

To Work or Not to Work ... That is the Question: Labour Market Decisions in the Classroom

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Abstract

This paper presents a simple classroom experiment for first-year university students of introductory economics, about participation in a competitive labour market. The students are designated as workers and the lecturer/tutor represents the numerous employers in this experiment. The experiment is run for several periods, each period representing different conditions in the labour market. During each period, workers must decide whether or not to offer their labour services based on the information they have at hand. We find that this participatory approach to teaching basic labour market concepts is not only well-received by students, but that it is just as effective at promoting students' retention and understanding.

JEL classification: A20, A22

Key words: Labour market, classroom experiment, reservation wage, posted wage offer, marginal productivity

Introduction

When considering how students learn, it is acknowledged that there are many learning processes just as there are many teaching processes. Although the most common method of teaching undergraduate economics students is still the 'chalk and talk' method (Becker and Watts, 2001) it is now increasingly recognised that students need to be encouraged to engage in active dialogue with lecturers and other students, via classroom experiments for instance, to foster the learning process (see for instance Dickie, 2006; Thurston, 2005; Guest, 2009).

By using a classroom experiment to aid understanding, as suggested by Becker (2004) to create more active learning, students have the opportunity to learn as they participate in the experiment, to discuss the concepts, to practise and also to explain to other students what is happening. The verbal interactions between the students and the lecturer, as well as among the students, are very important, as these allow students to reflect on the activities that are currently taking place. At first, some students may imitate others' actions in the experiment, but as the experiment progresses, understanding and learning should take place.

In this paper, we develop a simple labour market experiment that engages students and allows them to participate actively in a hypothetical labour market, enabling them to experience for themselves how different factors affect their labour market decisions. This experiment is designed for first-year university students of introductory economics and played in a class (seminars or tutorial groups) with about 20–30 students. Nonetheless, it can also be adapted to suit higher-level labour economics students (suggestions for extensions are provided later in the paper) and can also be played in a larger, lecture setting.

After running several sessions of the classroom experiment, we found that teaching basic labour market concepts using this alternative approach was just as effective in promoting students' understanding and retention of the subject matter. Further, the students enjoyed participating in the experiment and are now more enthusiastic and appreciative of how the labour market works, by being part of it in the experiment.

Labour market decisions in the classroom

The following classroom experiment shows students how a basic, competitive labour market operates. More specifically, the objectives of the experiment are:

- 1. to examine the factors that determine the demand for, and supply of workers, and,
- 2. to examine how labour market regulations affect employment and unemployment.

This classroom experiment draws from and will contribute to a wide range of comparative scholarship on experimental labour markets (see for example Haupert, 1996; Bergstrom and Miller, 2000 and Hazlett, 2004, among others). It is significant for its focus on a more robust distribution of costs relevant in determining a worker's reservation wage, including opportunity costs, that help students experience, in their own way, how decisions about whether or not to work are

made, and in providing the students with a thought-through example of how different government actions, specifically provision of unemployment benefits and minimum wage laws, alter labour market outcomes. The experiment, including the discussions held about the different labour market outcomes, is expected to reinforce the understanding and appreciation of such concepts.

During the course of the experiment, students observe how changes in the price at which a particular output is sold, changes in the marginal productivity of workers and workers' reservation wage affect demand for, and supply of, labour. Students will also be able to examine how labour market regulations affect wages and employment. As this experiment is specifically designed for an introductory economics course, it is best to allocate about 5 minutes to explain the objectives and the mechanics of the experiment, 40 minutes to run four periods representing different labour market scenarios and to discuss the different outcomes in each period, and 5–10 minutes to summarise the main conclusions. This experiment can be played comfortably with 20–30 students, but can be adapted to suit a larger class size.

Mechanics of the classroom experiment

There are two types of workers in the competitive labour market: skilled and unskilled workers. The students take on the role of workers and are randomly divided into skilled and unskilled workers. Skilled workers have a higher marginal productivity of labour than unskilled workers. For simplicity, we assume constant marginal productivity of workers. Each worker is also randomly assigned different costs associated with working (this includes the opportunity cost of their time, transportation costs, childcare expenses, etc.) that would make up the worker's reservation wage. For ease of running the experiment, the numerous employers, represented by the lecturer/tutor, offer appropriate wages to skilled or unskilled workers, and all workers signalling their willingness to work will be hired. It is not unreasonable to assign the lecturer/tutor the role of numerous employers, since in a competitive labour market, no single employer can offer a higher or lower wage rate than the market rate because doing so would drive them out of the market. In an advanced labour economics class, the students may be randomly assigned the role of employers. In this experiment, we assume that employers can distinguish skilled workers from the unskilled and know the respective marginal productivities of skilled and unskilled workers.

