From Traditional to Organic:

How Effective are Agri-Environmental Subsidies in Driving Agricultural Conversion?

Wilhelm Waldenlind

Independent project 15 credits
Swedish University of Agricultural Sciences, SLU
Faculty of Natural Resources and Agricultural Sciences/Department of Economics
Agricultural Science with a Specialisation in Economics and Business Administration
Degree project/SLU, Department of Economics 1753 • ISSN 1401-4084
Uppsala 2026

From Traditional to Organic: How Effective are Agri-Environmental Subsidies in Driving Agricultural Conversion?

Wilhelm Waldenlind

Supervisor:	**Thomas Slijper, Swedish University of Agricultural Sciences (SLU), Dept. of Economics**
Examiner:	Shon Ferguson, Swedish University of Agricultural Sciences (SLU), Department of Economics

Credits:	15 credits
Level:	First cycle, G2E
Course title:	Independent project in Economics
Course code:	EX0903
Programme/education:	Agricultural Science with a Specialisation in Economics and Business Administration
Course coordinating dept:	Department of Economics
Place of publication:	Uppsala
Year of publication:	2026
Title of series:	Degree project/SLU, Department of Economics
Part number:	1753
ISSN:	1401-4084

Keywords:

Swedish University of Agricultural Sciences
Faculty of Natural Resources and Agricultural Sciences
Department of Economics

Abstract

Despite ambitious political goals within the European Union's Common Agricultural Policy (CAP), Sweden's organic agricultural land area has recently experienced a significant structural decline. This study evaluates the effectiveness of agri-environmental subsidies as an economic steering mechanism for promoting organic land conversion, examining whether financial policy measures or market-driven opportunity costs exert the primary influence on farmers' structural decisions. The empirical framework uses a balanced panel dataset comprising 1,008 observations across Sweden's 21 counties from 2010 to 2024, analyzed with a two-way Fixed-Effects regression model to absorb region- and time-specific heterogeneity.

The baseline regression reveals a statistically significant positive relationship between financial support and total organic acreage, indicating that increases in subsidies drive aggregate organic expansion. Specifically, the key operational coefficient of approximately 33 means that for every one million SEK increase in regional subsidies, the organic land area is expected to expand by roughly 33 hectares, holding all other variables constant. However, the crop-specific robustness checks uncover substantial heterogeneity: while winter wheat and spring barley are highly responsive to policy adjustments, oats are driven entirely by market-based structural factors. These findings indicate that flat-rate subsidies lose their economic steering capacity during conventional market price surges, making this study highly valuable for agricultural policymakers seeking to design more dynamic, market-flexible policy instruments.

Table of contents

List of figures

1. Introduction

Over the decades, the agricultural industry has primarily focused on maximizing crop production, driven by fast technological advances, heavy machinery, and synthetic chemical inputs. This approach of short-term profit maximization has simultaneously resulted in ecological stress on the land. These negative externalities appear as nutrient leaching, widespread eutrophication, and biodiversity decline. The continuous reliance on these production inputs accelerates the development of resistance among pests and pathogens. Therefore, when farmers attempt to transition to sustainable farming practices, they face major financial and management challenges.

To advance the agricultural sector toward sustainability, Sweden has established 16 national environmental quality objectives to guide industry in long-term practices (Swedish Environmental Protection Agency, 2025). These goals connect directly to the United Nations Sustainable Development Goals (SDGs) and the global mission to protect biodiversity (United Nations [UN], 2015). Some of these guidelines play such a central role in long-term farming that they are directly credited with helping farms transition. Therefore, Sweden has developed government subsidy programs to provide financial support to help farmers manage the economic risks and additional costs associated with transitioning from conventional methods to organic production.

1.1 Problem Discussion

Organic farming faces many difficulties, both economic and related to risk and knowledge gaps. In an already complicated market, the extra burden of switching to organic farming, compared with conventional methods, creates additional obstacles. The food market is already disrupted by many policies. The more policies are implemented, the further away from the point where consumers and producers meet, shifting the market away from equilibrium. Economic theory shows that the less elastic side of the market will bear a larger share of the burden when prices deviate from equilibrium. In this context, when the fixed subsidies do not adjust to volatile market prices, the financial risk is shifted directly onto the farmers. (Perloff, 2018). Within this sector, agricultural producers often represent the more inelastic side of the market due to high market-entry costs, long production cycles, and rigid asset investments. This, in turn, generates lower yields and greater transition risks for farmers who cannot easily adapt to sudden policy shifts or market shocks. Therefore, the implications of a policy or subsidy are important to examine to understand its actual effect on the market from the perspectives of supporting consumers and producers, as well as long-term environmental goals.

The organic acreage has started to decline in recent years. The nominal subsidies have remained relatively constant, but high inflation and rising production costs have consumed real economic value. The total organic agricultural land in Sweden has simultaneously had a steady decrease by around 4% between 2024 and 2025 alone, marking the sixth year in a row of decline and resulting in a total reduction of 23% in organic land since 2019 (Swedish Board of Agriculture, 2026). Meanwhile, the global event has shaken the market, making it volatile. Input prices for essential goods like diesel and electricity surged during the 2022 energy crisis. Market prices for conventional crops reached record highs, making traditional farming much more profitable than organic production.

1.2 Aim and Research Questions

This thesis analyses how changes in environmental subsidies for organic farming have affected total organic acreage at the county (län) level in Sweden. Econometric methods will be used to isolate the effect of subsidies from other market factors, evaluating both the total impact and potential differences across specific major crops.

The study intends to answer the following research question: To what extent does the level of agri-environmental subsidy affect total organic land area, and how does this effect differ across crop types (oats, winter wheat, and spring barley)?

2. Background and Literature Review

2.1 Policy Framework and the CAP Architecture

The Common Agricultural Policy (CAP) of the European Union is designed to support EU farmers in producing food both sustainably and with lower risk. CAP operates via two primary financial mechanisms, commonly known as the two pillars (European Commission, 2026). Pillar 1 focuses on the direct income support. It is distributed through payment under the Basic Payment Scheme. Given to all agricultural producers regardless of their chosen farming practices. Pillar 2 is designed to function as a fund targeting development aligned with environmental objectives. This second pillar specifically seeks to improve the long-term agricultural competitiveness while encouraging ecological and regional resilience.

While both pillars shape the economic reality of European agriculture, Pillar 2 is the primary focus in this study. Since the basic income support from Pillar 1 is assumed not to affect the relative economic incentive to convert from conventional to organic farming. However, as Jaime et al. (2016) demonstrate, the direct payments from Pillar 1 can sometimes create unexpected trade-offs, where general income support inadvertently dampens the steering capacity of targeted agri-environmental incentives. Therefore, these decoupled markets are excluded from the econometric model to maintain a strict focus on the policy-driven steering mechanisms intended for the environmental transition.

