TEACHING AGRICULTURAL POLICY USING GAMES: THE AGRIPOL GAME

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Abstract

We developed the AGRIPOL game as a tool for teaching agricultural policy to economic and non-economic students. AGRIPOL consists of a world with 7 different countries, each one represented by a small group of students. The students have to maximize their country's social welfare by choosing an optimal set of policy instruments. By doing this students learn in an interesting and hands-on way to understand the workings of agricultural policy instruments, the interrelatedness between countries (policy impact spill-overs) and the role of political weights in the policy formation process. A WTO negotiation round is included to let students experience the difficulties and benefits of cooperation.

Keywords: economics education, political economy, agricultural policy
JEL-codes: A2, P16, Q18

Introduction

An important topic in Agricultural Economics education is teaching *agricultural policy*. Students should be able to understand the working of various policy instruments and the underlying aims of the governments that use them. The reality of agricultural policy is typically more complex than is suggested by the efficiency optimisation paradigm of economic welfare theory. Students should understand both the relationship and the difference between the aim of allocative efficiency and the multiple policy objectives that lie behind the use of certain instruments. Furthermore, although agricultural policies often tend to separate a country's agriculture from the rest of the world, there remains a connection between national and international markets, which is central to the ongoing WTO negotiations. It is important that students understand both the effects that policies of one country have on other countries and the political-economic problems that complicate international negotiations on farm policy reform.

In brief, teaching on agricultural policy should enable students to:

- understand the functioning of various policy instruments;
- be able to analyze the market (price, quantity, trade) and welfare consequences of policies and policy changes;
- be able to relate instruments to multiple policy goals;
- understand national and international market interdependencies.

Literature

While the teaching of economics has become more and more technical over time, even at an undergraduate level, the use of games provides an important connection between theories and the key features of the markets and institutions that are studied. Since the 1960s economists have experimented with incorporating computerized economic simulations into their classes (Porter, Riley and Ruffer, 2004). Examples in microeconomics classes are optimization exercises (students maximize utility or profits given some fixed parameters) and market simulations (with endogenously determined prices and exogenous 'shift'-variables). The games used in macroeconomics all involve students selecting policy variables to try to control inflation, unemployment and other variables (economic growth, consumption, balance of trade surplus).

From a quick scan of the literature it appears that teachers who use these tools are usually very positive about them, although there have been only a few controlled studies of the effectiveness of the use of games. Where such studies were undertaken, they showed a positive contribution of games to the student's learning process (Gremmen and Potter, 1997). At a course given at the University of

Amsterdam, for example, the failure rate was reduced by 50 per cent after a series of laboratory exercises had been introduced as a mandatory element in the course programme (Holt, 1999: 609).

Many teachers are hesitant to use games for fear of losing control or of obtaining anomalous results that will be difficult to explain. Others object on the grounds that games are too time-consuming or difficult to use in large classes. Indeed, the game outcomes might be unpredictable, in particular when the underlying models are complex. Nevertheless, the patterns and evolution of macroeconomic policy analysis games are easily recognizable for experienced teachers, so that they have little difficulty in explaining the results during lectures .

An important argument mentioned in favour of using games is that they fit in with a Socratic teaching approach. In such an approach, students are made to think about the subject they want to learn and are encouraged to ask good questions. If students play games, they will be faced with questions they cannot answer because they lack the required knowledge. If the games are played by (small) groups, some questions will be answered by other members, so that the students begin to learn from each other. Other questions will be asked to the teacher, which enables the teacher to address the issues that interest the students. It is important in the Socratic education philosophy not just to focus on the final answer but to take incorrect answers seriously and ask follow-up questions or suggest new experiments which might provide further insight (Holt, 1999: 610).

AGRIPOL

AGRIPOL is an agricultural policy game that resembles the policy games used in macroeconomic analysis. It consists of seven countries: EU-15, US, Kenya, Argentina, New Zealand, Poland and South Korea. The model underlying the game is closed by a 'rest of the world' country, which is treated as a passive country). Each country has specific agricultural characteristics and political circumstances.

AGRIPOL considers three markets: dairy, beef and cereals. The core of the game is a partial equilibrium model, which considers the supply and the demand on these markets as well as their interrelations. The model is calibrated on stylized year 2000 data of quantities, prices, exchange rates, tariffs, direct payments, quota, set-aside rates, etc. The demand and supply elasticities used to calibrate the (constant elasticity) supply and demand functions are based on SWOPSIM (Sullivan *et al*., 1992), but can be easily adjusted by the teacher. The game is programmed in Excel.

Within the game four sources of dynamics are taken into account: population growth, GDP growth, technical change and investment. Population and income trends are based on real world estimations and shift the demand functions. Investment increases the capital stock from one period to another and adjusts the supply functions. The investment realized in period *t* depends on the amount of profits (which lead to investment) or losses (which lead to disinvestment) realized in period *t-1*.[2] As an optional feature, a stochastic weather-variable can be used, which adjusts the realized production by a random percentage drawn from a pre-specified range. The policy instruments that can be used in the game are given in Table 1.

