Agricultural Price Formation in Theory and Reality

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Edited by
Ulrich Koester and
Stephan von Cramon-Taubadel

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FOREWORD

This textbook is based on a translation of the German textbook "Agrarpreisbildung: Theorie und Anwendung" that we published with Springer in 2021. Besides translating and updating parts of the original German text, we have added two chapters: Chapter 7 by David Zilberman on "Innovation in Agriculture", and Chapter 11 by Jens-Peter Loy on "Price Formation in Food Retailing".

Most degree programs in economics do not include courses devoted solely to the fundamentals of pricing in a particular sector. Why, therefore, have we written a textbook for a course on pricing in agriculture? Our motivation is as follows:

Textbooks on price theory at the Bachelor level usually explain price formation based on neoclassical economic theory and the construct of the 'homo oeconomicus'. The homo oeconomicus is not a real human being, but an imaginary economic agent, such as an individual, a firm or a household, that aims to maximise its utility. Its utility function is constant, stable and socially independent. Homo oeconomicus knows everything about its economic and social environment and thus also about all of its alternatives. It does not need to consider the reactions of others to its own decisions. Hence, in the world of homo oeconomicus, uncertainty about the behaviour of others or about changes in the economic environment plays no role. Based on this construct, neoclassical price theory explains the determination of market equilibrium and how it reacts to changes in exogenous factors. Neoclassical price analysis is predominately comparative static, and dynamic paths between equilibria are usually not considered.

In reality, uncertainty about the behaviour of other participants plays an important role on markets. Individuals, firms and households interact, and market outcomes depend on these interactions. The nature of market equilibria and how they react to changes in exogenous factors therefore depend on institutions which govern interactions between market participants by defining how participants are expected, permitted or obliged to behave. For example, how farm land prices react to changes in agricultural product prices depends on the design of land lease contracts as

well as the laws that regulate what may and may not be stipulated in these contracts. Moreover, the distribution of the economic gains that result from market interactions also depends on institutions. Under such conditions, price determination is not merely a technical question of maximising a known utility function under conditions of perfect information. Instead, price theory needs to account for institutions. Furthermore, if markets are to contribute to solving societal problems, then economists also need to consider how to design institutions that support this contribution.

Based on these considerations, some authors conclude that the neoclassical approach in economics is irrelevant (Boettke, 1997). We disagree. We present the neoclassical approach, but supplement it with insights from institutional economics where necessary, to cast light on aspects of price formation on real-world agricultural markets. Neoclassical price theory uses mathematics (marginal analysis) to show how individual economic agents react to incentives, and how their decisions are coordinated by the price mechanism. While this approach is subject to limitations, it is powerful and flexible. Neoclassical instruments can be used in many areas of economics, and economic research in recent decades has shown that the neoclassical approach can also generate useful insights in fields such as the New Institutional Economics (NIE).

In this textbook we therefore attempt to extend the instruments of neoclassical price theory by including insights from the NIE. In the NIE, institutions are understood to be norms that restrict or otherwise influence the social behaviour of individuals and thus make it more predictable. Institutions thus understood include informal restrictions such as customs and traditions, formal regulations such as laws, property rights or contracts, as well as the instruments that are used to enforce these regulations. Rules of particular importance for price formation on agricultural markets include inheritance laws, land transfer laws, laws on the taxation of income from agricultural activity and from the sale of agricultural land, regulations on the use of agricultural pesticides and animal feed, foreign trade regulations, and quantitative restrictions such as production quotas. Informal institutions, such as family farming traditions that extend over generations, or a long-standing membership in a local cooperative or farmers' union, can also affect behaviour and price formation in agriculture.

In the NIE, an organisation is defined as a group of persons with a common goal. North (1990) refers to institutions as 'the rules of the game', and to organisations as the 'players of the game'. Organisations that are important for agricultural price formation include various legal forms of agricultural

enterprise, private and public consultancies, public administrations at supra-national, national, regional and local levels, private and public companies, auctions, and commodity futures markets.

