

AAEA at ASSA, 3-5 January 2020, San Diego

Strategic Outsourcing and Precision Agriculture: Towards a Silent Reorganization of Agricultural Production in France?

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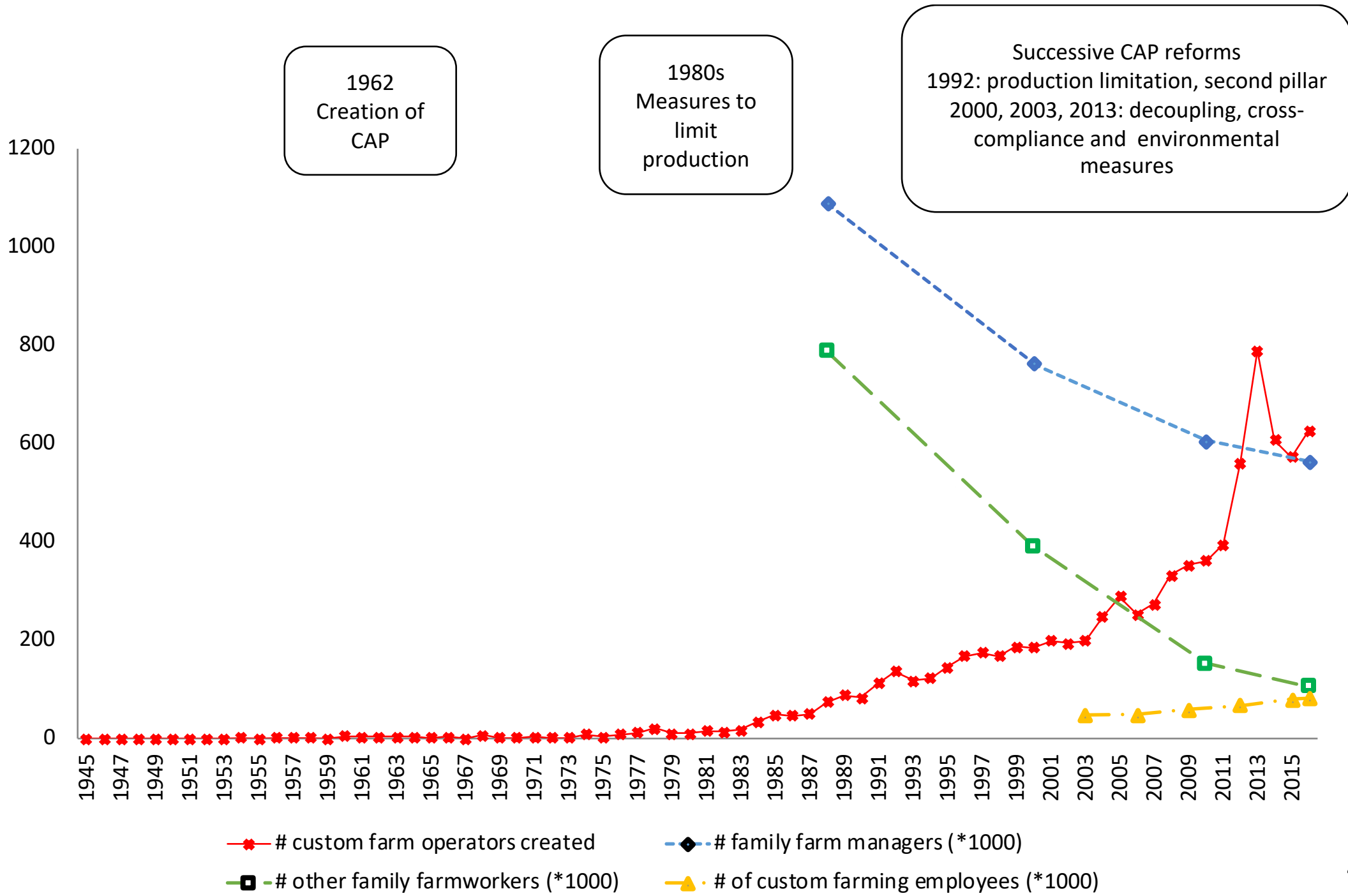
OUTLINE

1. The overlooked development of custom farming associated with precision agriculture: some stylized facts
2. A TC-PR-RC framework to consider the issue of outsourcing with high asset specificity
3. Empirical evidences from France
4. Policy implications and research perspectives

1. The overlooked development of custom farming associated with precision agriculture: some stylized facts

- Custom farming in France: 7/10 farmers, old practice but rapid development and major changes since 2000
- 2016: 7% of farmers who outsource significantly, + 53 % increase since 2000, a market of 4 billion euros
- More medium and large size farms that outsource (+ 103 % over 2000-16)
- Important increase in custom companies (+ 14 % over 2000-16) and workers (+ 65 %)

