



Spanish Real Estate Bubble: A Classroom Experiment

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Abstract

The European Higher Education Area (EHEA) requires development of teaching methodologies that encourage active participation by students in the autonomous learning process, taking the figure of the professor as the mediator. On the other hand, the economy is a fundamental aspect in today's society insofar that it contributes to explaining the behaviour of individuals. In this sense, the experimental economy applied in lecture rooms is presented as an innovative educational procedure that is perfectly adapted to university teaching, since it facilitates acquisition and consolidation of curricular knowledge and favours the development of capabilities by students, whilst at the same time improving the quality of teaching and has a positive impact on the interest students have in the subject. This paper describes the application of an economic experiment as an active learning method to prove the mechanisms used to set prices. The experience took place at the ESIC Business and Marketing School Valencia university centre, within the subject of "Spanish Economy" in Official Business Management and Administration degrees and in Marketing and Sales Management degrees. The starting point for this experience was the work by Radim Boháček (2002), adding changes aimed at empirically explaining inflation, the real estate bubble and subsequent economic crisis in Spain. The obtained results prove that this educational experience favours learning of the economic concepts students study, and stimulates proactive interest in the subject. From the obtained results a second experiment is proposed in order to consolidate concepts concerning price setting mechanisms in the presence of intervention by the Public Sector (taxes and subsidies) or establishing incentives that model collusive behaviour leading to situations where market offers are concentrated in oligopolies.

Keywords

EHEA, autonomous learning, Spanish economy, experimental economy, pricing, real estate bubble

1. Introduction

The implementation of the European Higher Education Area (EHEA) has transformed how knowledge is transmitted. In fact, one of the main goals of the EHEA is to improve the quality of university teaching by focusing its attention on the adoption of competencies among students (Cano, 2008).

The incorporation of the new university system is an attempt to establish a dynamic, active and flexible training strategy to ensure students are able to carry out autonomous learning (Whitehead, 2008). In this way, it is possible to develop the skillsets demanded on the current changing, competitive and complex employment market (Hunt, Eagle and Kitchen, 2004).

For this reason, universities must drive innovative experiences in teaching-learning processes in order to combine consistently the generic, overarching and specific skills that facilitate professional guidance to enable graduates to enter the working arena successfully (Roger et al., 2016).

At this point, it is appropriate to highlight that the skill acquisition process is more successful if it takes place through teamwork instead of resorting to the traditional transmission of knowledge (Exley and Dennick, 2007). In this sense, the EHEA encourages methodologies driving the development of competencies in which co-operation and teamwork constitute fundamental method for teaching and learning, as the learning so acquired is considered to be deeper and longer lasting (Gil et al., 2006).

The conventional methodology based on the transfer of knowledge must precisely be replaced by a project contemplating the acquisition of skills and aptitudes based on self-learning (Martín et al., 2014). In other words, students must become the protagonists of their own learning. To do so, it is of vital importance to conduct practical sessions and debates in the classroom to enable students to develop an intervention at both personal and team level materialized in the gaining of the skills needed to approach their professional career successfully (De Juan, González, Parra, Kanther and Sarabia, 2008).

The present article explains the different stages carried out to draw up a project for educational innovation based on the development of an economic experiment within the classroom. The experiment is established on the basis of that proposed by Boháček (2002) by introducing a series of different alterations enabling the process and the outcomes to approach a large part of the conclusions drawn from the theoretical corpus of the subject within which this innovation project is housed.



Thus, co-operative learning is seen in this experiment as a very interesting option to organize the teaching processes and the acquisition of skillsets. Nonetheless, it is important to point out that it is not enough to bring a series of students together to ensure co-operative effort. The success of teamwork lies in understanding how people learn, process and use the information provided to them (Estrada et al., 2014).

The goal of this experiment involved facilitating autonomous learning by students in the context of the curriculum for the subject of “Spanish Economy” as part of its integration into the syllabus for the degrees in Business Management and Sales & Marketing at ESIC Business and Marketing School. These official qualifications are awarded through the Miguel Hernández University in Elche.

The innovation project attempted to make more accessible a subject framed within the domain of applied economics and habitually distant and inaccessible for second-year students. This economic experiment involved 36 students, of whom 8 were Erasmus exchange students from a German university.