Since many institutions and organisations in agriculture differ from those in other industries and sectors, agricultural price formation can also differ and deviate from what is predicted by the neoclassical theory commonly presented in bachelor's programs. We have therefore written and compiled this textbook to go beyond the standard neoclassical presentation found in the leading general microeconomic textbooks, and to extend the presentation found in textbooks on agricultural price formation, such as Tomek and Kaiser (2014), to reflect the importance of institutions and organisations.

Acknowledgement

Completing this textbook has taken longer than anticipated, and we thank the contributing authors for their patience and forbearance as we first completed the German version and then embarked on the task of translating, editing, and incorporating new chapters into this English version.

The individual chapters (with the exception of David Zilberman' chapter on "Innovations in Agriculture") were first translated from German with the help of DeepL by Fenja Bahr and Kirsten Kriegel in Kiel, to whom we are very grateful. Stephan von Cramon then thoroughly edited each chapter and interacted with the corresponding authors to produce the final versions. Manuel Droste, Jan Simon Erchinger and Anna von Kameke in Göttingen provided excellent assistance with the formatting and proofreading of the individual chapters – they caught many errors and inconsistencies, and greatly improved the final product. Finally, we thank Adam Rummens at Cambridge Scholars Publishing for his professional advice and his patience as several deadlines were extended on the way to completion. It goes without saying that we remain responsible for any remaining errors and shortcomings.

Ulrich Koester (Kiel) Stephan von Cramon-Taubadel (Göttingen)

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CHAPTER ONE

THE IMPORTANCE OF INSTITUTIONS FOR AGRICULTURAL PRICE FORMATION

ULRICH KOESTER AND
STEPHAN VON CRAMON–TAUBADEL

1.1. Introduction and learning objectives

Neoclassical economics aims to present the necessary conditions for an optimal allocation of factors. The allocation is optimal if the production of goods valued at market prices cannot be expanded profitably by reallocating factors. In this equilibrium state, certain marginal conditions must apply which, among other things, also determine the remuneration for factors such as capital and labour as well as the market prices of the individual produced products.

As with any theory, neoclassical theory is based on underlying assumptions and definitions. How exactly it can explain a specific economic situation, such as current reality, depends on the closeness to reality of these assumptions and definitions.

Neoclassical theory is characterised in particular by the use of mathematical analysis and has proven to be a good starting point for explaining economic reality in many situations. However, it is often only a starting point and cannot provide exhaustive explanations. This is especially the case when it comes to explaining the level and change of agricultural prices.

The aim of this chapter is twofold:

– First, we will show how price formation for products and factors in agriculture can be explained by means of the premises of

neoclassical economics combined with concepts and findings from the so-called New Institutional Economics (NIE).

– Second, we will demonstrate that the explanation and understanding of specific economic situations and changes can be improved by extending the basic premises of neoclassical theory.

Hence, we do not consider the NIE to be a substitute for neoclassical analysis, but rather a complement which can help to reduce or overcome important limitations of neoclassic analysis.

1.2. On the concept of institutions and the significance of institutional economics

The literature distinguishes between **Old and New Institutional Economics** (OIE and NIE). The differences between the OIE and the NIE are based less on the different terms they employ for institutions than on differences in their methodologies. Ostrom [1] (1990, p. 51) defines **institutions** as follows:

> "'Institutions can be defined as the sets of working rules that are used to determine who is eligible to make decisions in some arena, what actions are allowed or constrained, what aggregation rules will be used, what procedures must be followed, what information must or must not be provided, and what payoffs will be assigned to individuals dependent on their actions … All rules contain prescriptions that forbid, permit, or require some action or outcome. Working rules are those actually used, monitored, and enforced when individuals make choices about the actions they will take."

North (1990, p. 7) defines institutions more briefly:

> "Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interactions".

These definitions are widely followed in literature. Some authors subsume rules and organisations under the term institutions. Thus, the World Bank (2002, p. 7) writes: "*Institutions are rules, enforcement mechanisms, and organisations*". In most cases, however, the literature differentiates between institutions and **organisation**: the former are interpreted as the **rules of a**

[1] Elinor Ostrom was awarded the Nobel Prize in economics in 2009, together with Oliver Williamson, to whom we refer later in this chapter.

game, and the latter as the players. The difference in definition is unimportant for the substance of the NIE, which considers both institutions in the narrow sense (rules) and organisation as subjects of research.