... could be a signal of major changes in agricultural labor organization



- **Major changes** in custom farming practices:
 - Operations associated with precision agriculture using sophisticated digital technologies (GPS guidance system, equipment with optical sensors...) and specialized skills
 - = 2/3 of grain farms but only 1/3 are equipped
 - « A to Z » outsourcing : 12% of grain farms
- ⇔ **More strategic outsourcing ?**
- **Similar phenomenon** in other European countries
- Surprisingly, **very few studies** on custom farming compared to contract farming and industrial outsourcing

 **What brings farmers to outsource cropping operations with high asset specificity?**

2. The TC-PR-RC conceptual framework

TC-PR: Outsourcing in the presence of high asset specificity = a counter-intuitive phenomenon

FARMER

- Ownership of land and harvest
- Knowledge of farming conditions

- (-) Non optimal use of assets
- (-) Timeliness cost
- (-) Lock-in cost
- (+) Gains in effort specialization

THE ISSUE

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Possibilities of opportunistic behavior on both sides under one-shot relationship

⇔ **HYP 1** (*Williamson; Milgrom & Roberts; Allen & Lueck*)

CUSTOM OPERATOR

- Basically also a farmer
- Ownership of the specialized equipment and labor
- Technical expertise

- (-) Hold-up cost
- (-) Sharing of specialized knowledge
- (+) Gains in effort and asset specialization
- (+) Economies of scale

Incentive mechanisms under RC & repeated interactions

⇔ **HYP 2** (*Baker & Gibbons & Murphy; Ruzzier*)

- (+) Gains in expertise from collective learning
- (+) Reputation and trust built over time
- (+) Threat of outside options
- (+) Ex-ante built-in contractual bonus

3. Empirical evidences from France

- **Mixed methodology** combining quantitative regressions of a choice model and case study of contractual arrangements
- **Data:**
 - **1200 farmers surveyed** in South-West of France (71 % outsource one and more cropping operations)
 - **Case study of 20** largest to medium custom operators
 - Plus secondary data on operators
- **Quantitative analysis:**
 - Logistic & negative binomial count models to study the determinants of outsourcing for different intensity of asset specificity
 - Proxies for RC: geographical proximity & state of local outsourcing market, outsourcing habit

3.A. Major results about the determinants of outsourcing choice

- **In the case of single outsourcing**, the determinants vary according to the type of operation outsourced:
 - The access to precision equipment and specialized skills in the case of seeding and harvesting
 - The reputation of the contractor in the case of pesticide application
- **In the case of multiple outsourcing** with increasing intensity of asset specificity, the probability to outsource increases with:
 - The desire to focus on core activities
 - The access to precision equipment & skills
 - The habit of outsourcing
- **The size effect:** The smaller is the farm, the more likely the farmer will outsource precision operations
- **The effect of an active local outsourcing market** is **ambiguous** since, for operations intensive in specific assets, farmers do not necessarily work with local operators

3.B. Major results about contractual arrangements and built-in incentive mechanisms

- **The basic arrangement:**
 - annual contract tacitly renewed with a flat payment per hectare or per operation
- **In the presence of high asset specificity**, informal mechanisms (trust & reputation) may not be sufficient => **additional incentive mechanisms:**
 - **Built-in *ex-ante* bonus** proportional to the value of the output (in quantity and quality)
 - **For “A to Z” outsourcing, a third party** who act as an intermediary and controls both the farmer and the custom operator
 - **Additional services: technical & strategic advices** based on the management & use of big data, supply of inputs and marketing of harvest with gains in scale & scope economies

4. Conclusions

Major results

- Lack of investment capacity no longer a major determinant
- French farmers tend to outsource more and more operations intensive in specific assets to avoid costly investment (in specialized equipment & labor) and to re-organize owned assets around core activities ⇔ **strategic outsourcing & development of “alliances”**
- This is possible under certain types of contractual arrangements and built-in incentive mechanisms (informal, *ex-ante* bonus)

Research perspectives

- Need to deepen the analysis of informal attributes of RC through formal modeling of repeated interactions with built-in incentive mechanisms ⇔ economics of network
- Quantitative analysis of custom companies' rationale

Policy issues

- Evidences of a **new organization of agricultural labor** in France (and more generally in Europe) and the **growth of a new market for custom services** (new demand, new supply, new jobs)
- Two major questions:
 - About the status of the farmer: ***Emergence of a new agricultural model without family farms and without farmers? ⇔ Future CAP policies***
 - In relation with the development of outsourcing of operations with digital precision technologies
⇔ ***Optimum definition of property and use rights of data produced by precision technologies since the use of those data can represent a strategic business for the custom companies? ⇔ EU data protection law***

THANK YOU FOR YOUR ATTENTION !