2.2 The 'Rational Farmer' and Economic Incentives

To study how these CAP policy instruments function in practice, it is necessary to examine the socio-economic structure and behavioral drivers of individual producers. The agricultural sector contains a diverse range of farm structures, spanning from traditional, family-operated farms to large-scale commercial agribusinesses (Swedish Board of Agriculture, 2002). This structural diversity directly influences agricultural decision-making, which is characterized by a conflict between two contesting sides: strict economic profit optimization and non-pecuniary personal interests, such as environmental management or traditional farming values (Dessart et al., 2019). This mix of farm structures directly shapes macroeconomic outcomes across regions. Investigating county-level data, therefore, allows us to analyze how these varied individual choices add up to distinct, regional shifts in organic land area

In economic theory, the concept of the 'rational farmer' is defined by Lampe and Sharp (2017) as someone who optimizes decisions through including perspectives from both economic and agronomic dimensions. Therers' study points out that historical developments in the transition toward professional farming are closely linked to the adoption of quantitative measures, such as modern accounting, to improve efficiency. While traditional and affective factors play a role in land use decisions, economic survival and profit optimization are key to sustained survival and, therefore, the dominant drivers. While many farms have an intrinsic motivation to enforce eco-friendly practices, the agricultural economic literature shows that financial viability often acts as a constraint. As Kings and Ilbery (2010) argues, transitioning to organic production methods can sometimes challenge a farmer's traditional professional identity. In a word, being efficient and boosting yield are closely connected to the cultural ideal of a "good farmer".

Agricultural subsidies serve as a direct tool for balancing farm profits with environmental goals. The decision to use the land is based on a simple trade-off scenario. Farmers compare the subsidies as fixed payments per hectare against volatile market prices for conventional crops. Because organic farming yields lower returns and entails greater capital risks, the subsidy must cover these specific losses. By reducing the opportunity cost of producing it traditionally, these policy payments shift economic incentives and create a more attractive alternative. This shifts the equilibrium, making the sustainable practice a business decision rather than a guaranteed economic loss.

2.3 Previous Research on Subsidy Effectiveness and Conversion Barriers

An Italian study by Bernini and Galli (2024) examines the effectiveness of the European Union’s Common Agricultural Policy. The specific focus on pillar two is to evaluate how the policies affect farmers' strategic decision making. The study looks at how the policy is designed to support and promote a sustainable approach. The agricultural sector faces obstacles, including environmental and economic factors that conflict with one another. Pillar 2 is designed to serve as a bridge to help farmers adopt sustainable practices, particularly in common trade scenarios. The study also analyzes spillover effects and how local farmers often influence the farmer, underscoring that there are more ways to influence behavior than just agricultural subsidies.

A main contribution of their work is the analysis of structural incentives by which direct income support (such as Pillar I payments) can interact with targeted environmental incentives of agri-environmental programs (Pillar II). Their results show that agricultural subsidies do not operate in a vacuum. The financial security from direct payments directly shifts farmers' opportunity costs, influencing their willingness to adopt organic systems. These conclusions by Bernini and Galli (2024) focus on Italy's general institutional framework, and where this study builds on their logic by analyzing how Swedish farmers respond to Pillar 2 subsidies amid sudden macroeconomic shocks, price volatility, and soaring input costs (Swedish Board of Agriculture, 2026).

Beyond the financial incentives, such as pillar two, the study by Bernini and Galli (2024) highlights the importance of geographic factors and their role in barriers to organic conversion. Depending on the specific crop type, some of them are easy to grow organically, while others face much higher barriers, including fundamentally different biological, technical, and economic obstacles. Combined, if a difficult crop is on land with already existing barriers, very few farmers would see that as a more lucrative option. These barriers combined lead to crop-specific heterogeneity. Using advanced spatial econometric models, the study shows that conversion rates are strongly influenced by regional characteristics. Analyzing the metrics alone may miss local constraints that drive or hinder the expansion of specific crops.

To further isolate these technology-driven constraints, economic literature emphasizes the high capital and investment requirements of sustainable farming. To understand these constraints, Sipiläinen and Huhtala (2013) evaluate the opportunity costs of adopting eco-friendly practices by comparing conventional and organic crop farms in Finland. Lohr and Salomonsson (2000) confirm a similar pattern in Sweden, showing that the structured layout of conversion subsidies is essential. From a broader perspective, studies around Europe have pointed out that modern frameworks must be more adaptive. Specifically, flexible institutions are required to quickly reduce the financial risks associated with new agricultural technologies (Verburg et al., 2022). Their study shows that investing in specialized machinery is highly important for the organic farmers who are no longer able to use synthetic chemical inputs. The need for mechanical solutions or technological innovations in weed and soil management could be a key to overcoming the barriers that prevent farmers from applying practices with lower environmental impact, but only if a farm possesses the financial capacity to acquire this equipment.

Through analyzing these farm types side by side, the authors find that the shadow values of implementing organic practices vary considerably across regions and available technologies. This variance creates a difficult dilemma for the policy design. While a uniform, flat-rate subsidy is administratively simpler than an individualized support subsidy, it results in an uneven distribution of economic subsidies among different farm types. In contrast, smaller farms face financial obstacles when adapting to the mechanical demands of organic production, resulting in varying degrees of baseline resistance to flat subsidies.

The financial attractiveness of agri-environmental subsidies doesn´t depend only on policy design; it is also heavily influenced by local conditions and transforming market dynamics. Across Sweden's 21 counties, there are structural differences in soil fertility, the average farm size, and yield capacities from region to region. This variation generates an uneven baseline in production. The study did not account for these variations, which could have influenced its interpretation of the results. The 2010–2024 period was affected by macroeconomic disruptions, including fluctuations in the global grain market and increased input costs (Swedish Board of Agriculture, 2026). These price shocks directly altered the baseline profitability of conventional farming; they simultaneously modified the relative economic incentives of converting the production to organic land. Due to events that affect all countries, simultaneity increases the relevance of using a fixed-effect model for both countries and years to control for these events.

Beyond these financial investment traps, the existing literature emphasizes that conversion barriers are often deeply rooted in concrete, physical agronomic limitations. Following the crop-specific findings, it becomes evident that while financial incentives are important, they do not work alone, as the empirical results are heavily dictated by underlying agronomic and technical constraints. Organic agriculture does not compete on equal terms with conventional agriculture. Without synthetic pesticides and chemical fertilizers, organic producers face completely different agronomic challenges. In particular, the weed management acts as a major biological barrier. Mechanical weed management requires more labor, fuel, and tractor hours. The increased workload and the risk of yield loss are often the main reasons behind why many farmers choose not to convert (Dessart et al., 2019). This resistance aligns with findings by Stephenson et al. (2022); their study highlights the fear of unmanageable weed pressure and agronomic uncertainty. These two perspectives are the primary reasons for farmers deciding against an organic transition. Conversion can be viewed as both a technical switch and a multidimensional process at the crossroads of agronomic and socioeconomic realities (Bellon & Lamine, 2009).