Starting from the design of the pedagogical experience, consideration was given to achieving higher levels of development among students in the subject’s general and specific skills, making it possible for the learning outcomes established by the university to arise in a comprehensive and more satisfactory manner for students.

2. Description of the teaching innovation project

The goal of the innovation project was to achieve the articulation of a practical learning method whereby students could verify, in addition, the validity of part of the economic theory studied in the subject.

In particular, one important goal involved analysing price formation and, in the specific case of the Spanish property market, assessing the role of regulators in the design of incentives. It was also fundamental for participants in the experiment to be able to make it tangibly apparent how the various supply-side restrictions (land regulations) and, on the demand side on the other hand, the effects caused by the monetary policies on low interest rates applied by the European Central Bank (ECB) that ultimately contributed to the generation of our real estate bubble.



Thus, the elements involved in the formation of relative prices, i.e. why one item should be worth more than another, are crucial for students to be able to understand not only the process of inflation in the Spanish property sector but also, on a wider scale, any distortion in market equilibrium.

Starting from the paper published by Radim Boháček (2002) and the variants proposed by Rey-Biel (2015), an economic experiment was designed around the exchange of various legumes (beans and chickpeas) that was subjected to three major conditions:

- a) Contingency: The amount of incentive received by each participant must depend at least on the decision taken by the subject involved.
- b) Dominance: Changes in the subject's satisfaction with respect to the experiment had to be due, fundamentally, to changes in the amounts of incentive received.
- c) Monotonicity: A higher incentive payment had always to be preferred by students to a smaller payment, and subjects must not become satiated.

The sequential design of the structure of the experiment proposed is presented below.

Table 1. Structure of the economic experiment

PHASE 1	<p>A) NORMATIVE STAGE</p> <ul style="list-style-type: none"> - Share-out of the initial provision of beans and chickpeas, and of the paper records to all participants - Explanation of the methodology (introduction) <i>How to carry out exchanges, how to record the timeline annotations on the paper record provided, the agent making the exchange and the exchange rate</i> <p>B) RANDOM CONTROL STAGE (Duration: 5')</p> <p>C) EXCHANGE STAGE (Duration: 15')</p> <ul style="list-style-type: none"> - Free exchange between any pair of agents with monitoring of the timeline and annotations proposed with respect to the methodology
PHASE 2	<p>A) NORMATIVE STAGE</p> <ul style="list-style-type: none"> - Monetary injection of more chickpeas to leave the total proportion on the market at 1/6 - Explanation of the methodology (winner's rules) <p>B) RANDOM CONTROL STAGE (Duration: 5')</p> <p>C) EXCHANGE STAGE (Duration: 15')</p> <ul style="list-style-type: none"> - Free exchange between any pair of agents with monitoring of the timeline and annotations proposed with respect to the methodology
PHASE 3	<p>A) NORMATIVE STAGE</p> <ul style="list-style-type: none"> - Explanation of the methodology (variation) <p>B) RANDOM CONTROL STAGE (Duration: 5')</p> <p>C) EXCHANGE STAGE (Duration: 15')</p> <ul style="list-style-type: none"> - Free exchange between any pair of agents with monitoring of the timeline and annotations proposed with respect to the methodology

Source: *Own production*

In PHASE 1A, it was established that each individual could take an initial provision of red beans and ordinary chickpeas pre-established in different sacks distributed at random and contained in a box.

This initial provision presented, for the class as a whole (the market), an uneven proportion of 1/3, in which 3 chickpeas were presented for each bean.

In this way, some economic agents (students) might find themselves with a proportion of 2/1 in their initial provision; others with a proportion of 5/1; and others with a proportion of 1/6. The total amounts of legumes contained in each bag were the same for all students, but not the proportion between beans and chickpeas. Distribution in the classroom was at random.

In order to resolve the contingency condition, three Exchange Stages (1C, 2C, 3C) were designed with the aim of allowing students to perform unlimited free exchanges with their classmates. The moment at which the market was declared exhausted was when it was no longer possible to engage in any further transaction as all participants were satisfied with the amounts exchanged and, in consequence, with the combination of beans and chickpeas retained.

