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Experimental Economics

Why a Chapter on Experimental Economics?¹

There are various reasons why a chapter on experimental economics should be included in a book on microeconomics or in the supplementary material. Firstly, it has come of age; as many have noted, the Nobel Prize for Economics was jointly awarded to Daniel Kahneman and Vernon Smith in 2002 for their pioneering work in the fields of psychological and experimental economics.² When social scientists are awarded such a prestigious prize then one needs to sit up and take notice. This alone would be sufficient for examining – if only cursorily – the nature of experimental economics.

Secondly, and connected with the above, the impossible now seems possible: economic theory – predominantly, although not exclusively, at a micro level – can now be formally tested empirically. It used to be the case (and not that long ago) that economic theory was, well, just that, economic theory. The idea of testing it empirically was not considered to be practical or feasible. Theories in the “hard sciences” could be tested but not economics. For example, Einstein’s general theory of relativity, which among other things predicted that light from distant stars would be bent by the gravitational field of massive objects, was confirmed by Arthur Eddington and his colleagues in 1920 during a total eclipse of the sun which enabled them to note the apparent change in the position of stars near the sun. More recently, some economists had noted:

Economics . . . cannot perform the controlled experiments of chemists or biologists because [it] cannot easily control other important factors. Like astronomers or meteorologists, [it] generally must be content largely to observe.

(Samuelson and Nordhaus, 1985: 8³)

This quotation (widely used, it would seem, in the literature on experimental economics including here!) is a bit unfair on the two economists named above; they merely expressed what the majority of the economics profession held true at the time. To their credit, pioneers such as Smith and Kahneman have shown that this is not the case.

On a personal note there is another reason. I have noted both as a student and as a teacher of economics that inquisitive students will always question the assumptions upon which many economic theories rest.⁴ The unease springs from the apparent non-realism of some of the assumptions used. The standard response is Milton Friedman's snooker ball or pool ball analogy: pool players may not know the laws of torque (the forces that determine the spin on the cue ball) but that does not stop the laws of physics from accurately describing the end result or the outcome of a particular shot even though the player is oblivious to their existence. So too, a manager may never have heard of a marginal cost or revenue curve but that does not stop him or her from acting in such a way as to confirm the usefulness of such concepts when he or she attempts to maximize profits. In short, the assumptions of a theory are not the ultimate factor in determining a theory's usefulness; rather it is the theory's *predictive power* that is ultimately important.

Even then, many students, and not a few economists, remained at the very least uncomfortable. If based upon a set of assumptions a real-world event is predicted by theory but that prediction fails to materialize, then is it the set of assumptions and the theories upon which they are built that are wrong, or the real world? Should we start to re-model (through politics as much as economics) the real world to conform to our cherished assumptions and theories that underpin our understanding of how the economy works or rather how the economy *should* work? Or should we accept the real world as it is and redefine our assumptions of how economic agents operate such that the end results of our economic theories explain the real world we actually observe? In passing, it should be noted that by posing such questions we start to blur the distinction between normative and positive economics.

Experimental economists are now in a position to examine under scientific conditions whether many of the assumptions and theories used to model how the economy operates are supported by evidence. If they are, then all very well and good. If they are not, then does this not at the very least point in the direction of a re-examination of the theory? If economic agents are by and large not *rational*, for example, then it *may* be the case that leaving the market to its own devices is not the best way to maximize utility within society in general. Such a view starts to raise political as much as economic issues as regards policy formulation on the part of governments. We shall be careful in what follows to stick as closely as possible to the economic side of the arguments involved.

This chapter has two principal aims. Firstly, it is a gentle introduction to the reader of the area of experimental economics. Experimental economics differs in some respects from other branches of economics in so far as the branch of economics known as labor economics, say, has a set of theories about how various aspects of the labor market operate. On the basis of these theories it is possible to then make predictions and forecasts as to what will happen within the labor market relating to this or that aspect. Experimental economics, on the other hand, is as much, if not more, a tool or set of techniques for examining the theories of various branches of economics. Since it can be used in a wide variety of economic branches the output of experimenters has been prodigious. *The Handbook of Experimental Economics* (Kagel and Roth, 1995) alone runs to 721 pages and was an attempt to summarize what experimental economics had unearthed up to 1995 – the book's publication date. This chapter runs to less than a tenth of that length, and as such will definitely be an introduction!⁵

Secondly, there are two aspects worth dwelling on as regards experimental economics; the first is the actual technique or techniques themselves. How do you actually carry out an experiment in economics? Are there any underlying principles that need to be followed in order to ensure that any experiment carried out is "valid"? (We explore this issue of validity below.) And then there are the actual results that

have been uncovered, many of which support traditional theory as taught in the lecture theaters of universities throughout the world and some which do not. We have attempted to blend both aspects throughout the chapter although the actual techniques of experimental economics and underlying principles are tackled early on.⁶ Toward the end of the chapter we examine the differences that have arisen between experimental economists and experimental psychologists both in terms of results uncovered in experiments and in their methodological approach to experimentation.