To overcome these problems, technological innovations in agricultural machinery are of huge importance. For instance, traditional plowing has been a common practice in farming for both traditional and organic production. There is, though, a downside to plowing: That it damages soil structure and biodiversity. The factor worms for example is an important component of the organic approach because they stimulate growth, a function the traditional approach can get from fertilizers. Minimizing the impact on the soil is especially important where the organic approach lacks the chemical inputs that would otherwise help control weeds, for example. Such low-disturbance systems offer new solutions for organic management. If the soil has a greater capacity to protect itself, that would be part of the solution, along with a subsidy. Systems that minimize such behaviors help farmers convert production. These machines allow accurate crop establishment while lessening soil disturbance.

By keeping the soil relatively undisturbed between rows, these methods can significantly suppress weed growth and help preserve soil moisture.

Those technological innovations help farms to reduce the opportunity cost of switching to organic farming. Economic barriers have complicated the conversion, but when a farmer can effectively manage weeds without chemical sprays, the baseline risk of conversion drops. However, these specialized machines require high initial capital investment. This implies that the transition to eco-friendly farming is more than just a choice of production method; it is also a major investment decision. Therefore, policy steering mechanisms like the Pillar subsidies may be necessary to help farmers absorb these initial technology risks and capital costs.

The substantial standard deviation relative to the mean in the descriptive statistics, combined with the yield gap percentage, underscores that agricultural dynamics in Sweden are far from flat. The geographical realities of Sweden range from fields in the south to forests in the north, creating an even larger range of "yield gap" due to variations in nature, which represents the percentage difference in harvest volume between organic and conventional farming. This regional heterogeneity severely distorts the CAP framework's local effectiveness. varying regional cost structures. In counties with highly fertile soil, like the southern plains, intensive production is much more frequent. Forcing a shift to organic methods here would mean abandoning the high-yield inputs used in traditional production, resulting in a severe drop in output per hectare.

Because the opportunity cost in these high-performing counties is so steep, a flat nationwide subsidy for all cereals fails to attract intensive commercial farms. This distortion is fundamentally rooted in a problem of asymmetric information between local farmers and the government, generating a classic case of adverse selection. Because individual farmers possess private knowledge about their soil quality and true opportunity costs that the central government cannot observe, a flat-rate subsidy per hectare fails to account for these private cost differences.

On the other hand, in regions with less productive soils, such as those in the northern districts, the gap between conventional and organic yields is much narrower. The same per hectare subsidy now becomes a strong financial incentive due to the minor revenue losses. This framework clusters organic farming in less productive lands while leaving fertile areas unchanged, directly undermining Sweden’s ability to hit its aggregate organic production targets.

3. Methodology and Data

3.1 Econometric Model

To evaluate whether subsidies influence the transition from conventional to organic farming, this study will use a fixed effects model. This econometric approach accounts for unmeasured regional characteristics, like variations in soil quality, average temperatures and solar exposure. Those geographic factors will differ substantially between the northern and southern parts of Sweden. Implementing the fixed effects framework ensures a within-county analysis, controls for time-invariant geographic noise, and isolates the causal effect of policy shifts on organic land allocation. Furthermore, the model controls for time-fixed effects, capturing macro-level shocks that affect all counties simultaneously. Examples of such events include the extreme drought of 2018(Swedish Board of Agriculture 2019), major reforms to the EU's Common Agricultural Policy (CAP), and general market price fluctuations that affect the national agricultural sector as a whole. The framework is presented in the following econometric model:

$$Y_{it} = \beta_1 Subsidy_{it} + \beta_2 Farm\ size_{it} + \beta_3 Yield\ gap_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

Y_{it} is the dependent variable representing the total organic agricultural land for winter wheat, oats, and spring barley. Where i is representing county (län) and t representing time measured in years. $Subsidy_{it}$ is the main independent variable denoting the total agri-environmental support payments. To control for structural and productivity differences, $Farm\ size_{it}$ and $Yield\ gap_{it}$ are included as regional control variables. To control for unobserved factors, α_i and γ_t capture county and year fixed effects, respectively, while ε_{it} is the error term. The baseline models in Tables 1, 2, and 3 use a linear-linear specification where β_1 shows the absolute change in organic hectares per one million SEK increase in support. To check the robustness of these results and account for differences in county size, Table 4 presents a log-log specification using the transformation $\ln(Y_{it} + 1)$ to handle zero values and interpret the coefficients as elasticities. Finally, standard errors are clustered at the county level across all models to control for heteroskedasticity and serial correlation.

3.2 Data Sources and Description

The data in this study were received from the Swedish Board of Agriculture (Jordbruksverket). The government agency is primarily responsible for administrative authority in domains such as animal welfare and development in the countryside. It also collects data and statistics on agricultural development in Sweden. Using this official source ensures high reliability and consistency, as the dataset is constructed from standardized, mandatory reporting across Swedish counties. For the period studied (2010–2024), the agency provided the foundational panel data on regional agri-environmental subsidies (subsidy_mln), organic land acreage, and crop-specific conventional yields.

Table 1. Variable Definitions and Sources

Variable	Description	Unit	Source
Organic area	Total organic land area under support (measured in absolute terms and as a percentage share)	Hectares (ha) / Percent (%)	Swedish Board of Agriculture 2026
Subsidies	Agri-environmental payments (Pillar 2)	Million SEK (MSEK)	Swedish Board of Agriculture 2026
Farm size	Mean size of agricultural holdings	Hectares (ha)	Swedish Board of Agriculture 2026
Yield gap	Productivity gap (Organic / Conventional)	Percent (%)	Swedish Board of Agriculture 2026

Dependent Variable: organic agricultural land area

The dependent variable (Y_{it}) measures the extent of organic agricultural land across Swedish counties and is evaluated through two approaches. In the baseline specifications (Tables 1, 2, and 3), the dependent variable is operationalized in absolute terms as the total number of hectares dedicated to organic farming. To check the robustness of the results and control for differences in overall county sizes, secondary models (Tables 4 and 6) use the percentage share of organic land relative to the total farming area within the county. Presenting the dependent variable as both absolute hectares and percentage shares ensures that the main findings are stable regardless of the vast geographic and agricultural differences between Sweden's counties.

Variable of interest: Agri-environmental Subsidy

The main independent variable captures government total support paid to organic farmers within a county during a specific year, measured in millions of SEK in the first model and as a percentage in the second. These subsidies/payments are distributed through the CAPs pillar 2 payment scheme via the Swedish rural development program. Economically, this variable acts as a financial incentive in our model. The funding is explicitly designed to counter the lower yields and increased regulations that farmers face when abandoning conventional methods, thereby directly altering their economic trade-offs during conversion.

Control Variables: Farm size and yield

Average farm size works as a control variable in the study. Farm scale strongly dictates a producer's capacity for risk management, as larger operations possess greater financial buffers to withstand the volatility and revenue losses inherent in a multi-year organic transition. Often is smaller average farm sizes are an indactor of regional characteristics, such as lower quality soil, labor-intensive systems or restricted local land rental markets. Accounting for farm size helps prevent omitted-variable bias and isolate the net steering effect of Pillar 2 subsidies on land allocation.