In order to resolve the dominance condition, three Normative Stages (1A, 2A, 3A) were designed for the purpose of providing a sequenced explanation of the methodology and the rules governing the experiment so as to furnish participants with tools and criteria to enable them to increase their own utility. In PHASES 1A and 2A, the information presented was deliberately incomplete in order to trigger a design that would constrain the behaviour of individuals.

In order to resolve the monotonicity condition, a final incentive was determined for the 'most competitive' economic agent. This consisted in a 50-euro gift voucher from a well-known department store. Although all the participants knew about the final incentive, they were gradually informed through PHASES 1A, 2A and 3A about the specific rules that would enable them to be 'more competitive'.

Similarly, and in view of the possibility of fraud being perpetrated by participants, three Random Control Stages (1B, 2B, 3B) were designed. In each of the control stages, the lecturer inspected the data sheets and the balances (beans and chickpeas) of three students, chosen at random, and their most recent counterparties, i.e. the last three students with whom agreement had been reached for a transaction with the student being inspected. In this way, a total of 9 students were inspected at random (25% of the class) along with their

final counterparties for each immediately preceding exchange phase, so the possibility of a check affected practically 50% of the market.

This inspection and control condition is similar the function performed by the Public Exchequer facing tax fraud in a real market. The goal in our case, as for the Tax Office, involved inhibiting opportunistic behaviour leading to the exploitation of the regulatory cracks in the game, thus preventing the generation of distortions and externalities.

In the event of fraud being detected, the penalty meant that both the student under inspection and the counterparty would lose their stock of legumes and would cease to participate in the game, thus making it impossible for them to win the final prize. It should be indicated that any inaccuracy in the amount noted between a pair of economic agents or any mismatch in these amounts, or in their stock of legumes with respect to the balance noted at the moment of the inspection, would imply the expulsion of both participants from the game. It must be remembered that Student A in the last exchange of a phase with Student B should have noted down the same amounts as Student B but in the reverse order, and both should coincide in their tally of the real balances of beans and chickpeas, for both A and B.

We must stress that there were no mistakes in the tallies kept and we can therefore infer the high level of attention given by participants during the experiment, as any carelessness would have implied a severe penalty.

The design of the experiment also mitigated the impact that might have been caused by the economic agents becoming satiated through tiredness or boredom in view of the repetitive mechanics of the game and this was possible through a flexible, functional design with a total duration of less than 75 minutes.

During PHASE 2A, the lecturer, acting as a Central Bank, flooded the market with chickpeas by raising the monetary supply of chickpeas to create, on aggregate and analysing the market as a whole, a disproportion of 1/6 (beans/chickpeas). The share-out was fair and proportional, with each student receiving the same number of chickpeas.

Due to the intrinsic characteristics of this design, a student who had inferred an equilibrium price of 1/3 prior to the monetary injection passed to an inferred price of 1/6.

During PHASE 2A, the lecturer explained the winner would not be the participant who, as most of the students had guessed, had the largest number of beans and chickpeas (added together), but rather that the outcome would be decided by multiplying the number of beans

by the number of chickpeas. Thus, participants were able to infer that they should seek exchanges enabling them to achieve a certain equilibrium between beans and chickpeas because, if a player managed to accumulate a lot of beans but few chickpeas, for example $6 \times 2 = 12$, and another achieved a degree of balance between beans and chickpeas, for example $4 \times 4 = 16$, then the second one would beat the first.

During PHASE 3A, the lecturer introduced a further modification. By then all the participants were aware of the disproportion that existed between the different legumes; they were not able to specify it in numerical terms but they were able to gauge it.

At the end of PHASE 3C, the pair of participants involved in a last exchange that had been recorded as the final exchange representing the highest relative prices would obtain from the Central Bank an additional 50 beans and 50 chickpeas each, which would be added to their stock at that moment and the game would then come to an end and the final tally would be drawn up (multiplication of beans and chickpeas of all the participants) to determine the winner.

3. Methodology

A stopwatch was projected in the classroom to give an accurate reference of the time in minutes and seconds, programmed in three blocks of 15 minutes each, to provide the timeline during the exchanges in PHASES 1C, 2C and 3C for inclusion on the control sheets distributed together with the initial provision of legumes.