It is also worth mentioning to the student reader who is at an intermediate level of understanding of economics that this area of experimental economics is not one that is normally covered by undergraduate economic courses (unless the lecturer on such a course has a specific research interest in experimental economics!). Indeed, one might be hard-pressed to find postgraduate courses in economics where these issues are raised. It is, however, long overdue that an attempt was made to introduce the undergraduate student to the methodology of experimental economics and, indeed, to some of the controversies that have arisen through various experiments as they relate to economic theory taught at an undergraduate level.

What is Experimental Economics?

At a surface level it is quite straightforward (as many things in life always appear to be). The experimenter, under controlled laboratory conditions, attempts to mimic or reproduce the market for whatever – bread, cars, financial derivative, public goods and so on – in miniature. In the process of doing so he or she studies the behavior of the participants (often referred to as subjects) in this microcosm of a market with the view to seeing whether the market outcomes reproduced in the laboratory (usually a classroom of sorts) conforms to or deviates from the established theory. A slight variation is to see whether the results of the experiment can discriminate between economic theories which are at odds with one another.

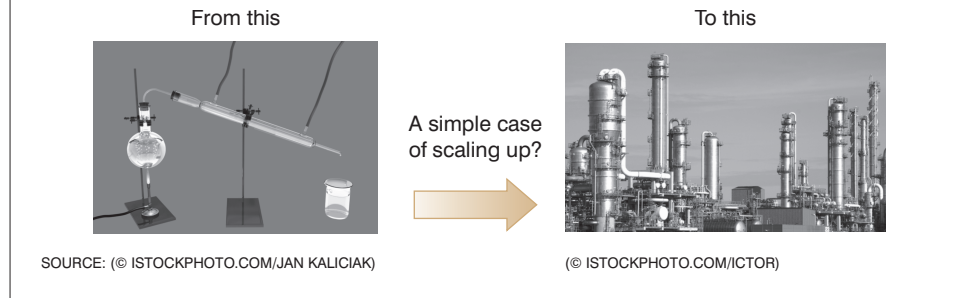
The above would seem straightforward enough. However, what are “*controlled laboratory conditions*”; and can a market in microcosm exactly *parallel* a market at the all-embracing macro level?

We return to the subject of controlled laboratory conditions below; however, the extent to which results from a classroom experiment with (student) volunteers can be generalized to markets involving, perhaps, millions of people can be demonstrated by looking at another hard science, that of chemical engineering. Chemical engineers apply the laws of chemistry and physics along with mathematics, to the process of turning raw materials into other products. The conversion of crude oil into various petroleum products would be an example. However, there is a world of difference between doing a small-scale chemistry experiment in a laboratory and converting that into meaningful industrial production.

To give a couple of examples, in a school science laboratory which is used mainly for teaching purposes waste products can usually (but not always!) be easily discarded through normal channels – sometimes even just down the sink or into the classroom waste bucket. Not so when the waste product is on a commercial scale; special containers will need to be made to store the waste product, it may also then be very costly to actually dispose of the waste material itself, making the actual production of the final product non-commercial.

Heat, to give another example, may be applied, via a Bunsen burner relatively costlessly, to agitate oil in the school laboratory in order to distil off the separate components of the oil through a small-scale, glass condenser. (See Figure 19.1.) At the commercial level, the exact amount of heat required to raise the oil to specific

FIGURE 19.1 From the Laboratory to the Commercial World: A simple case of scaling up? *Can the laboratory experiment always be simply scaled up for industrial production and by implication can the class-based economic experiment be applied to the economy at large?*



temperatures and so separate out the various components of the oil will need to be worked out; unlike the Bunsen burner this will not be costless! That heat will need to be applied through a special heat transfer mechanism – giant Bunsen burners will not work! In short, what seems straightforward in the laboratory may not always be so when the process is transferred to an industrial production level and when that production must be carried out on a commercial basis.⁷

In the field of economics itself, or rather that of Keynesian economics, if one firm within a *closed* economy cuts the wages of its employees to boost profitability then it does not automatically follow that if *all* firms cut the wages of their respective employees that profitability will increase for all firms. What may be a successful experiment in boosting profitability for one firm will not necessarily be replicated by others the more widespread the practice becomes.⁸ (Consult your macro lecturer – or indeed your micro lecturer – if you do not understand this last example.)