The variable yield gap is part of the model to help the study identify the underlying production risks and opportunity costs of shifting away from standard methods. In conventional agriculture, where synthetic fertilizers and pesticides function as a safety net to ensure some type of guaranteed output in normal harvest scenarios. Shifting to organic practices removes this protection, introducing higher output volatility and capital risks. A narrower productivity gap reduces this structural barrier, making the subsidy's financial incentives substantially more attractive to the individual farmer.

Fixed Effects (α, γ)

The use of a fixed-effect model is just to be able to isolate a policy effect. The two residuals in the model include both county and year fixed effects. County fixed effects (α) absorb unobserved, time-invariant factors specific to each region, such as regional farming traditions or stable geological soil traits. Year fixed effects (γ) account for unmeasured annual shocks that hit all Swedish counties simultaneously and without checking for this leads to skewness in the intercept. This is important for capturing broader macroeconomic changes, such as post-2022 food price inflation, shifts in global grain markets, or sudden changes in national agricultural guidelines.

3.3 Methodological Limitations and Validity

From this primary data source, an indicator of average farm size per county was constructed to serve as a control variable in the model. Average farm size, measured in owned land, not in tenant land/arrendatorer. This is crucial because of unobserved behavioral differences in these ownership categories. This results in some limitations that prevent us from observing the exact lease structures and individual lengths in contracts. Controlling for owned farm size functions as a proxy for regional financial stability and long-term security. Since converting requires a multi-year commitment, farmers with larger acres of owned land face a lower risk of land tenure insecurity, making them more likely to respond to subsidy incentives. Omitting this variable would skew the results, as the model could miss structural regional stability in response to subsidy levels rather than to the underlying factors.

The study used linear interpolation in order to fill in where the data lacked of observations. This is necessary to keep the dataset balanced and avoid dropping entire counties from the model. While doing this helps preserve the long-term structural trends from 2010 to 2024, it comes with a trade-off. The method smooths out any sudden, sharp fluctuations that might have happened from one year to the next in specific counties. Another thing to consider is the major CAP reform in 2023 (Swedish Board of Agriculture, 2024), which falls in the middle of the data timeline (2010–2024). The policy change sets off a domino effect: it does not directly affect the farmers and instead has a delayed impact. This multi-year transition phase introduces bias because the study evaluates only immediate annual responses. This might understate the effects of past subsidy levels on current acreage decisions.

The empirical analysis is focused on three major cereal crops: winter wheat, spring barley, and oats. Although these crops account for the majority of the Swedish cereal production (Swedish Board of Agriculture, 2016), the study excludes protein crops, oilseeds, and green fodder. These excluded crop categories require totally different cultivation practices compared to the analyzed cereals, which share relatively homogeneous production methods. Therefore, the findings of this study cannot be generalized to the entire agricultural crop sector. That this study also uses aggregate county-level data rather than farm-level observations. This led to losses in perspectives, such as the model cannot capture unobserved personal factors, such as a farmer's specific attitude toward sustainability, family traditions, or localized agronomic knowledge.

The choice of a linear-linear framework for the primary models is motivated by two main reasons. First, the dataset contains several observations with zero values, which makes a standard logarithmic transformation mathematically impossible since $\ln(0)$ is undefined. Using a linear specification avoids dropping these important data points and preserves a balanced panel. Second, the linear-linear setup allows for a direct interpretation of the policy effects in absolute terms, which is useful for policymakers who plan budgets in actual SEK and hectares rather than percentages. However, to ensure the robustness of the results and control for county size, the log-log specification in Table 4 handles the zero observations by adding a constant of 1, written as $\ln(Y_{it} + 1)$, allowing the coefficients to be interpreted as elasticities.

A further limitation concerns the possibility of spurious correlation between subsidies and organic acreage. Both variables could plausibly be driven by the same unobserved regional characteristics, for instance, counties with generally stronger agricultural administration or more favorable soil and climate conditions might both attract higher subsidy allocations and independently support more organic production. The county fixed effects (α_i) absorb time-invariant versions of this confound, but they cannot rule out that year-to-year changes in subsidy allocation and organic acreage are jointly driven by a third, time-varying regional factor not captured in this model. This limitation should be kept in mind when interpreting the subsidy coefficient as a causal estimate.

4. Results

4.1 Descriptive Statistics

Table 2 presents descriptive statistics for the study’s dependent variable, the main independent variable, and the control variables included in the regression models. This section provides an overview of the data used as the basis for the empirical analysis. The study uses a county-level panel of data from Sweden's 21 counties for the period 2010–2024.

Table 2.Descriptive statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
organic_area_ha	955	1,234	1,862	0	16,090
yield_conv_kgha	838	4,604	1,498	990	8,960
yield_gap_pct	628	65.87	12.47	36.40	140
subsidy_mln	1,008	28.91	31.01	2.790	188.7
avg_farmsize_fill	1,008	39.72	14.62	18.88	72.77
Number of panel_id	21	21	21	21	21

The number of observations (N) varies between different variables, resulting in an unbalanced panel. The panel is unbalanced, mainly due to the yield data. Although subsidies and farm sizes are recorded for all 1008 periods, this is the maximum number of observations. Yieldgap statistics for specific crops and counties may be zero because official records are unavailable for some years. Reducing the number of observations for the yield gap variable to 628. This affects the study's reliability due to data attrition. The average production ratio of 65.87% implies a mean yield gap of around 34%. This provides the study with an estimate of the average productivity loss associated with organic farming relative to typical methods in the sample, a key factor in the farmer's decision to convert the land from an economic perspective.

The dependent variable, Organic Area, has an average of 1,234 hectares per county-crop combination. The substantial standard deviation of 1,862 relative to this mean indicates that organic farming is not evenly distributed across Sweden. The production is instead highly concentrated in specific regions due to structural differences in soil quality, climate, and local farming traditions. This high regional variance justifies using a Fixed Effects model to control for these time-invariant spatial characteristics

Figure 1 illustrates the development of organic land area for three selected crops over a 19-year period. While the combined area shows a continuous increase until 2020, followed by a decline, the individual trend lines for each crop show both similarities and differences. The simultaneous movements in certain periods suggest the influence of broader social trends and common shocks, such as changes to the EU Common Agricultural Policy (CAP) or in Sweden's national environmental policies (Johansson et al., 2021). However, divergent trends across specific crops indicate that factors such as varying success rates in organic farming, market demand, and data attrition have a significant role in the regional distribution of organic farming.