Each participant had to record the following information on his or her data sheet for each exchange:

- a) The PHASE in which it took place (1C, 2C, 3C)
- b) The exact moment it took place (minute and second)
- c) The player with whom the exchange was made¹
- d) The swap ratio (number of beans and the number of chickpeas exchanged²)

¹ The participants were assigned numbers from 1 to 36 and noted the specific code assigned to their respective counterparties in their different trades.

² The swap ratios admitted any proportional fraction in the form $2/5$; $6/7$; $9/4$; representing 2 beans for 5 chickpeas, 6 beans for 7 chickpeas or 9 beans for 4 chickpeas.

In this way, the exchange rate for a bean can be calculated by dividing the denominator by the

- e) The balance at the end of the trade (how many beans and how many chickpeas)

Bearing in mind the market's dimensions (36 participants trading with each other, all standing up) meant that it was difficult for players, and costly in comparative terms, to carry out a complete, overarching co-ordination of all the members on the market because, if they had tried to, they would have missed the chance to make more and better exchanges.

At the end of PHASES 1C, 2C and 3C, the lecturer asked the participants to shout out the ratios of the last trades they had made on the market. In other words, the exchange rates for supply and demand in the last operations between pairs of students. This gave rise to ratios varying between 1/1 for the exchange of one bean for one chickpea and 1/8 for the exchange of one bean for 8 chickpeas.

As these exchange rates were shared aloud, participants could become aware of the inflationary process that was being created on the market, even though this would not have been apparent to them until that moment due to the bias caused by the asymmetry in the information.

4. Outcomes

At the end of PHASE 1C, it was possible to see that inflation exceeded real scarcity on the market. While the proportion in the initial provision was 1/3, by the end of PHASE 1C, the closing prices between supply and demand were 1/3, 1/6 and 1/8.

This indicates the existence of volatility due to the fact that, in a non-organized market, information asymmetry meant that not all the participants were aware of the last price traded and, in consequence, they were ignorant of the 'best contractual position' that would allow them to buy chickpeas or sell beans, and *vice versa*.

numerator. In the preceding examples, the price of a bean would respectively be 2.5, 1.17 and 0.44 chickpeas.

Analogously, the price of a chickpea can be calculated by dividing the numerator by the denominator in the swap ratio indicated above. Using the same examples, the price of a chickpea would respectively be: 0.4, 0.86 and 2.5 beans.

At the end of PHASE 2C and, in particular, PHASE 2D, it was possible to verify that the exchange ratios were getting higher and higher.

After PHASE 2C, the monetary injection of chickpeas justified the increase in prices.

However, in the course of PHASE 3C, alongside the price increases, there was a continuous process for the creation of alliances among the participants to the point where true oligopolies were established in terms similar to those expressed by García-Gallego (2008).

Thus, by forcing dumping practices, as many as four hidden markets³ were created and enabled their members to accumulate a large number of chickpeas by effecting major alterations on the market price and achieving different concentration manoeuvres that ended up allowing the highest final exchange ratio to be set at 1/96 and the second highest to be recorded at 1/68.

In this sense, after the corresponding inspection and control verifications had been carried out, the player who had registered the highest exchange ratio and the corresponding counterparty each received an additional provision of 50 beans and 50 chickpeas. As the winner acknowledged the collusive concentration strategy applied, it was finally announced that the prize would be shared with the other members in the team (oligopoly).

From an analytical perspective, in order to calibrate the results of this innovation project, a questionnaire was distributed for quantitative metrics. The last question in this survey was descriptive and qualitative through a semi-structured block to allow students to deal with the following items:

- a) strategy followed in PHASE 1C and justification
- b) strategy followed in PHASE 2C and justification
- c) strategy followed in PHASE 2D and justification
- d) general comments and proposals for improvement

³ We are aware of the number of oligopolistic markets created following the mathematical and statistical analyses associated with the data contained on the data sheets from each of the participants. Following this process, we studied the real-time formation of the supply and demand curves, which have given rise to very interesting conclusions. Due to their nature and complexity, however, an in-depth analysis would exceed the scope of the present article.