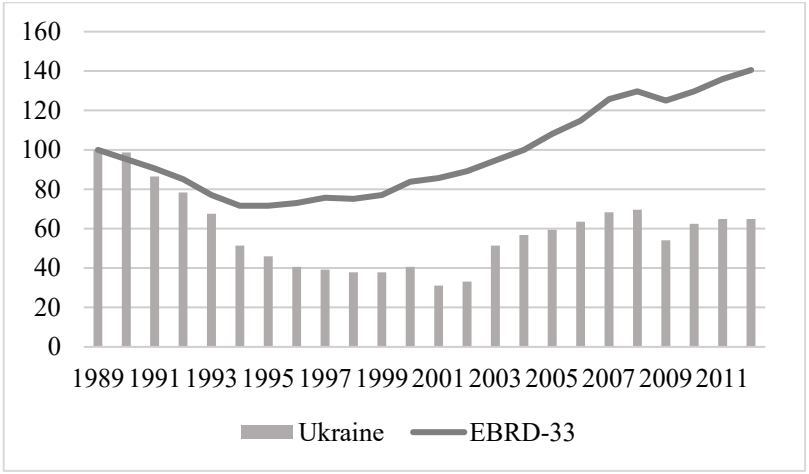
The OIE emerged at the beginning of the last century. It aimed at a critique of the market economy system and, unlike the NIE, was largely descriptive. Thorstein Veblen (1899), John Rogers Commons (1893, 1934) and Wesley Clair Mitchell (1903, 1914) are often cited as its founders. The NIE, like the OIE, focuses on the concept of institutions. In contrast to the OIE, however, it does not reject the research methods and results of neoclassical economics. Instead it aims to extend neoclassical economics by adding more realistic premises.

The work of Ronald Coase (1937) is regarded as the starting point of the NIE. Coase showed that transaction costs, which were neglected by the neoclassical analysis of the time, are of great importance for explaining economic problems and thus also for the functioning of both market and planned economies.[2] Even though this seminal work appeared in 1937 and revealed fundamental weaknesses of neoclassical analysis, it did not initially lead to an expansion of neoclassical economics. It was only later that the term New Institutional Economics was established in the literature, especially by Nobel Prize winner Oliver Williamson (1975). In the 1980s and 1990s, a comprehensive NIE literature emerged, which is summarised in a survey article by Williamson (2000).

In agricultural economics, the importance of the NIE was underscored by the experiences of the former planned economies in Central and Eastern Europe after they began the transition to more market-based economies in 1989. Figure 1 shows that it took 20 years for gross domestic product (GDP) in Russia to return to its 1989 level; in Ukraine GDP had not returned to 1989 levels after 23 years. Over the same period, income disparities in these countries increased considerably. Consequently, many individuals must have become much poorer in the course of the transformation.

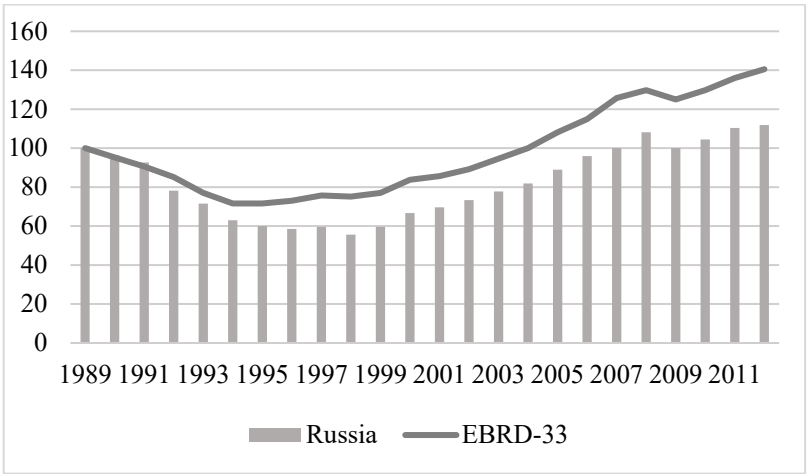
[2] We discuss transaction costs in greater detail in Section 3 of this chapter, and in Chapter Two.

Figure 1.1: The development of real GDP in Ukraine and 33 transition countries (index 1989 = 100)



Source: EBRD (2012, p. 157).