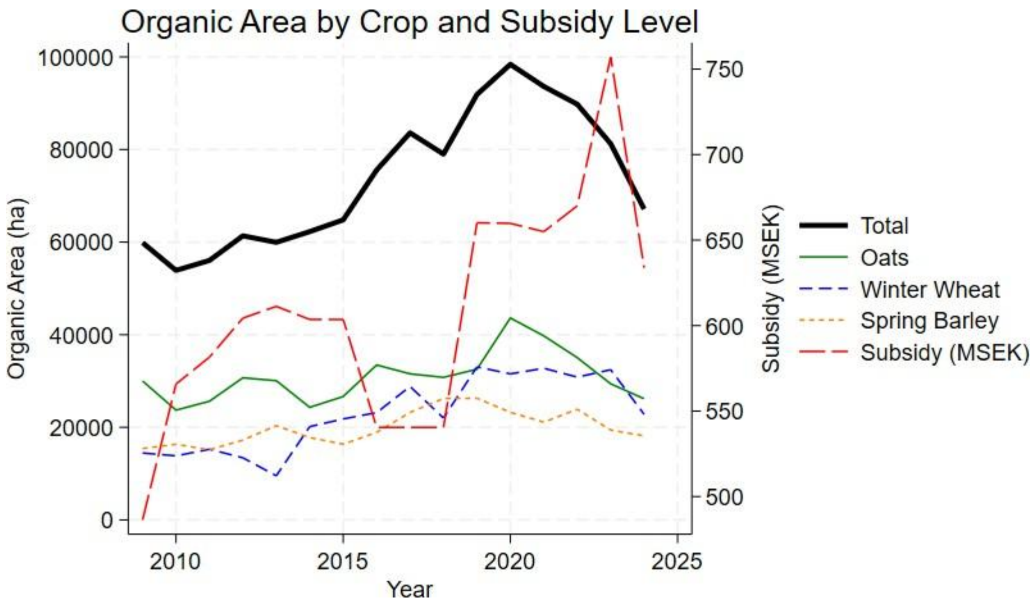

Figure 1. Organic Area over time
Source: Swedish Board of Agriculture data covering the period 2016–2023.

4.2 Main Results

The regression results in Table 3 show a highly significant positive impact of the agri-environmental subsidy on the total organic land area (Column 1, $p < 0.01$). Holding other variables constant, a 1 million SEK (MSEK) increase in the subsidy is associated with approximately a 33.85-hectare increase in total organic land area.

Table 3 .The Impact of Subsidies on Total Organic Land Area (Hectares)

	Total	Oats	Winter Wheat	Spring Barley
Agri-environmental Subsidy	33.85***	9.802	58.61***	33.31***
	(3.838)	(6.275)	(8.220)	(3.880)
Average Farm Size	49.72***	51.66**	62.49**	28.74**
	(13.18)	(21.23)	(29.96)	(12.93)
Constant	-1,619***	-642.6	-3,057***	-1,066**
	(460.8)	(731.0)	(1,093)	(443.2)
Observations	955	333	286	336
R-squared	0.295	0.271	0.487	0.429
Number of panel_id	62	21	20	21
Year FE	Yes	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

However, there is significant crop heterogeneity shown across the different models. The strongest effect is found for Winter Wheat (Column 3), where a 1 MSEK increase in the subsidy yields an estimated increase of 58.61 hectares, which is statistically significant at the 1% level ($p < 0.01$). This is followed by Spring Barley (Column 4), which shows a statistically significant increase of 33.31 hectares ($p < 0.01$). In contrast, Oats (Column 2) constitutes an exception; the coefficient is small (9.80 hectares) and statistically insignificant. This indicates that changes in subsidy levels do not have a statistically significant impact on organic acreage dedicated to oats.

The control variable for structural makeup, Average Farm Size, shows a consistent, statistically significant positive effect across all four specifications ($p < 0.01$ for total area and $p < 0.05$ for each individual crop). An increase of 1 hectare in the county's average farm size is associated with an expansion of organic land. The magnitude of this effect ranges from 28.74 hectares for spring wheat to 62.49 hectares for winter wheat. The results strongly support the economic theory that larger farms possess greater structural and financial capacity to absorb risks and commit to the multi-year conversion process required for organic farming.

The model performs exceptionally well for Winter Wheat, explaining 48.7% of the temporal variance within a county ($R^2 = 0.477$). For the total organic land area, the model explains 29.5% of the variation ($R^2 = 0.255$). The total number of observations ranges from 286 (Winter Wheat) to 955 (Total), indicating a well-balanced, comprehensive panel dataset across the Swedish counties. Finally, the inclusion of Year Fixed Effects (FE) ensures that the models control for countrywide macro shocks and annual weather fluctuations that affect all regions.

The results in Table 4 support the main findings, but the relative proportions (%) from the acreage models show critical nuances in crop heterogeneity that help control for regional differences, specifically the size of a county relative to the total organic land. The table will correct for countries with a larger total field area rather than for countries with fewer fields, where the subsidy would have a larger impact, depending on the rest of the production. For the total organic share (Column 1), the Agri-environmental subsidy has a statistically significant positive effect ($p < 0.05$). Specifically, a 1 MSEK increase in the regional subsidy level is associated with a 0.0967 percentage point increase in the total share of organic land area per county.

Table 4. Factors Influencing the Relative Share of Organic Farming (%)

	(1) Total	(2) Oats	(3) winter wheat	(4) spring grain
Subsidies	0.0967**	0.150	0.0227	0.101***
	(0.0492)	(0.0936)	(0.116)	(0.0284)
Farm size	0.343**	0.684**	0.0853	0.215**
	(0.169)	(0.317)	(0.421)	(0.0946)
Constant	-4.075	-11.27	2.211	-1.269
	(5.900)	(10.90)	(15.36)	(3.242)
Observations	954	333	285	336
R-squared	0.122	0.182	0.134	0.432
Number of panel_id	62	21	20	21
Year FE	Yes	Yes	Yes	Yes
Extra controls	No	No	No	No

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Note: Table 4 presents estimated coefficients based on a log-log specification. Consequently, the coefficients represent elasticities, measuring the percentage change in the dependent variable given a one percent change in the agri-environmental subsidies. Standard errors are clustered at the county level.

When examining individual crops, a striking shift is observed compared to absolute models. While Winter Wheat (Column 3) showed the largest absolute expansion in hectares in Table 4, its effect on relative market share is small (0.0227) and statistically insignificant. It shows that while subsidies drive an absolute increase in organic winter wheat, they do not significantly change its overall share relative to conventional winter wheat in the counties. Conversely, Spring Grain (Column 4) shows a highly significant positive response ($p = 0.01$), with a 1 MSEK increase in subsidies driving a 0.101 percentage point increase in its organic market share. For Oats (Column 2) the subsidy remains statistically insignificant, consistent with previous findings.

Average Farm Size continues to show a strong, positive, and statistically significant impact on the organic share across almost all models ($p < 0.05$for Total, Oats, and Spring Grain). For instance, a 1-hectare increase in average farm size is associated with a 0.684 percentage-point increase in the organic share of Oats. This further confirms the structural capacity argument established in the previous section.

In terms of model fit, the R^2 values show that the explanatory power of the fixed-effects specifications varies considerably when comparing the aggregate land shares against individual crop types. Looking at the models presented in Table 4 (Columns 1–4), the framework explains 12.2% of the within-county variance in the total organic share over time ($R^2 = 0.122$).

The explanatory power for each specific crop increases slightly to 13.4% ($R^2= 0.134$) for winter wheat and 18.2% ($R^2 = 0.182$) for oats. Interestingly, the model shows its highest explanatory power for spring grain, accounting for 43.2% of the variance within the data ($R^2 = 0.432$). This variation underscores that pooling diverse crops into a single aggregate index (Column 1) smooths out the distinct, crop-specific market patterns and biophysical realities that drive separate farmer decisions, thereby confirming the methodological necessity of evaluating the major grains individually.