The general and specific skills⁴ in the curriculum for “Spanish Economy” in the degree for Business Management are described below. These are the ones covered in the educational innovation project presented here.

Table 2. **Specific competencies for the “Spanish Economy” subject**
Degree in Business Management (ESIC Valencia – UMH)

TYPE	COMPETENCY
SPECIFIC	Ability to analyse the general problems within the sphere of micro-economy and the macro-economy
SPECIFIC	Ability to relate knowledge of fundamental economic theories and institutions.
SPECIFIC	Ability to use and interpret the company’s data and information to draft specialized reports and to take decisions
SPECIFIC	Ability to identify and evaluate the impact of economic events on companies
GENERAL	Ability to use the necessary tools to observe adequately the systems under study
GENERAL	Critical and analytical ability in the corresponding to area of speciality.
GENERAL	Ability to evaluate, optimize and contrast criteria for taking decisions
GENERAL	Ability to work in multi-disciplinary and multi-cultural teams.
GENERAL	Ability to consolidate, extend and integrate fundamental knowledge in the field of the Social and Legal Sciences
GENERAL	Availability of efficient self-learning methodologies and skills for the adaptation and updating of new knowledge and scientific advances, as well as the trends in needs in order to adopt an aptitude for innovation and creativity in the exercise of the profession

Source: *Own production*

⁴ According to the teaching guidelines established by the Miguel Hernández University in Elche (UMH)

The general and specific skills⁵ in the curriculum for “Spanish Economy” in the Sales Management and Marketing degree are described below. These are the ones covered in the educational innovation project presented here.

Table 3. **Specific skills for the “Spanish economy” subject**
Degree in Sales Management and Marketing (ESIC VALENCIA – UMH)

TYPE	COMPETENCY
SPECIFIC	Understand the marketing environment in which the business organizations are operating and not for profit organizations.
SPECIFIC	Know how to explain general problems in the sphere of economics.
GENERAL	Identify, recognize and understand the basic problems in the area of Social and Legal Sciences
GENERAL	Use tools to analyse adequately the phenomena under study
GENERAL	Have critical and analytical aptitudes

Source: *Own production*

The assessment questionnaire for the innovation project incorporated social and demographic variables and all responses were anonymous.

The technical details of the research is given below, together with the profile of the students surveyed and their descriptive statistics.

⁵ According to the teaching guidelines established by the Miguel Hernández University in Elche (UMH)

Table 4. **Technical details of the survey**

Universe	University students from ESIC Valencia - Degree in Business Management - Degree in Sales Management and Marketing Subject: Spanish economy (2nd year)
Geographical scope	Valencia, Spain
Sample design	Personal survey
Sample size	36 valid questionnaires
Fieldwork	November 5th, 2015
Statistical techniques	Descriptive analysis
Statistical software	SPSS version 21.0
Source: <i>Own production</i>	

Table 5. **Profile of the students surveyed**

	Characteristics	Percentage weighting
Gender	Male	36.11%
	Female	63.89%
Age	Mean	20.278
	Standard deviation	1.560
	Minimum	19
	Maximum	26
Source: <i>Own production</i>		

Table 6. Descriptive statistics

	Minimum	Maximum	Mean	St. Dev.
1. I was interested in the economics experiment proposed by the lecturer	2	5	4.472	0.774
2. My interest in educational innovation projects has increased after the economics experiment project	2	5	4.167	0.845
3. I thought the structure of the economics experiment was correct	3	5	4.306	0.710
4. The quality of the practical experience acquired through the economics experiment is good	3	5	4.194	0.710
5. The economics experiment could have lasted longer	2	5	3.806	1.009
6. The lecturer responsible has correctly integrated us into the dynamics of the economics experiment	2	5	4.306	0.710
7. I found the economics experiment intellectually stimulating	2	5	4.278	0.849
8. The methodology of the economics experiment has enabled me to learn elements of the content that I consider valuable and that I would not otherwise have managed to understand	2	5	3.914	0.887
9. My interest in the material studied in the subject has increased as a consequence of the economics experiment	2	5	3.694	0.822
10. I have understood the economic theory studied in the syllabus thanks to the economics experiment	2	5	3.528	0.878
11. Overall, I have improved my collaboration with other colleagues and with the lecturer through the economics experiment	2	5	3.944	0.860
12. Overall, I have improved my professional competencies in the course of the economics experiment	2	5	3.722	1.003
13. I would recommend an economics experiment like this to my colleagues	3	5	4.194	0.856