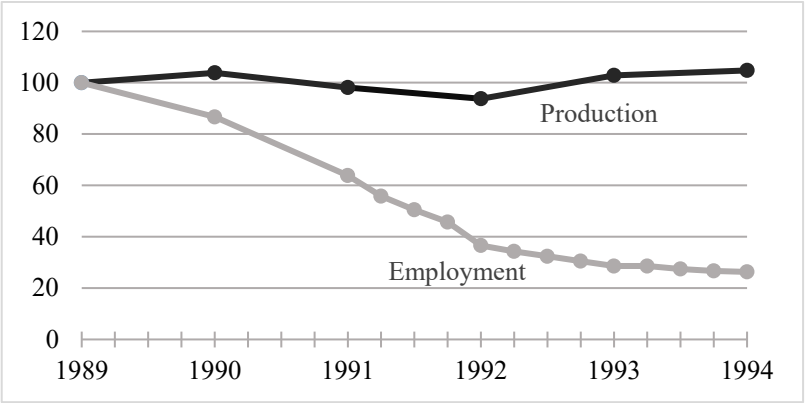
Figure 1.2: The development of real GDP in Russia and 33 transition countries (index 1989 = 100)



Source: EBRD (2012, p. 141).

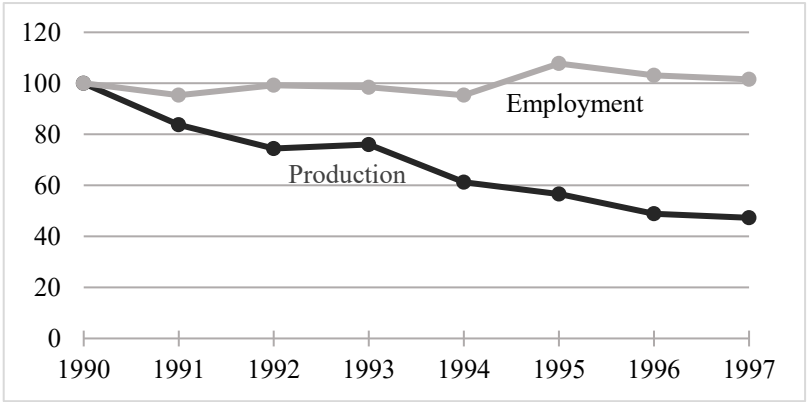
The importance of institutions can also be illustrated by comparing the development of agricultural production in Germany's new federal states following Reunification with the development in Ukraine (Figures 3 and 4). In the new Länder (former German Democratic Republic - GDR), agricultural production initially remained roughly constant into the mid-1990s, while agricultural employment immediately fell rapidly. In Ukraine – as in many other former Soviet Union countries - employment remained roughly constant, but production fell rapidly. This decline in agricultural production in Ukraine occurred although Western agricultural economists suspected that there was considerable inefficiency in the use of factors, especially labour, in Ukrainian agriculture before transformation began. It was also known that yields per hectare or animal unit were significantly lower than in Western countries due to inefficient use of technologies. Many experts therefore expected that agricultural production would increase rapidly with transformation, not decrease. What actually occurred after transformation began cannot be explained using standard neoclassical theory, but it can be explained by drawing on NIE.

Figure 1.3: The evolution of agricultural production and employment in the federal states of the former GDR (1989-1994, index 1988 = 100)



Source: Statistisches Bundesamt (1994, various pages; 1995, p. 680); Sachverständigenrat (1996, p. 376), own calculations.

Figure 1.4: The evolution of agricultural production and employment in Ukraine (1990-1997, index 1990 = 100)

