

4.4: DEVELOP AND IMPLEMENT A MODEL OF THE SUPPLY CHAIN MECHANISMS AND THE BARGAINING POSITION OF FARMERS ALONG THE CHAIN

Background

One of the key goals of the MIND STEP project is to develop innovative tools focusing on the interactions among farmers and the other agents of the agri-food supply chain to enhance IDM-based analysis of policies. Task 4.4 contributes to this objective by developing and implementing a model of supply chain mechanisms in modern food market by accounting for and parametrizing the extent of market power that raw agricultural commodities suppliers may obtain using coordination tools, such as producer organizations (POs).

By pooling and collectively marketing their output, horizontal integration of farmers through the creation of POs enables them to exercise countervailing power with respect to potential buyers, and so, to obtain higher returns on raw agricultural commodities (Sorrentino, Russo and Cacchiarelli, 2018; Lee and Van Cayseele, 2022).

Despite the extensive and rising use of these instruments by raw agricultural commodity suppliers, POs are not adequately represented in traditional New Industrial Organization (NEIO) models (Sheldon 2017), where the farm sector is usually assumed to be perfectly competitive. Therefore, extending traditional NEIO models, such as the conjectural variations approach (Appelbaum 1982), by incorporating these new features of agri-food supply chains is essential to correctly evaluate the potential effects of different policies or market shocks on market and agricultural prices and on farm incomes

Methodological Approach

Following the framework developed by Schroeter and Azzam (1991) and Sexton (2000), and its application by Gohin and Guyomard (2001) and Anders (2008), we estimate the degree of market power along a two-stage supply chain where an integrated retail-processing sector exploit some degree of oligopoly power in selling final goods (i.e., vis-a-vis consumers) and of oligopsony power in purchasing raw agricultural commodities (i.e., vis-a-vis farmers) respectively.

The estimated market power parameters are then used to carry out simulations to assess how different supply chain organizations may affect retail and farm prices and market equilibrium. The presence of countervailing power at the farm level deriving from the use of coordination tools (e.g., producers' organization) is simulated as a reduction in the extent of oligopsony power at the retail-processing level.

In our empirical application, we focus on the pig-pork supply chain from two case studies of Italy and Germany. They represent proper case studies for this analysis given the coexistence of transactions which are carried out through contractual agreements and through the spot market. In Italy, it is well recognized that, from an organizational point of view, one of the key criticalities for this supply-chain is the lack of strategic coordination between the different stages, especially among farmers, as evidenced by the small number of existing Producer Organizations (Rete Rurale Nazionale, 2020).

Key outcomes

The results from the empirical application on the pig-pork supply chain in Italy show that currently the degree of oligopsony power of the retail-processing sector vis-à-vis pig farmers



is extremely high, with the Lerner index being very close to 1 (i.e., 0.91) with negative consequences on farm prices and incomes. On the other hand, the results from the counterfactual simulations also show that strengthening the bargaining position of farmers along the agri-food chains through means of horizontal coordination may greatly improve farm prices (up to +30.4%) and incomes, given the concurrent increase in the quantity supplied/demanded. Consumers may benefit too from higher quantities of the final good available on the market and lower retail prices.

Furthermore, the results from the empirical application on the pig-pork supply chain in Germany demonstrate that processors exercise both oligopoly and oligopsony power, with a higher degree of oligopsony power of the retail-processing sector over farmers compared to the extent of oligopoly power over consumers. Our analysis suggests that better coordination among pig producers through horizontal integration (e.g., producer organization) and vertical coordination (e.g., contracts) could enhance their economic position, providing them with countervailing power vis-à-vis retailers and improving farm prices and incomes. More specifically, the findings show that an increase in farmers' bargaining power vis-à-vis the retail-processing sector would increase production and producers' prices, whereas the retail price will decrease. Moreover, it is worth noting that when compared to Italy, the percentage change of farm price in Germany is lower, ranging from 4% to 9%.

Implications of obtained results

This work contributes to integrating the features of modern agri-food markets into the classical NEIO approach, where the agricultural sector is usually assumed to be perfectly competitive (Sheldon 2017; Bonanno, Russo, and Menapace 2018).

The results from the current analysis show that changes in the competitive environment that characterizes agri-food industries, due for instance to the development of horizontal coordination among farmers (i.e., POs) reduce the predictive power of current models and platforms, where there is only little representation of regional value chains and of the presence of bargaining power also from the agricultural sector.

Our approach can contribute to better quantitative policy analysis by improving the understanding of price transmission mechanisms along food chains with different forms of organization and coordination, therefore enabling policy makers to obtain more reliable estimate of the potential effects of policy interventions or market-shocks on farm prices and income, which is essential to design cost-effective policies to support the agricultural sector.

Improving the understanding of such issues is crucial to simulate questions like whether a better market integration will lead to similar or better market outcomes and incomes for the agricultural sector, and so, to assess the potential impacts of policies which enable a more balanced position of farmers in the chain. The results from this analysis can be particularly of interest considering that supporting farmers in the creation of producers' organization is one of the actions taken by the European Commission to contrast unfair business practices in the food chain by strengthening their bargaining position (EC).



In terms of the MIND STEP model toolbox, the results from this analysis can be used to introduce appropriate price-transmission equations in large market models, such as CAPRI or MAGNET, as well as new parameters/elasticities, to simulate the potential price changes generated by the introduction of coordination tools along the food supply chains. Such price changes can be used to simulate potential farm-level impacts (e.g., production changes, income changes, environmental impacts) using an IDM model such as FARMDYN.

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