4.3 Robustness Checks

The econometric model was stringed to strongly supported the subsidy effect, and two other variables were introduced to minimize bias. Stringing the model means tightening the econometric framework by adding strict control variables, thereby forcing the subsidy effect to hold even when accounting for external factors such as productivity shocks. The two control variables were the organic /conventional yield ratio (%) and organic yield (kg/ha). If the model remains robust, these additions indicate a reliable relationship between the dependent and the primary independent variable.

Stability of the Subsidy Effects

The results in Table 5 show that the positive impact of the agri-environmental subsidy remains very strong, even when controlling for regional crop productivity. For the aggregate organic market share (Column 5), the subsidy coefficient stays positive and statistically significant (0.0487).

Table 5. Robustness Check: Controlling for Agricultural Output and Yield Gaps (%)

	(5) Total (+ctrl)	(6) Oats (+ctrl)	(7) winter wheat (+ctrl)	(8) spring grain (+ctrl)
Subsidies	0.0487**	-0.0367	0.0729***	0.0720***
	(0.0220)	(0.0448)	(0.0245)	(0.0276)
Farm size	0.115	0.567***	-0.000415	0.120
	(0.0920)	(0.181)	(0.0983)	(0.130)
Organic/conventional yield ratio (%)	0.0329**	0.0495	0.106***	-0.0102
	(0.0162)	(0.0317)	(0.0269)	(0.0208)
Organic yield (kg/ha)	- 0.0014***	-0.00133	-0.0002	-0.0004
	(0.000)	(0.000914)	(0.000429)	(0.000428)
Constant	6.543	-4.966	-0.496	3.571
	(3.987)	(8.119)	(4.989)	(5.119)
Observations	621	209	165	247
R-squared	0.472	0.682	0.417	0.515
Number of panel_id	47	14	14	19
Year FE	Yes	Yes	Yes	Yes
Extra controls	Yes	Yes	Yes	Yes

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

By looking at each crop by itself, how the subsdly will influence each crop differently. The crops that show a highly significant positive effect at the 1% level ($p < 0.01$) are both Winter Wheat (Column 7, coefficient 0.0729) and Spring Grain (Column 8, coefficient 0.0720). For Oats (Column 6), the subsidy remains statistically insignificant. This cross-crop stability is strong empirical proof that financial support directly drives land-use choices for wheat and barley, completely independent of temporary yield shocks.

Economic Importance of the Yield Gap

Adding a variable that examines productivity across the two different practices helps the study gain new economic insights into the opportunity costs that farmers face. The

Organic/conventional yield ratio (%) shows a positive and highly significant effect on Winter Wheat ($p < 0.01$). The coefficient of 0.106 means that if the yield ratio increases by 1 percentage point—meaning the organic yield gets closer to conventional levels and the yield gap shrinks—the market share of organic winter wheat expands by 0.106 percentage points.

Because winter wheat is a nutrient-demanding crop, it results in a high baseline for conventional yields. A smaller yield disadvantage directly lowers the farmer's financial risk and opportunity cost. This directly reflects the long-term agronomic realities observed by Sacco et al. (2015), whose six-year transition trial demonstrates that crop production faces significant stabilization phases before organic yield gaps begin to narrow. When organic yields approach conventional standards, the conversion becomes economically viable on its own, reducing the farmer's reliance solely on the Pillar 2 subsidy. This logic is supported by the aggregate model (Column 5), which shows that the overall yield ratio has a significant positive effect (0.0329).

Model Fit and Data Structure

Adding crop yield data significantly increases the within-county explanatory power (R^2) across all crop types. This is highly visible for Oats (Column 6), where the model now accounts for 68.2% of the variation over time ($R^2 = 0.682$). However, this is mostly driven by the structural farm size variable (0.567***), proving that oat production is guided more by farm size than by policy payments.

The total number of observations is lower in Table than in the rest of the baseline because the Swedish Board of Agriculture collects its crop-specific yield records at intervals longer than a year to year range. However, the panel architecture and Year Fixed Effects (Year FE) are fully intact, ensuring that the policy implications remain mathematically reliable.

Table 6 presents a model to test for strength by including the variables Conventional Yield (kg/ha) and the Organic/Conventional Yield Ratio (%). The conventional yield works as a proxy for regional soil productivity and agricultural quality. Counties or districts with comparatively better soil quality tend to have higher output production, which itself leads to higher opportunity costs of conversion. Due to regional variations in agricultural productivity, the yield ratio variable is introduced to effectively capture the localized yield gap between organic and conventional farming systems. By including this perspective in the model, which controls for these agronomic factors, this specification tests whether the previously observed policy effects are driven by underlying land wealth and soil suitability rather than by the subsidy's financial incentives.

Table 6. Robustness Check: Controlling for Soil Productivity and Yield (Dependent Variable: Organic Land Area in Hectares)

VARIABLES	(1) Baseline	(2) Full Model
Agri-environmental Subsidy (MSEK)	38.87***	32.12***
	(10.71)	(10.65)
Average Farm Size (ha)		58.27***
		(20.33)
Conventional Yield (Productivity Proxy)		0.297***
		(0.103)
Organic/conventional yield ratio (%)		7.281*
		(3.921)
Constant	71.99	-3,779**
	(295.5)	(1,452)
Observations	955	625
R-squared	0.283	0.368
Number of panel_id	62	49
Year FE	Yes	Yes

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The inclusion of the soil productivity proxy and the yield gap does not change the statistical significance of the primary independent variable. The agri-environmental subsidy remains statistically significant at the 1% level. From an economic standpoint, the baseline effect is highly stable. While a one-million SEK increase in subsidies leads to an estimated 38.87-hectare expansion in the baseline specification, the coefficient remains at 32.12 hectares in the full model when measured in absolute land area.

Although the model experiences a reduction in observations from 955 to 625 due to data constraints regarding continuous yield monitoring across certain counties, the overall explanatory power increases, with the R^2 value rising from 0.283 to 0.368. The coefficient for conventional yield is positive and statistically reliable (0.297, $p < 0.01$), and the yield ratio is also positive and significant at the 10% level (7.281, $p < 0.1$). Together, these results confirm that while baseline land productivity and localized agronomic dynamics affect the distribution of organic farming, the financial incentive of the subsidy remains a primary and robust driver of farmers' conversion decisions the 10% level (7.281). Together, these two coefficients confirm that baseline land productivity and regional yield dynamics affect the distribution of organic land. The subsidy retains high significance. These data indicate that institutional policy models and financial support remain primary, robust drivers of farmers' decisions to convert.

5. Discussion

Interpretation of Empirical Findings and Robustness

The empirical findings show a mixed impact of agri-environmental subsidies across crop types. Wheat and barley have positive and statistically significant coefficients, indicating that financial incentives are effective in driving organic conversion for these crops. This is probably because organic grains already have an established market and processing setup in Sweden, which lowers the risk for farmers who convert.