Outcomes in the labour market are determined through a 'posted wage offer'. In this 'posted wage offer' market, the employers or 'buyers' of labour services orally communicate their wage offers to the workers or 'sellers' of labour services, who then decide and signal to the employers whether or not they will work given the wage being offered and their opportunity costs. The 'posted wage offer' market is suitable in the context of this labour market experiment for an introductory economics class where the employers (the lecturer/tutor) have full information of the skills (abilities) that workers possess, and under the assumption that there are no other explicit costs associated with hiring workers.

To keep the exposition of the labour market concepts simple for an introductory economics class, the employers hire all skilled and unskilled workers who are willing to supply their labour at the wage rates offered in each period. The employers are profit-maximising employers and offer wage rates accordingly. The employers, represented by the lecturer/tutor, then write on the board the number of skilled and unskilled workers that will be hired at the wage rates offered, and how many will remain unemployed. Discussions will follow through from the results of the 'posted price offer' in each period, under different scenarios.

The workers' aim is to maximise their own profit from working and not working. If a worker decides to work, the worker's profit will be equal to the wage he/she will receive less his/her reservation wage. That is, profit_{work} = wage – reservation wage.

If a worker decides not to work, his/her profit_{notwork} = 0, assuming that the government does not provide unemployment benefits. When the government introduces unemployment benefits, a worker who decides not to work will be entitled to receive unemployment benefits so that his/her profit_{notwork} = unemployment benefits.

If profit_{work} > profit_{notwork}, the worker will choose to work. If profit_{work} < profit_{notwork}, the worker will choose not to work. If profit_{work} = profit_{notwork}, the worker can choose to work or not work.

The experiment is run for four periods, with each period representing different labour market scenarios. In each period, workers can decide to either supply their labour or remain unemployed.

How the experiment is played

At the beginning of the session, the lecturer/tutor takes a deck of playing cards and each worker (student) is asked to pick one card from the deck. A worker who gets a red card is skilled; a worker who gets a black card is unskilled. All skilled workers have a marginal productivity of 30 units of output per day; all unskilled workers have a marginal productivity of 20 units of output per day. In this experiment, it is implied that employers already have an existing workforce and want to hire more workers, hence the assumed marginal productivities of skilled and unskilled workers. Skilled workers are asked to sit on the right side of the room; unskilled workers are asked to sit on the left side of the room so the lecturer (i.e. employers) can distinguish between skilled and unskilled workers.

The number on the card the workers receive (face cards: jacks, queens and kings are assumed to have a numerical value of 10), multiplied by \$10, represents the dollar value per day of their reservation wage (see Figure 1). The worker's reservation wage includes the opportunity cost of his/her time, transportation costs, childcare expenses, etc.

Table 1 sets out the wage rates the employers will be offering to unskilled and skilled workers based on the price of output (determined from a roll of the die) and the respective marginal productivity of unskilled and skilled workers, under different scenarios in the course of the experiment. Columns 2 and 3 show what the respective wage offers will be, assuming that the marginal productivity of unskilled workers is equal to 20 units of output per day and 30 units of output per day for skilled workers. Column 4 shows the wage offers when the marginal productivity of skilled workers is assumed to double to 60 units of output per day. Columns 5 and 6 show the wage offers, assuming that the marginal productivity of skilled workers remains at 60 units of output per day, and taking into consideration a government-imposed minimum wage law for all workers of \$100 per day.

In the first period, at a roll of a die, the lecturer/tutor (employers) finds out the price at which the workers' output will be sold, and based on this, offers appropriate wages to skilled and unskilled workers. Workers can use a record-keeping sheet, reproduced in Table 2, to note their own labour supply decisions in each period.

