils, which harms biodiversity.

Greenhouse Gases

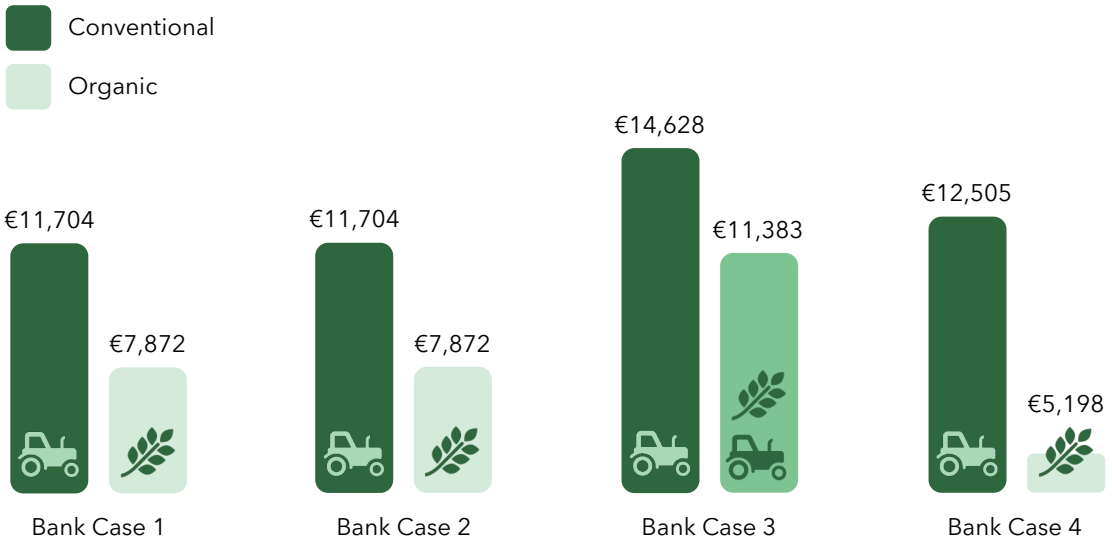
CO_2 and N_2O are large drivers of climate change.

Environmental Value – Overview

The switch from conventional to organic farming implies a dramatic decrease in environmental costs.

41.31% *decrease in environmental costs*

€4,991 *per ha in environmental costs saved*

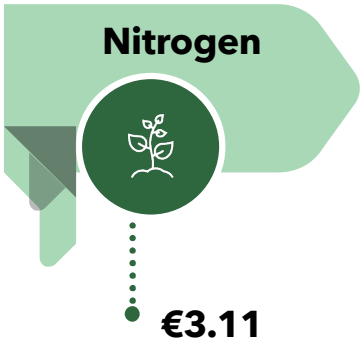


- On average*, environmental costs are decreased by 41.31% when switching from conventional to organic farming.
- On average, environmental costs of €4,991 per ha of arable land would be saved by helping Dutch farmers to switch to organic farming.
- A large fraction of this reduction in environmental costs is attributable to the dramatic decrease in the use of pesticides and lower GHG emissions.
- Differences in crops planted has a major impact on the environmental costs.

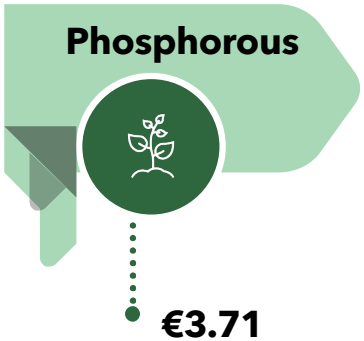
**The average calculation excludes Bank Case 3, given that the farmer did not intent to switch entirely to organic farming but only appr. 50% of the operations.*

Monetization

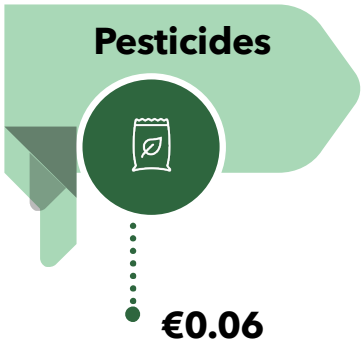
Monetization of the four environmental factors calls for different emission estimates for conventional and organic farming.



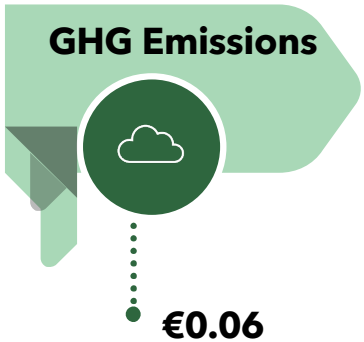
- 121.67 kg Nitrogen surplus per ha.
- Conventional farming: 10% leaching.
- Organic farming: 31% reduction in leaching.



- 21 kg Phosphorous surplus per ha.
- Conventional farming: 9.65% leaching.
- Organic farming: 1% reduction in leaching.