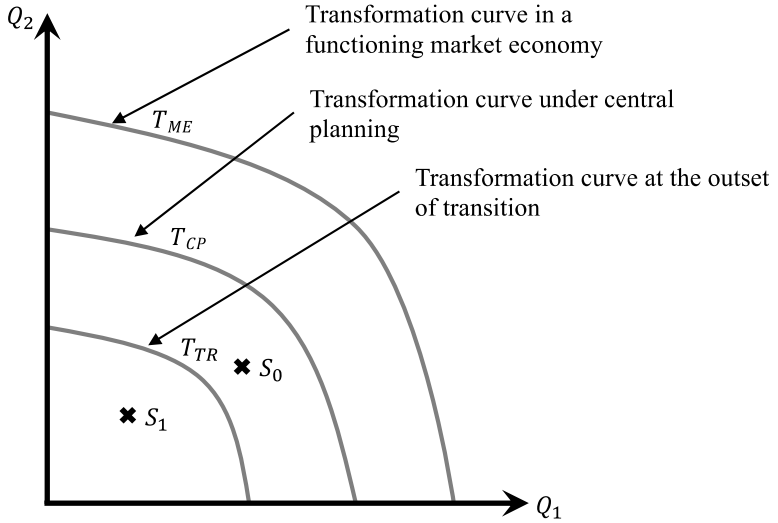


Source: State Committee of Statistics (no date), own calculations.

Which amounts of which goods are produced in an economy is explained in neoclassical economics with the help of a **transformation curve** (also referred to as a **production possibility curve**).[3] Assume that only two goods (q_1 and q_2) are produced. The transformation curve is the set of all maximum possible combinations of q_1 and q_2 that can be produced with the given resource endowment and technology, i.e. for any quantity of q_1 (q_2) the maximum quantity of q_2 (q_1) that can also be produced. Figure 5 shows a set of typical transformation curves.

[3] We formally derive the transformation curve in Chapter Two.

Figure 1.5: The expected and actual development of production in a typical transition country from a neoclassical perspective



Source: Own depiction.

In order to explain what actually transpired in transition economies, it helps to recognised that the amount of production in an economy depends not only on the available resources and technology, but also on the existing rules and organisations (the institutions). A change in laws, for example labour market regulations, can lead to a shift in the transformation curve. It can also impose restrictions (e.g. shortened working hours) that make it impossible to fully exploit the technically possible production capacity. In the latter case, a production point is realised that lies not on but rather below the transformation curve. Alternatively, one might also define the transformation curve as the set of all maximum possible product combinations that can be produced with given resources, technology and institutions.

The initial situation in a typical transition economy can be represented as follows using neoclassical instruments. Transformation curve T_{ME} shows the production possibilities in a market economy with adequate institutions. T_{ME} lies above transformation curve T_{CP}, which shows the production possibilities for the same economy under central planning. Planned economy production was less efficient than market economy production

because, for example, planners did not have sufficient information to optimally coordinate individual decisions. The difference between the two curves is also due to the fact that in a market economy system, other specific institutions, e.g. a regulatory framework, make it possible to achieve more efficient production than is possible in a planned economy system. In fact, however, neither planned nor market economies produce on the technically possible transformation curve, since not all existing institutions are fully enforced. In Figure 5 we assume that point S_0, which lies below the maximum attainable transformation curve T_{CP}, was reached under central planning before transformation began, and that production point S_1 was attained thereafter, i.e. that both production possibilities and production fell following the onset of transformation.

The transition from a planned to a market economy could only have led to an increase in production if the institutions in the planned economy had been fundamentally changed at the same time and adapted to those in efficient market economies. However, such institutional change takes time. Old planned-economy networks often linger. Institutions in the form of laws can be enacted relatively quickly, but the implementation of these laws often causes at least temporary problems. For example, it takes time to establish a functioning legal system for private-sector litigation, a tax authority with qualified tax experts, and a court of auditors to control state expenditures. It especially takes time to establish and safeguard private property.

In addition, the behaviour of individuals in planned economies is different from that in market economies. It is therefore understandable that the transformation curve T_{CP} in the formally central-planned economies did not shift outwards to T_{ME} initially, but rather inward to T_{TR}. The constitutive and regulative principles of a market-economy system formulated by Eucken[4] require a strong state in which both the government and the population are convinced of the advantages of a market-economy order and are in a position to implement these principles. It was naive to expect that the governments of individual transition countries would be able to institutionalise and enforce an efficient market-economy system immediately following the onset of transformation. Reflecting this, Figure

[4] Eucken (1950) defined seven constitutive (C) and four regulative (R) principles of a market economy (see van Suntum et al., 2011): C1 – functioning price system; C2 – monetary stability; C3 – open markets; C4 – private property; C5 – freedom to engage in contracts; C6 – liability; C7 – predictable and reliable economic policy; R1 – anti-monopoly policy; R2 – progressive income taxation; R3 – correction of externalities; R4 – regulation to protect workers' rights (e.g. against child labour).