Table 1 Policy instruments[1]

Policy instrument	**Unit**	**Dairy**	**Beef**	**Cereals**
Import tariff/export subsidy	local currency / ton	yes	yes	yes
Deficiency payment	local currency / ton	yes	yes	yes
Direct income payment	million local currency	yes	yes	yes
Intervention	million tons	yes	yes	yes
Milk quota	fraction of output in yr 1	yes	no	no
Set-aside rate	fraction of land in yr 1	no	no	yes
Set-aside premium	local currency / hectare	no	no	yes
Tariff on fertilizer	local currency / ton	no	no	yes
Structural policy	million local currency	yes	yes	yes

Each country in AGRIPOL has its own social welfare function. This depends on five policy goals: 1) increase in farm income level, 2) price stabilization, 3) increase in per capita food

consumption, 4) decrease in budget expenditure and 5) increase in balance of trade surplus. The weights attached to these policy goals differ per country and can be specified by the teacher. An example is given in Table 2, which gives the weights that we used during our last year's course.

The policy weights sum up to 1 and the indicators for each objective as well as aggregate welfare are set at 100 for the base situation. The groups of 3 to 4 students that play the governments of each country are given the task of achieving the highest aggregate welfare score for their country. The group that realizes the highest score in the last round of the game is the winner.

Table 2 Example of a policy weight matrix

	EU-15	USA	Kenya	Argent.	N. Zeal.	Poland	S.Korea
Farm income	.50	.40	.10	.20	.30	.40	.60
Price stabilization	.00	.00	.00	.00	.00	.00	.00
Per cap. food cons.	.00	.00	.15	.20	.20	.40	.30
Budget expenditure	.40	.50	.60	.20	.25	.20	.10
Trade balance	.10	.10	.15	.40	.25	.00	.00

Use of the game

We use AGRIPOL in a 6 week course on the theory and practice of agricultural policies and policy reforms. Parallel to the course lectures, students play one round ('year') of the game each week. A round starts with each 'government' submitting a policy sheet, which specifies its policy decisions for that round, together with a written motivation of 400 words. The policies of all governments are introduced in the model, and the results are sent back to the students. The information that is sent back contains information about the policies pursued by all countries, market and price effects, budget effects, effects on protection indicators (nominal assistance coefficients), social effects and scores of the policy goals and the social welfare functions of the countries.

The students study this information and come to weekly 90 minute sessions in which the results are discussed. The teacher invites 'governments' to motivate their policies and asks them to try to interpret the outcomes. Moreover, he uses the written motivations submitted jointly with the policy sheets to check whether the reasoning of the students is consistent or needs further correction. Sometimes an additional round is played during the sessions.

After a number of 'years' a session is devoted to playing a round of WTO negotiations. Some days in advance, each 'government' has to submit a short note (some 1000 words) in which it analyzes the evolution of the game up until then and indicates what kind of international agreement it would like. These notes are sent to the 'WTO committee', which is formed by three students who are arbitrarily drawn out of the country-groups.[3] The committee analyzes the proposals and comes up with its own compromise proposal, which is sent to all 'governments'. Moreover, the committee prepares an agenda and a strategy for the WTO negotiations that will be played during the session. In the session, a round table is organized, with one representative per government (other members may assist their representative, but have no voice-right) and the three WTO committee members. An agreement is only obtained if there is full consensus.

If a WTO-agreement is reached this is accounted for in AGRIPOL by (re)specifying the bounds on various policy instruments. These bounds have to be respected in the following rounds played. In addition, the 'governments' may agree to introduce tariff rate quotas (quantity, rate and allocation-shares) and limits on the quantities of subsidized exports (the former are aimed at guaranteeing a certain degree of market access.) The model provides the opportunity to introduce these measures alongside the regular policy instruments that are indicated in Table 1.

Results and evaluation

AGRIPOL has now been used for two years. Students are enthusiastic. They like this way of learning and show creative behaviour. In both years, some groups spontaneously proceeded to make a simple model of their country in order to be better able to select winning policies.

Although the game is relatively simple, it appears that a situation with 7 countries, 3 markets, and nearly 20 policy instruments soon becomes complex. For this reason, the sessions that are used to

analyze the results and to trace the outcomes to the policies pursued in various countries are vitally important. Using the game as a stand alone tool directly used by the students without feedback from teachers would hardly contribute to the learning process. So the game has really to be embedded in a teaching environment.

AGRIPOL was played both with students who had a considerable background in economics as well as with technical agronomic students who had only followed some basic economics courses. The game helped the latter to develop an understanding of basic mechanisms, aided by simple market diagrams, without having to digest all economic theory about producer and consumer behaviour.

Because the 7 countries included in the game vary with respect to their magnitude of production as well as their net-trade position, the students also learn that policy changes in some countries have much more influence on world agriculture than those in other countries. It gives them insight into the different power and importance of countries in agricultural world markets and WTO negotiations.

Students also get a better insight into the relationship between politics (say a country's specific social welfare function) and the efficiency-orientation that figures so prominently in the economic profession. Moreover, their understanding of the political complexities of achieving international agreements is improved by the playing of a WTO round.

Summarizing, students learn that:

- different political interests generate different agricultural policies;
- the performance of countries depends on what happens elsewhere;
- the global importance and power differs strongly between different countries (EU/US and rest);
- policy coordination matters, but consensus in trade negotiations is difficult to achieve.

Endnotes

1. Monetary variables are measured in local currency. Within the domestic-world market price linkage equations each country's exchange rate plays a role. Although the exchange rate is a variable in the model it is not used as a policy instrument variable.
2. Structural policy works in a way similar to investment in that it leads to an increase in the capital stock within agriculture.
3. After the negotiations the students from the WTO committee are randomly attached to a certain country-group in order to avoid interest bias.

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