- Impact expressed as an equivalent in kilogram of CO2 emissions per ha.
- Conventional farming: eCO2 range from 9 kg for legumes to 58kg for vegetables.
- Organic farming: No pesticides for legumes and 80% less pesticides for vegetables.



Conventional:
- Yield: 44.33 tons per ha.
- 120.00 kg CO2 per ton of crop.

Organic:
- Yield: 27.29 tons per ha.
- 130.00 kg CO2 per ton of crop.

All prices per kg of pollutant are based on CE Delft True Pricing estimates.

Integrated Value

Integrated Value – Overview

Integrating environmental costs into the valuation shows the financial benefit of switching from conventional to organic farming.

Integrated value calculation:

Financial value

+

γ x Environmental value

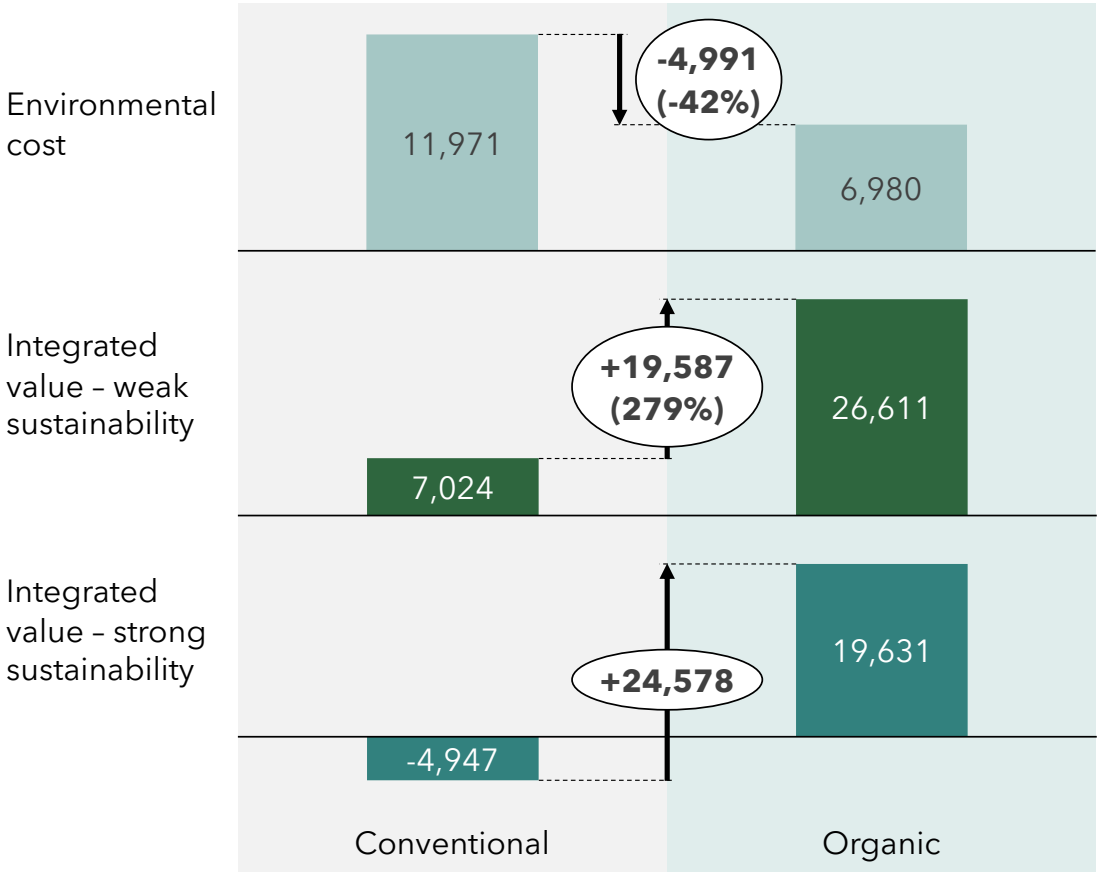
+

β x Social value

The integrated value with weak sustainability requires a weighting factor of **γ** of 1.

Integrated valuation with strong sustainability is achieved by applying a weighting factor of **γ** equal to 2.

Average impact from switching to organic farming* per ha (in EUR):



- The switch to organic farming reduces the environmental cost, on average, by 42% (4,991 EUR) per ha.
- On average, the integrated value with weak sustainability more than triples from switching to organic farming.
- With strong sustainability, the conventional farms are, on average, value destroying and hence, the switch is even more impactful.

