

Extended Abstract

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Paper/Poster Title	Paper – Guilty or Scapegoat? Land consolidation and the Decline of Hedgerows
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Abstract prepared for presentation at the 98th Annual Conference of The Agricultural Economics Society will be held at The University of Edinburgh, UK, 18th - 20th March 2024.

Abstract	<i>200 words max</i>
<p>Land consolidation is a prevalent policy instrument to reduce farmland fragmentation through the spatial redistribution of land ownership. While its primary goal is to improve agricultural productivity, its potential consequences on the landscape should not be overlooked, as they may threaten its sustainability. The French consolidation program in the second half of the 20th century is a case in point. Often blamed for the drastic decline in hedgerows observed in the countryside, researchers still debate its responsibility. Our study proposes the first causal estimation of its impact on hedgerows by applying a staggered difference-in-difference setting to a longitudinal survey in Lower Normandy, France (1972-2010). Results indicate that consolidated municipalities experienced an additional loss in hedgerow density of 11.9m/ha (standard error: 2.39). Importantly, this loss represents one-fifth of the total decline, challenging the common narrative that consolidation is the primary cause of the hedgerow decrease. Our analyses also reveal heterogeneous impacts across time since consolidation and the period of consolidation but no evidence of spillover effects. Our results call for stakeholders to explicitly share accountability for the landscape damages attributed to land consolidation while placing this policy instrument into a broader context of political, social, and market drivers of landscape dynamics.</p>	
Keywords	land property, land consolidation, landscape, hedgerows, policy evaluation, difference-in-difference
JEL Code	Q15 ; Q24
Introduction	<i>100 – 250 words</i>
<p>Land consolidation programs have been part of major agricultural reforms implemented worldwide to foster efficient agriculture and rural development. These policies aim to reduce land fragmentation and achieve efficiency gains by spatially regrouping property rights, potentially leading to significant alterations in the landscape and the ecosystem services it provides. Accounting for these environmental impacts is crucial to evaluate the sustainability of consolidation reforms comprehensively. While previous studies have reported landscape changes following land consolidation, their descriptive approach makes it challenging to identify the actual contribution of land consolidation to these transformations. In contrast, recent econometric studies employ a causal framework to assess the consequences of land consolidation, focusing on agronomic, economic, or sociodemographic outcomes.</p>	

This study aims to integrate the landscape impacts of land consolidation by conducting a causal analysis of how the French consolidation operations affected the hedgerow network in Western France throughout the latter half of the 20th century. Hedgerows are emblematic landscape elements of the French Western countryside. Although they provide a bundle of services related to production (e.g., timber), regulation (e.g., carbon storage, cattle enclosing), or cultural services (e.g., landscape aesthetics, marking of private property), they dramatically declined during this period. Rural geographers remain uncertain whether land consolidation is to blame for this collapse. Some works report "blank slate" operations, while others argue that rationalized interventions prevented uncontrolled and excessive uprooting.

Methodology

100 – 250 words

We use a quasi-experimental setting to identify the causal effect of land consolidation on hedgerow density in Lower-Normandy. The census of consolidation operations in France provides information on the consolidated municipalities and their treatment period. Photointerpretation of aerial images on a stratified sample of 1179 circles produces a representative panel of Lower-Normandy over the period 1972-2010. Combining the two datasets, we provide the first causal assessment of how a consolidation program impacts landscape elements following a difference-in-difference approach. We use heterogeneity-robust estimators to account for variations in treatment timing (staggered treatment) and consider possible spatial correlation and local spillover effects.

Results

100 – 250 words

In our preferred specification, land consolidation leads to a significant average loss in hedgerow density of -11.9 m/ha (standard error: 2.39). This decrease accounts for approximately one-fifth of the overall hedgerow loss observed for the consolidated municipalities during the study period.

We also identify heterogeneity in treatment effects over time and cohorts. The earliest treated municipalities experienced a relatively high and persistent loss of hedgerows, while the latest did not show a significant decline. In-between municipalities experienced a significant short-term density loss, which became weakly significant in the longer term. These dynamics reflect that never-consolidated municipalities continued to experience a slower rate of hedgerow loss, combined with higher environmental expectations and regulations on land consolidation over time in France.

We find no evidence of local spatial spillovers when introducing a spillover dummy. Our analyses do not reveal significant pre-trends and are robust to alternative specifications and samples, as well as potential violations of parallel trends up to three times observed pre-trends.

Discussion and Conclusion

100 – 250 words

In summary, our results present a nuanced perspective on the role of land consolidation in the hedgerow shrinking experienced in Western France. While it



contributed significantly to the total loss, it does not account for most of the decline, challenging common beliefs held by stakeholders. Our conclusions align with those of Chabé-Ferret and Enrich (2021), suggesting that "land consolidation did not trigger the structural transformation of French agriculture." We highlight the need for a closer examination of other factors contributing to hedgerow losses, placing land consolidation in a broader context of policy, market, and social drivers of landscape dynamics. Nevertheless, our study underscores the importance of paying attention to the landscape consequences of consolidation reforms. While policy design can help mitigate environmental impacts, stakeholders should explicitly share accountability for the remaining public losses.