Figure 1: Reservation wages

	\$1(0	Ś	520)	Ś	\$30)	\$4	40	\$	50	\$6	50	5	\$7	0	\$	80	\$90	\$10	0	\$100	\$100	\$100
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Table 1: Wage offers

Price of output (based on a roll of die)	Unskilled Wage Rate (\$/day) (PxMPunskilled)	Skilled Wage Rate (\$/day) (PxMPskilled)	Skilled Wage Rate (\$/day) (MPskilled has doubled)	Unskilled Wage Rate (\$/day) w/ minimum wage of \$100/day	Unskilled Wage Rate (\$/day) w/ minimum wage of \$100/day
1	20	30	60	100	100
2	40	60	120	100	120
3	60	90	180	100	180
4	80	120	240	100	240
5	100	150	300	100	300
6	120	180	360	120	360

Table 2: Employment decisions

You are a skilled worker. Your marginal productivity of labour is 30 (or 60 after the introduction of new technology) units of output per day.

Wage offered	Reservation wage	Unemployment benefit	Work?
			Not work?

You are an unskilled worker. Your marginal productivity of labour is 20 units of output per day.

Wage offered	Reservation wage	Unemployment benefit	Work?
			Not work?

A posted wage offer is made by the lecturer/tutor (employers) to skilled and unskilled workers to determine how many skilled and unskilled workers will be hired at the offered daily wage rate for skilled and unskilled workers. Each time the lecturer rolls the die (representing a change in the price at which output is sold), Table 3: Labour market outcomes

Period 1 No unemployment benefit

Roll of	Wage	Skilled	workers	Wage	Unskille	d workers
die	offered	No. of	No. of	offered	No. of	No. of
(price)		Employed	Unemployed		Employed	Unemployed

Period 2

Marginal productivity of skilled workers = 60 units of output per day

Period 3

Marginal productivity of skilled workers = 60 units of output per day Unemployment benefit = \$50/day

Period 4

Marginal productivity of skilled workers = 60 units of output per day Unemployment benefit = \$50/day Minimum wage for all workers = \$100/day

another posted wage offer is made. The results of each posted wage offer are recorded on a table (Table 3) and posted on the board for later discussion.

In this first period, we show that employers hire workers according to the value of their marginal product, and that competitive employers will not offer a wage rate that is higher or lower than the workers' value of marginal product because doing so will not maximise their profits. Workers on the other hand, compare the wage rate with their reservation wage and make decisions on whether or not to supply their labour services. It is useful to remind students at this stage that, in the real world, the interaction of demand for, and supply of, labour determines the equilibrium wage and employment level in the labour market. In the second period, a new technology is introduced that effectively doubles the productivity of skilled workers only. The employers (via the lecturer/tutor) again post a wage offer to workers, taking into consideration that the marginal productivity of skilled workers has doubled; results are noted on Table 3 for discussion. In this period, it is useful to remind the students of the outcomes in the labour market in the first period, in particular, how changes in the price of the output affected the demand for labour. After this, the lecturer/tutor can discuss how, this time, changes in the marginal productivity of workers affect the demand for, and supply of, workers. In particular, how is the wage rate of the skilled workers affected by the increase in productivity? How would unskilled workers be affected? The important points to draw out from the discussion, after the second period, are that changes in the price at which output is sold and/or changes in the productivity of workers are the main factors that affect the demand for labour.

In the third period, the employer assumes the same price for output from the last roll of the die in the immediately preceding period. In the third period however, the government introduces unemployment benefits and a worker who decides not to work will now be eligible to receive a \$50 per day unemployment benefit.

Another posted wage offer is made by the employers, and workers now make their decisions, taking into consideration the unemployment benefit they can receive should they choose not to work. Results are noted on Table 3 for discussion. After the unemployment benefit was introduced, some students were surprised to find that if their reservation wage is quite high, and the wage offer is not too high, it may actually be in their best interest, at least financially, to just stay at home and receive unemployment benefits. The results in this third period made for some very interesting discussion among students. Some students pointed out that although they may be financially better off by not working and just receiving unemployment benefits, they will still opt to work so they do not lose their skills (an application of what they would have learned about structural unemployment), or for a sense of pride and/or accomplishment.

In the fourth period, the price of output and the skilled workers' productivity remains the same as in the immediately preceding period, but this time the government mandates a \$100 per day minimum wage for all workers, both skilled and unskilled.