Oats show no statistical significance. This means subsidies alone are not enough to advance organic oat production. Farmers' decisions seem to depend on more than government payments; crop-specific market conditions, price volatility, and agronomic factors like crop rotation also matter. Part of this difference may come from regional structure: wheat and barley are grown mainly on the larger, more productive fields in southern Sweden, while oats have traditionally grown more on less fertile land further north. This matches the geographic conversion barriers described by Bernini and Galli (2024). A flat-rate subsidy applied the same way everywhere creates unequal incentives depending on local conditions. A more differentiated subsidy design could fix this, but it would raise administrative costs.

The results hold up in the checks in Table 5 and Table 6. Table 5 directly controls for the organic-to-conventional yield ratio and organic yield levels. The coefficients for wheat and barley stay positive and significant, so the baseline result is not just picking up a productivity shock. Table 6 controls for conventional yield as a proxy for soil quality; the subsidy coefficient for total organic area barely changes, from 38.87 to 32.12 hectares, so the effect is not just driven by regional land quality. One clear change is that oats becomes statistically significant once soil productivity is controlled for. This suggests that part of the null result for oats in the baseline model was masking a regional productivity difference, rather than a real absence of a policy effect.

These results point out some limits of flat, Pigouvian-style subsidies. Financial support is sufficient to cover the opportunity cost of conversion for high-yield crops like wheat and barley, but less so for oats, where market premiums are lower and yields are less predictable. A flat acreage payment gives uneven results across crops. Future policy design could account for crop- and region-specific opportunity costs rather than applying the same rate everywhere.

Macroeconomic Realities and the Reversal of the Organic Trend

A clear structural break is observed towards the end of the panel period, when the previously upward trend in organic land area begins to decline. Because the nominal value of the CAP Pillar 2 subventions remained relatively stable during these years, it led to an economic mismatch between policy-driven supply incentives and consumer-driven demand. While the subsidies are designed to help expand the supply of organic acreage, the empirical reality demonstrates that the core issue does not lie solely in supply, but increasingly in market demand.

In reality, a severe decline in purchasing power has shifted consumer behavior. The macroeconomic shock of high food price inflation post-2022 reduced consumer incentives to buy premium-priced organic goods, leading them instead to opt for cheaper, conventional alternatives (Ekologiska Lantbrukarna, 2023). As consumer demand dried up, the viability of the organic market became heavily dependent on the baseline subsidies that farmers could rely on. However, when the market price premium vanishes or declines, the fixed government subsidy is no longer sufficient to cover the additional opportunity costs of producing organically.

Lately, more and more farmers have left organic certification and gone back to conventional farming (Swedish Board of Agriculture, 2024). The year fixed effects absorb these shocks statistically, but the trend break still matters here, since it shows how sensitive the subsidy's effect is to conditions outside the policy itself. Established policy measures stay vulnerable to macroeconomic shocks and sudden shifts in consumer purchasing power.

Policy Implications: The Need for Dynamic Subsidies

These results point to a major structural flaw in the design of CAP's environmental payments: their complete lack of flexibility. When a policy instrument is locked in and ignores macroeconomic shifts, unforeseen price shocks can fully wipe out the economic incentive to farm organically. In fact, this inflexibility itself exposes a deeper conflict within the CAP framework, wherein the market-oriented supports in Pillar 1 often run counter to the environmental objectives of Pillar 2.

The core implication for future agricultural frameworks is that CAP incentives cannot remain static. If future policy models shift away from fixed, flat-rate payments and toward market-adjusted support mechanisms, they could overcome some of these existing economic barriers. However, implementing such a dynamic subsidy model would inherently require a significantly higher administrative workload than a flat subsidy which is much simpler to administer—meaning this transition may face practical constraints.

In a scenario where the subsidy is linked directly to current input costs and conventional crop prices. A spike in the conventional grain prices would automatically trigger an upward adjustment in the organic subsidy, thereby keeping the opportunity cost constant. The subsidy would instead be adjusted around a flexible, responsive framework that would protect farmers from sudden market shifts, prevent regional organic land area from dropping, and ensure that public funds effectively achieve their long-term environmental goals.

Food Security and Practical Production Constraints

There is no realistic likelihood of a complete transition to only have organic production in Sweden. The agricultural sector is constrained by restrictive systemic productivity limits. These structural yield penalties relative to conventional methods would mean that a 100% conversion rate would severely reduce total domestic food output and force oss to be dependent on imported livestock feed supplies, not only during periods of crisis but also in day-to-day consumption. This would threaten national self-sufficiency and create other problems.

To maintain domestic consumption and sustain crop production without synthetic inputs, a complete organic transition would face critical constraints on nitrogen availability and yields. Therefore, environmental subsidies should not target an absolute transition to organic. Instead, they should aim for an optimal equilibrium in which organic production achieves long-term sustainability goals while maintaining a highly productive conventional baseline to ensure stable, affordable food security (Persson, 2015).

6. Conclusion

This thesis evaluates how CAP Pillar 2 agri-environmental subsidies affect the transition from conventional to organic farming across Sweden’s 21 counties between 2010 and 2024, and for the three crops: winter wheat, spring barley, and oats. By tracking the same regions over a 15-year period using a regional Fixed Effects framework, the econometric model isolates pure policy effects from local agricultural baselines and national macroeconomic shocks.

The results clearly indicate that flat-rate financial incentives do not elicit a uniform response across sectors. Instead, the policy's steering capacity depends heavily on the specific crop. For winter wheat and spring barley, the agri-environmental support has a statistically significant, positive effect. For these grains, the financial buffer successfully offsets the average 34% yield penalty that comes with organic cultivation. Oats present the opposite scenario. Here, the policy coefficient drops to statistical insignificance. This gap implies that when conventional crop markets are highly profitable and stable, the opportunity costs of switching to organic production simply outweigh the fixed government payouts.

A noticeable structural break also appears around 2020 in both the descriptive and graphical data. After this point, Swedish organic acreage began a steady, continuous decline. This turning point illustrates that agricultural supports never operate in an economic vacuum. High inflation and soaring input costs rapidly eroded the real purchasing power of the flat-rate subsidies. Additionally, institutional uncertainties related to the reformed CAP architecture and the introduction of new eco-schemes likely caused further friction for farmers.

Ultimately, while agri-environmental subsidies work well as an initial baseline for green steering, market forces can easily override them. Rigid, flat-rate subventions cannot withstand shifting commodity prices or macroeconomic crises. Future agricultural frameworks operating under the CAP should therefore abandon static payment designs. To keep resilient against volatile markets, future policy structures must adopt dynamic, risk-adjusted payments which adapt to both localized yield variations and changing global crop prices.