14. Globally speaking, I am glad I participated in this economics experiment	3	5	4.306	0.749
15. I would like more economics experiments like this in other subjects	2	5	4.417	0.806
16. I would attend another economics experiment organized at the university	2	5	4.222	0.989

5. Discussion

The overall assessment of the innovation project by the students was positive as we can confirm from the quantitative results validated by the participants.

The theoretical corpus contributing to explain price formation predicts that, in the presence of scarcity, prices tend to increase. Students were able to become aware of the fundamental principles on which economic theory is formulated and the way in which an inflationary process was formed, stage by stage.

In addition, with regard to the concept of transaction costs associated with information asymmetry that underlie a market (Tadelis and Williamson, 2012), the students were able to confirm that the perception of chickpea scarcity was uneven among the participants. Not all the economic agents (students) had the same information regarding the scarcity of beans. Only the lecturer was aware of the initial provision of legumes.

Insofar as the market was not an organized one, the information flowed in the exchanges through small constellations of economic agents, thus giving a biased vision of the scarcity and implying high prices with a lot of volatility.

Furthermore, the students confirmed that the individual action of an economic agent determines the action of the other agents, thus configuring the market.

In PHASE 2A, when the lecturer acted as the Central Bank and injected liquidity into the market in the form of extra chickpeas, students were able to confirm that the price of beans increased in the exchange ratios with respect to the currency (chickpeas) that flooded the market.

The low interest rates established by the ECB, together with the different regional laws on land and their collateral effects, lie at the base of the real estate bubble that Spain suffered following the collapse of Lehman Brothers.

In terms of the analysis of the outcomes from the questionnaire posed to the students following this innovation project, the results suggest a very positive assessment of this kind of experiment in the classroom.

Training actions of this type are highly appreciated by students as they enable them, through practice (tacit knowledge), to approach a reflexive iteration of the curriculum's theoretical corpus (express knowledge) and finally crystallize in a deeper level of understanding of the mechanisms giving rise to this learning process based on experience (Nonaka and Takeuchi, 1995).

The tabulation of the qualitative outcomes presented in the last section of the questionnaire which allowed participants to express themselves freely and openly showed great consistency among a large number of students regarding their assessment of the concertation and collusion strategy throughout PHASE 3C.

With all the cautions inherent to a qualitative methodology (Gutiérrez Brito, J., 2009), we must divide the evaluations given by the participants themselves with respect to their respective oligopolistic strategies into two main schools of thought.

On the one hand, students who deemed their behaviour reprehensible, even though they had engaged in it; and, on the other, students who openly evaluated it as honest and defensible.

With respect to the motivations of the first group, as the virtually unanimous justification of their behaviour, they alleged they were taking advantage of a void in the system, in the design of the game, and the non-existence rule prohibiting such collusive behaviour.

The second group, on the other hand, argued in favour of the exploitation of market synergies, and the competitive advantage represented by the size and volume of transactions acting around a central operator or group of economic agents.

While the first alleged a vulnerability in the game design, the second group found a competitive opportunity. Curiously, all the Erasmus students were among the second group.

Qualitative observations of this type led us to propose the future design of new economic experiments inspired by the experiment explained in this paper. In this case, experiments offering greater relevance to the Public Sector, with the introduction of subsidies and taxes, with the aim of profiling efficient mechanisms on highly regulated markets with barriers to access on the supply side, such as the electricity market (Staropoli and Jullien, 2006).

Similarly, in the assessment questionnaires used in the classroom for the result of the teaching innovation activity, we propose the future quantitative tabulation of arguments in favour and against the oligopolistic behaviour discovered by the participants in the course of the experiment, and an increase in sample so as to allow the performance of discriminating quantitative analyses in the light of social and demographic parameters such as gender, original qualification or nationality of the student.

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