A posted wage offer is again made to determine how many skilled and unskilled workers will be hired at the offered wage rates. Note however that, under this scenario, if the price based on the last period is less than \$5, the employer will not hire any unskilled worker. This is because it is not profit-maximising for the employer to do so as price (if less than \$5) multiplied by the marginal productivity

(i.e. the value of the marginal product of labour) of unskilled workers will be less than the minimum wage of \$100 per day. Moreover, if the price based on the last period is \$1, the employer will not hire any skilled workers either as it will not be profit-maximising to do so.

In the discussion following this period, the focus should be on how the introduction of a minimum wage has affected the labour market. For instance, it should be noted that although there will be circumstances when there will be no demand for labour under certain price levels with a minimum wage imposed, there will be more workers, particularly unskilled workers, who will be more willing to offer their labour services, i.e. supply of labour will be greater than demand for labour; therefore, unemployment could increase compared to unemployment in the previous periods.

Possible variations

The classroom experiment outlined above has been designed for university students of first-year introductory economics. This experiment, however, can be easily extended to suit higher level (labour) economics students. For instance, rather than the lecturer/tutor taking on the role of the employers, the class can be divided into several groups of employers and workers, so that some students end up as employers who decide the appropriate wages to offer and number of workers to hire. Alternatively, a non-competitive labour market can also be examined. The lecturer/tutor, for instance, can assume the role of a monopsonist, who can be either perfectly discriminating or non-discriminating. Discrimination in the labour market can also be introduced. One way of doing this is by imposing on employers to hire only male workers in each period. Another way of extending the experiment is by introducing the role of labour unions to see what happens in the labour market when a group of, or all, workers form a labour union. It is also possible to introduce different wage-setting mechanisms, such as negotiations, or a combination of posted price then negotiations, among others.

To play or not to play ... summary and conclusions

The labour market experiment outlined in this paper aims to introduce students to the workings of a simple competitive labour market, and how outcomes in this market are affected by different forms of government intervention. It shows students that wages firms offer depend on the marginal productivity of workers and the price at which output is sold. Any change to either or both of these factors changes the wage offer. The experiment also enables students to develop for themselves their own reservation wage. The experiment is able to draw out other costs (aside from the ones assumed in the experiment, which are mainly monetary costs) that may affect the students' own labour supply decisions. That is, for some

students, monetary costs are not the only considerations in forming their own reservation wage. Misgivings about losing their skills, or uneasiness about relying on government benefits, and/or desire for self-fulfilment and other opportunity costs can sometimes outweigh monetary considerations when deciding whether or not to supply their labour services.

From this experiment, the students can also gain a better appreciation of how government regulations affect outcomes in the labour market. For instance, we find that unemployment benefits may have different effects on the level of employment depending on whether students (workers) consider only monetary costs or include other non-monetary costs in forming their reservation wage. Also government regulations, such as minimum wage, could considerably affect hiring decisions of employers.

By giving students the opportunity to play the role of workers and getting them to decide for themselves whether or not they should work under different scenarios, students learn to appreciate the importance of the different factors affecting wage setting and labour supply decisions.

In order to determine whether or not there is any merit in conducting this labour market experiment to aid students' learning, we examined the quiz results of students, in two different semesters, on this particular topic (i.e. concerning workers, wages employment and unemployment). Students in one semester were exposed to the experiment (treatment group), while students in the other semester were lectured on the topic in the traditional 'chalk and talk' manner (control group). Students in both groups were exposed to the same material throughout the semester (except for the labour market experiment), the same number of class hours and had the same lecturer/tutor. However, the class size of the two groups differs with more students in the treatment group than in the control group.

We found that a higher percentage of students in the treatment group obtained perfect scores in the quiz (14.6% compared to 9.1%), but that the mean test scores in the treatment group (71%) was slightly lower that the mean test score (73%) in the control group. Nonetheless, standard tests for equality of means in the two groups (with different sample sizes, see for instance McGhee, 1985) fail to reject the hypothesis that the means are equal (p-value = 0.5782). This implies that, whether or not students were exposed to the game, students' implied understanding of the labour market (as measured by their test scores) was not statistically different. The treatment group/control group design and the examination of differences in mean outcomes are commonly used tools for determining whether or not to use classroom experiments and in assessing the effectiveness of such experiments (see, for instance, Dickie, 2006).