7. References

Bellon, S., & Lamine, C. (2009). Conversion to organic farming: A multidimensional research object at the crossroads of agricultural and social sciences-A review. *Sustainable agriculture*, 653-672. https://link.springer.com/chapter/10.1007/978-90-481-2666-8_40

Bernini, C. & Galli, F. (2024). Economic and environmental efficiency, subsidies, and spatio-temporal effects in agriculture. Ecological Economics, 218, artikelnummer 108120. https://www.sciencedirect.com/science/article/pii/S092180092400017X

Dessart, F.I., Barreiro-Hurlé, J. & van Bavel, R. (2019). Behavioural factors affecting the adoption of sustainable farming practices: a policy-oriented review *European Review of Agricultural Economics*, 46(3), ss. 417–471. https://agriculture.ec.europa.eu/system/files/2019-10/behavioural-factors-affecting-adoption-review_en_0.pdf

European Commission. (2026). *Common agricultural policy funds*. Directorate-General for Agriculture and Rural Development. https://agriculture.ec.europa.eu/common-agricultural-policy/financing-cap/cap-funds_en

Ekologiska Lantbrukarna. (2023). *Ekologiska marknadsrapporten 2023: Konsumtion och marknadstrender under högkonflationskrisen*. Uppsala: Ekologiska Lantbrukarna.https://www.ekolantbruk.se/rapporter/ekologiska-arsrapporten-2023

Jaime, M. M., Coria, J., & Liu, X. (2016). Interactions between CAP agricultural and agri-environmental subsidies and their effects on the uptake of organic farming. *American Journal of Agricultural Economics*, *98*(4), 1114-1145. https://onlinelibrary.wiley.com/doi/10.1093/ajae/aaw015

Kings, D., & Ilbery, B. (2010). The Environmental Belief Systems of Organic and Conventional Farmers: Evidence from Central-Southern England. *Journal of Rural Studies*, 26(4), 437-448
https://www.sciencedirect.com/science/article/abs/pii/S0743016710000355?via%3Dihub

Larsson, C., Brady, M. V., Hristov, J., & Johansson, H. (2018). *Reformen av CAP 2013: Lärdomar för en bättre jordbrukspolitik efter 2020*. AgriFood Rapport 2018:1. AgriFood Economics Centre, Lunds universitet.johansson/publication/cfed605c-3987-4118-a05e-5b6a99d6e496

Lampe, M. & Sharp, P. (2017). *'Rational' Farmers and the Emergence of Modern Accounting in Danish Dairying*. EHES Working Paper No. 115. European Historical Economics Society. https://ehes.org/wp/EHES_115.pdf

Lohr, L., & Salomonsson, L. (2000). Conversion subsidies for organic production: results from Sweden and lessons for the United States. *Agricultural economics*, *22*(2), 133-146. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1574-0862.2000.tb00013.x

NordGen. (2024). *Can oats help climate-proof our food systems? The AVENUE project intends to find out.* Nordic Genetic Resource Center. Retrieved May 28, 2026, from https://www.nordgen.org/sv/nyheter/kan-havre-hjalpa-till-att-klimatsakra-vara-livsmedelssystem-det-ska-projektet-avenue-ta-reda-pa/

Persson, E. (2015). *Ekologisk odling och livsmedelsförsörjning: En analys av skördetapp och produktionsbegränsningar* (Examensarbete för kandidatexamen, Lunds universitet). Hämtad från https://lup.lub.lu.se/luur/download?func=downloadFile&recordOId=8166532&fileOId=8166535

Sacco, D., Moretti, B., Monaco, S., & Grignani, C. (2015). Six-year transition from conventional to organic farming: effects on crop production and soil quality. *European Journal of Agronomy*, *69*, 10-20. https://www.sciencedirect.com/science/article/pii/S1161030115000593

Sipiläinen, T. & Huhtala, A. (2013). Opportunity costs of providing crop diversity in organic and conventional farming: would targeted environmental policies make economic sense? European Review of Agricultural Economics, 40(3), s. 441–462. https://academic.oup.com/erae/article/40/3/441/484216

Stephenson, G., Gwin, L., Schreiner, C., & Brown, S. (2022). Perspectives on organic transition from transitioning farmers and farmers who decided not to transition. *Renewable Agriculture and Food Systems*, *37*(6), 633-643. https://www.cambridge.org/core/journals/renewable-agriculture-and-food-systems/article/perspectives-on-organic-transition-from-transitioning-farmers-and-farmers-who-decided-not-to-transition/2E735670F679026E35A9C105C66F2A29

Swedish Board of Agriculture [Jordbruksverket]. (2026). Ekologisk växtodling 2025 (Statistikrapport JO0114). Jönköping: Jordbruksverket. https://jordbruksverket.se/om-jordbruksverket/jordbruksverkets-officiella-statistik/jordbruksverkets-statistikrapporter/statistik/2026-05-13-ekologisk-vaxtodling-2025

Swedish Board of Agriculture [Jordbruksverket]. (2002). *Ekologisk uthållighet – indikatorer för det svenska jordbruket*. Rapport 2002:10. Jönköping: Jordbruksverket.https://www2.jordbruksverket.se/webdav/files/SJV/trycksaker/Pdf_rapporter/ra02_10.pdf

Swedish Board of Agriculture [Jordbruksverket]. (2023). *Facts about Swedish Agriculture*. https://www2.jordbruksverket.se/webdav/files/SJV/trycksaker/Pdf_ovrigt/ovr2gb. pdf

Swedish Environmental Protection Agency [SEPA]. (2025, January 13). Sveriges miljömål. Sveriges Miljömål. https://www.sverigesmiljomal.se/miljomalen/

Swedish Board of Agriculture [Jordbruksverket].(2019). *Långsiktiga effekter av torkan 2018 och hur jordbruket kan bli mer motståndskraftigt mot extremväder* (Rapport RA19:13). Jönköping: Jordbruksverket. Retrieved from https://www2.jordbruksverket.se/download/18.21625ee16a16bf0cc0eed70/1555396324560/ra19_13.pdf

United Nations [UN]. (2015). Transforming our world: The 2030 Agenda for Sustainable Development. UN Publishing. https://sdgs.un.org/goals

Verburg, R. W., Verberne, E., & Negro, S. O. (2022). Accelerating the transition towards sustainable agriculture: The case of organic dairy farming in the Netherlands. *Agricultural Systems*, *198*, 103368. https://www.sciencedirect.com/science/article/pii/S0308521X2200004X

Approved students' theses at SLU can be published online. As a student you own the copyright to your work and in such cases, you need to approve the publication. In connection with your approval of publication, SLU will process your personal data (name) to make the work searchable on the internet. You can revoke your consent at any time by contacting the library.

Even if you choose not to publish the work or if you revoke your approval, the thesis will be archived digitally according to archive legislation.

You will find links to SLU's publication agreement and SLU's processing of personal data and your rights on this page:

- https://libanswers.slu.se/en/faq/228318

Publishing and archiving

Every author has to make an agreement, remove or add rows of consent depending on the number of authors. Please remove this text when no longer needed.

☒ YES, I, Wilhelm Waldenlind, have read and agree to the agreement for publication and the personal data processing that takes place in connection with this

☐ NO, I/we do not give my/our permission to publish the full text of this work. However, the work will be uploaded for archiving and the metadata and summary will be visible and searchable.