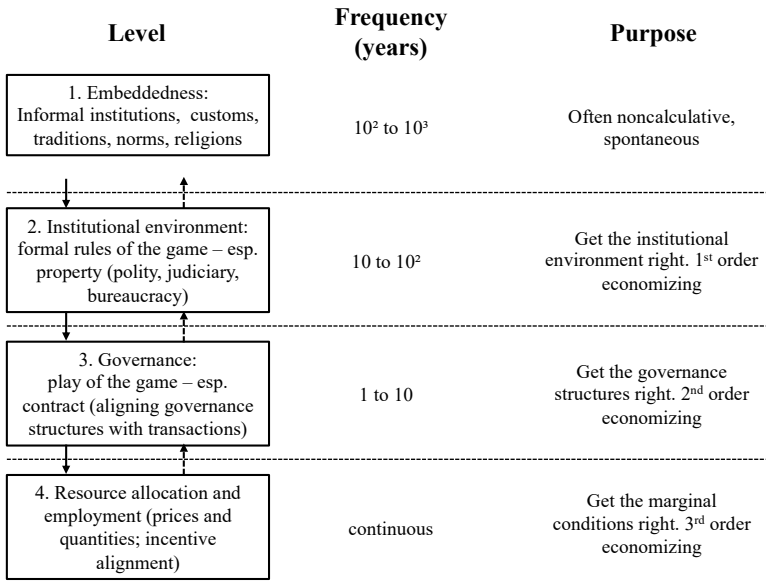
5 assumes that the transformation curve shifted inward to T_{TR}, and that the realised production point S_1 was below T_{TR} due to a lack of enforcement of the nascent legal regulations.

Not only the economic downturn in numerous transition countries but also the different amounts of time that it took for individual countries to recover from this downturn, and the economic rise of countries such as China and Vietnam that only partially liberalised, have led to a stronger emphasis on the NIE, also in agricultural economics. This is due in part to the fact that many agricultural economists expected that the agricultural sector would benefit especially strongly from transformation. Many agricultural economists assumed that agricultural production in the transition countries would increase and that the agricultural structure would change from large farms to more efficient smaller family farms. However, these expectations were not borne out.

In the following general discussion of institutions that are important for agricultural price determination we will draw on the above-mentioned survey article by Williamson (2000). In later chapters, specific institutions that play an important role on individual agricultural product and factor markets are discussed in greater detail. Williamson distinguishes between four hierarchically arranged **levels of institutions** (Figure 6). The institutions on the first level refer to behaviour by producers, consumers and political actors that is not based on rational considerations but is rather embedded in the prevailing social order. These are behaviours that occur spontaneously in accordance with habit and tradition, because everyone else in society follows them and finds them appropriate, and/or because one assumes without further reflection that they are good for oneself and/or the society of which one is part. These behaviours depend, among other things, on the prevailing culture of a society and tend to be long-lived. Since they are deeply rooted in the thinking of individuals and the mental models that they employ, they are referred to as '**embedded institutions**' in the literature.

What role do embedded institutions play in pricing in agricultural markets? First of all, it is useful to differentiate between embedded institutions on the supply side of agricultural markets and those on the demand side.

Figure 1.6: Williamson's hierarchy of institutions



Source: Williamson (2000, p.597).

1.2.1. The importance of embedded institutions on the supply side

On the supply side, the simplest neoclassical model is based on the assumption that producers pursue the goal of profit maximisation and have complete information at their disposal. They view the market price as given, and the marginal cost curve is rising and known.

However, these assumptions do not account for a number of relevant embedded institutions. First, the objective of many agricultural producers is not exclusively to maximise profits. Farmers in Western Europe usually manage farms that have been inherited over many generations. Maintaining family tradition therefore often plays an important role in the decision to take over or continue what might be an unprofitable farm. In addition, the decision to become a farmer is also a decision for a certain way of life, e.g. entrepreneurship, country living. Furthermore, a past decision to become a farmer is often difficult to revise, because it involves making investments