Nonetheless, we also found that students in the treatment group, those who were exposed to the game, were very enthusiastic and appreciated being active participants in labour market decisions in the classroom. Students' positive reactions to the game were expressed verbally, as well as in the end of the semester course evaluation questionnaire where a number of students explicitly noted that one of the highlights of the course was the labour market experiment in which they took part. This kind of reaction of students towards classroom experiments is consistent with what many of those who use classroom experiments have experienced and, consequently, it is not surprising then to find strong support for their use (see, for instance, Durham *et al.*, 2007).

For these reasons, we surmise that although the labour market classroom experiment we present in this paper does not appear to significantly improve students' understanding and retention, based on a comparison of quiz results, this result is still consistent with the findings of other users of classroom experiments (see, for instance, Yandell, 1999). We also regard this experiment as a valuable tool for engaging students and making them active learners, and an alternative to the monotony of 'chalk and talk' in the classroom.

Appendix: Instructions for the labour market experiment

Items you will need

Deck of playing cards Large die Whiteboard Whiteboard pens Copies of Table 2 for the students Overhead projector transparency (OHP) of Table 3

Instructions for the lecturer/tutor

- With the deck of playing cards in your hand stand at the door.
- Offer each student a card as they enter the room and give them a copy of Table 2.
- Instruct students to take a seat.
- When all students are seated explain that each card represents a type of worker: a
 red card represents a skilled worker; a black card represents an unskilled worker.
- Instruct those with a red card to move to the right-hand side of the room and those with a black card to move to the left-hand side, taking with them their Table 2 form and a pen.
- Explain that employers want to hire more workers for their factories, offices, etc. and that different workers have different marginal productivities: skilled workers

have a marginal productivity of 30 units of output per day, while the unskilled have a marginal productivity of 20 units of output per day.

- Write on the whiteboard what type of worker each group is and their respective marginal productivities.
- Explain to students that the number on their card (face cards have a numerical value of 10) multiplied by 10, represents their reservation wage which is made up of the opportunity cost of their time, transport costs, childcare costs, costs of buying new clothes for work, etc.
- Get students to discuss among themselves their reservation wage. Ask them what other things they could include in their reservation wage.
- Inform students that the price of the good will be determined by the roll of the die. Based on the roll of the die, the lecturer/tutor (employers) posts a wage offer, which is effectively the number from the die multiplied by the marginal productivity of workers. For example:
 - die = 2, so the price of output = \$2
 - skilled workers' wage offer = \$60 (price x 30 units of output per day)
 - unskilled workers' wage offer = \$40 (price x 20 units of output per day)
- Allow about 5 minutes for setting up the classroom experiment, i.e. explaining the objectives and mechanics of the experiment.
- Allow about 40 minutes to run and discuss four different labour market scenarios, represented by Periods 1 to 4 as described below.
- Allow about 5–10 minutes to summarise and conclude.

Period 1

- Roll the die to determine the price at which output is sold.
- Based on the price of output and the marginal productivity of workers, write the offered daily wage for each type of worker on the OHP of Table 3.
- Ask students to make a decision as to whether they will work or not work and ask them to move towards the centre of the room to indicate their willingness to work.
- Record the information as to the number of students willing to work on the OHP of Table 3.
- Ask students to discuss with students around them why they will or will not work.
- Ask if any students have changed their minds now they have discussed it.
- Discuss with the whole group the decisions that have been made and the reasons for making them. What does the wage offer represent?
- Ask students to return to their original positions in the skilled or unskilled workers' group and fill in their Table 2 form.
- Roll the die again to simulate a price change.
- Make a wage offer to skilled and unskilled workers and ask students whether or not they will work.
- Discuss with the whole group the decisions that have been made and the reasons for making them.

- The lecturer/tutor can repeat rolling the die and making new wage offers, until the students are comfortable with making decisions regarding whether or not to work.
- Allow about 12 minutes to run and discuss Period 1 scenario and results.