**The average calculation excludes Bank Case 3, given that the farmer did not intent to switch entirely to organic farming but only appr. 50% of the operations.*

Sensitivities & Limitations

Methodological Limitations

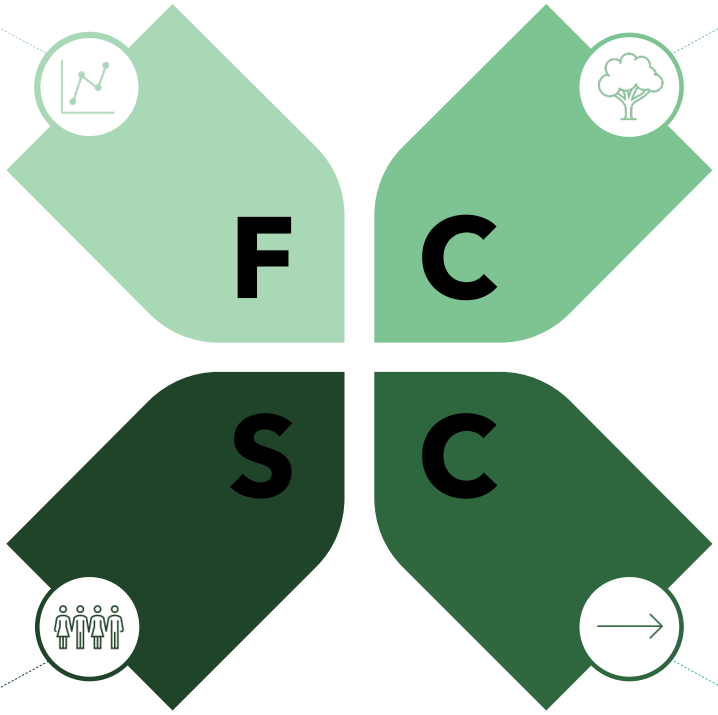
For a more comprehensive valuation, our analysis should be extended with further sustainability factors and farm-based nuances.

Averages

Differences due to, for example, geography, soil and weather conditions have not been taken into consideration.

Carbon Capture

Counterbalance of negative environmental impact through carbon capture is not considered.



While being secondary factors, social sustainability factors may be taken into account in a more comprehensive study.

Social Impact

The calculations presume emissions to be constant throughout time once the farmer has made the switch to organic farming.

Constant Emissions

Sensitivities

The long-term growth rate, the demand for organic products as well as the cost assumptions are key drivers of the financial value.

Financial Value

The **long-term growth rate** is set to 2%.

Given the continuous soil degradation if the farmer does not make the switch to organic farming, it is quite reasonable to assume that the farmer's ground will, at some point, no longer yield products that are viable to sell. The effect shown above might be even stronger if one were to account for this fact.

Financial Value

Immediate **demand for organic products**.

The demand for organic products is assumed to be immediately present once the farmer switches to organic (- after the two-year gap). This is highly optimistic, given that the lack in demand is potentially one of the largest restraining factors for organic farming.

Financial Value

The **increase in costs** per farmer.

Additional costs due to, for example, lower use in pesticides are only accounted for implicitly. Also, farmers prove to be highly heterogenous in efficiency and hence cost structure. A more detailed analysis would be required that accounts for specificities of each farmer.

Sensitivities

Discount rates largely impact financial and environmental value. The field attributed to each crop largely affects environmental value.

Financial Value

The **discount rate** for the free cash flows is set to approximately 5%.

A constant discount rate across cases and time is simplistic due to demand issues and long-term risks if farmers do not make the switch to organic farming.

Environmental Value

The **field (in ha)** assumed to be attributed to the respective crops.

Given the large differences in environmental impact per crop, the environmental costs will be dramatically different once this parameter is changed.

Environmental Value

The **discount rate** is set to 3%.

Given that all environmental costs are valued in perpetuity, the discount rate largely impacts the environmental value obtained.

Policy Recommendations

Policy Recommendations

Major governmental regulations are required to achieve a wide-spread adoption of integrated value considerations in bank lending.

Banks

Step 1

Repayment Schedule & Liquidity Ratios

Internal loan procedures must allow farmers to start paying interest on the debt two years after the taking out the loan, without any effect on financing costs. The investigation of liquidity ratios should factor this in as well.

Step 2

Integrated Value

The banks need to set a minimum target for integrated value that should be achieved by each client. Any project falling below this threshold after the loan and the respective structural changes should not be financed.

Step 3

Environmental Value

When financing the switch from conventional to organic farming, the banks should set a separate threshold for the decrease in environmental impact (e.g., 30%-40%).

Step 4

Incentives for Farmers

The banks should provide incentives for the farmers to further reduce their environmental impact. Loans and the respective financing costs should always be coupled with environmental targets.

The Dutch Government

Step 1

Impact Definition

To further the reduction of environmental impact, the Dutch government firstly has to exactly define the environmental impacts and determine a price for these factors. This will allow for a common ground in evaluations across banks.

Step 2

True Pricing of Products

The Dutch government should require true pricing of all products. This will counteract the demand gap for organic products, surge the transition to organic farming and therefore, save many emissions.

Step 3

Incentives for Banks

The Dutch government needs to adjust its supervisory mechanisms for banks that allow for the transition to organic farming. For instance, banks should be allowed to carry a lower capital charge with respect to these loans in order to make such investments more attractive.

Step 4

Banking Requirements

Banks should always be required to make an integrated value analysis. Each bank should have a maximum of environmental cost that can be incurred due to their financing activities.


Thank you!
Questions?

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