Period 2

- Explain that a new technology that improves the productivity of skilled workers has been developed. This means that skilled workers can now produce more output than before.
- Ask students if they can think of examples of technology that would improve workers' marginal productivity.
- Inform students that the skilled workers' marginal productivity has now increased to 60 units of output per day.
- The price of output is assumed to be the same as the last roll of the die in Period 1, and write the wages offered to the skilled and unskilled workers on the OHP of Table 3.
- Ask students to decide on whether or not they will work and indicate this by moving towards the centre of the classroom if they are willing to work, and fill in the relevant information on Table 3.
- Ask students to discuss in pairs (or groups of three) the reasons for their decision.
- Ask the whole group what factors affect the demand for labour. Again, discuss with students what the wage offers represent, i.e. that these represent the value of the marginal product of labour. Specifically, discuss with students how the wage offers for skilled and unskilled workers have been affected with the development of the new technology.
- Ask students to return to their original positions in the skilled or unskilled workers' group and fill in their Table 2 form.
- Allow about 8 minutes to run and discuss Period 2 scenario and results.

Period 3

- Government now introduces an unemployment benefit of \$50 per day. This means that those who decide not to work will automatically receive \$50 per day.
- The price of output is assumed to be the same as the last roll of the die in Period 1.
- Write the wages offered to skilled and unskilled workers on the OHP of Table 3 and ask students to decide whether or not to work, making sure that they take into consideration the \$50 per day unemployment benefit.
- Ask students to move towards the centre of the classroom to indicate their willingness to work, and fill in the relevant information on Table 3.
- Ask students to discuss in pairs (or groups of three) their decisions about whether or not to work, in particular, with reference to the unemployment benefit. Has the introduction of the unemployment benefit changed their working decision?

- With the whole group, discuss what the benefits of working and not working might be. For instance, would people choose to work regardless of the unemployment benefit because they are afraid to lose their skills when not working? What are the social reasons for working?
- Ask students to return to their groups.
- Allow about 10 minutes to run and discuss Period 3 scenario and results.

Period 4

- Government now introduces a minimum wage of \$100 per day for all workers.
- Explain that the unemployment benefit remains in place, and the marginal productivity of each type of worker remains the same.
- Write on the OHP of Table 3, the wages offered to skilled and unskilled workers, making sure that the \$100 minimum wage per day is also taken into consideration.
- Ask students to make a decision about working and move to the centre of the classroom to indicate their willingness to work, and fill in the relevant information on Table 3.
- If the minimum wage turns out to be greater than the value of the marginal product of labour, ask students whether or not the employers will still be willing to hire workers, and explain why or why not.
- Discuss with the whole group what happens to the number employed when a minimum wage is imposed. How many workers will be willing to work for the minimum wage? How many workers will the employers want to hire?
- Ask students to return to their original seats and in pairs (or groups of three), to draw a diagram that would illustrate the effect of the introduction of a minimum wage in the labour market.
- Allow about 10 minutes to run and discuss Period 4 scenario and results.

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Using Economic Classroom Experiments¹



Economic classroom experiments are an excellent way to increase student interest, but getting started may be difficult. We attempt to aid the newcomer by recommending which experiments to use and describing the current resources available.

Introduction

If you are reading this review in this special issue of the IREE, then you are probably interested in running economic experiments in your class but have little experience doing so. You may have heard about research on class experiments from colleagues, read a research article or two (or a pop-economics book), or even seen a demonstration. Still, it can be confusing knowing how to get started and the number of different resources available can be bewildering. We hope that this article will guide you through the possibilities, show you that the start-up costs are not too high, and convince you of the potential benefits.

In our experience, economic classroom experiments are a great way to introduce students to economic key concepts. They are fun for the students and for the teacher. While some charismatic teachers deliver lectures that appear near perfect, we believe that for most courses and lecturers, student interest in the material and student evaluations will improve with this technique.

Economics research has validated experimental methods and our teaching should reflect this development. The gradual acceptance of experimental methods culminated in 2002, when the Nobel Prize was awarded to Vernon Smith, who pioneered this revolution, and Daniel Kahneman. As evidenced by an article in this issue, Vernon Smith lets his teaching follow his research. Many of the researchers in the field also have followed suit. With the rise of the web, the cost of getting started has dropped significantly and the use of experiments has been adopted by many outside the field. With this in mind, using the words of Charles Holt (1999),