Physics tells us that the force (F) of an object is equal to the mass (m) of the object multiplied by the rate at which it accelerates (a), given concisely by $F = m \times a$. If one day the human race travels to the planet Mars such a formula will be equally valid, that is $F = m \times a$ will be as true on Mars as it is on Earth. (Naturally, if we were looking at free-falling objects the gravitational constant of acceleration a will be different since Mars has a weaker gravitational field.) The point is that for the hard sciences it is assumed that the laws of physics or chemistry are applicable not just everywhere on Earth but throughout the Universe!⁹ To what extent this can be said of the social sciences is still an open question.

More formally, this view is referred to, in research methodology, as the issue of *external validity* – to what extent can the results, conclusions – and hence recommendations – drawn from research carried out in a laboratory (be it in the field of economics or otherwise) be generalized to other situations; in the case of economics, generalized to the economy or sub-sections of the economy.

This concept of external validity is often expressed in the economics literature as *parallelism*. Parallelism is the extent to which similarities relating to outcomes in experiments can be extended or generalized to so-called field environments, that is, in this case, the economy as a whole or sub-sets of the economy or economic behavior.

According to parallelism, it should be presumed that results carry over to the world outside the laboratory. An honest skeptic then has the burden of stating what is different about the outside world that might challenge the

results observed in the laboratory. Usually new experiments can be designed and conducted to test the skeptic's statement. For example, in the past both authors have heard colleagues argue that laboratory asset market data are "artificial." When pressed, the colleague usually cites the large number of traders or the high stakes and professionalism of traders in the real world as the important differences. The appropriate response is to conduct experiments with more traders or more experienced (or professional) traders or to increase the salient rewards.¹⁰ The idea is to use the skepticism to promote constructive research, and not to engage in sterile arguments.

(Friedman and Sunder, 1994: 16)

The counterpart to external validity is *internal validity*. Internal validity refers to the design of the experiment itself and the data used in the experiment and hence the ability of the experiment to allow the experimenter to draw accurate or reasonable approximate conclusions. (See Leedy and Ormrod, 2005, Chapter 5, pp. 97–99 for further discussion on these concepts of external and internal validity.)

To give some examples of potentially erroneously conducted research, one can think of surveys within the social sciences: in many cities throughout the world the rich and powerful live in residences that for various reasons are difficult to access. If the government or a research organization conducts a household survey by knocking on a representative sample of doors within the city, then it may arrive at misleading estimates of average income given that many well-off people will be hard to contact.¹¹ If you desire an estimate of average income per head within the city, your sample for your research would be an underestimate of the average level of income per head in the city.

If one attempts to overcome this by, say, using a telephone survey approach, it may be that better-off people within a city or country have disproportionately more access to fixed-line telephones than those on lower incomes. Your sample for your research would then be over-sampling the better-off leading to a biased estimate of income – your results would show a higher level of average income than actually exists.

Final example: the senior management of a university wishes to enhance teaching within the faculties. As such, it instructs the staff development unit to run a series of teacher training courses focusing on issues such as presentation, feedback to students, e-learning potential for a course and so on. Lecturers can volunteer for the one-day and half-day workshops. To assess how much impact the courses have had, the staff development unit monitors the results from student evaluation forms handed out and filled in at the end of a module's completion. The students respond through the questionnaire in terms of how much they feel they have benefited from the module, to what extent the lectures were engaging or otherwise, the relevance of the module to their overall aims at university and so on. The student evaluation forms of those students who were taught by lecturers passing through the workshops are compared with the evaluation forms of those whose lecturers did not attend the workshops.

Lo and behold! The student evaluation forms are found to be far more positive for those lecturers who undertook the training than for those lecturers who did not. That proves it; the training laid on by the staff development unit was a success!¹²

Mmm . . . Not quite. Firstly, the staff who went through the training were all volunteers; as the old maxim goes: one volunteer is worth ten pressed men.¹³ To put it another way, it tends to be the most enthusiastic and committed people who volunteer to sign up for this type of training (and indeed most types of training). They tend to do so because, in this case, they are already probably more genuinely interested and motivated than many of their colleagues in terms of the delivery of their teaching.¹⁴

As such, even *without* the additional workshops, laid on by the staff development unit, the highly motivated lecturers would no doubt have received very positive feedback from their students. The design of the experiment by the staff development unit to monitor their workshops has fallen prey to what is termed *self-selection bias*. The bias arising from the attempt to evaluate the training is due to enthusiastic lecturers selecting themselves from the body of lecturers in the university – they are not, in other words, a representative sample drawn from the population of lecturers at the university. As such, results gained from the experiment at evaluation are biased and cannot be generally applied due to the way in which the evaluation was carried out.

From Chamberlin to Smith: Supply and Demand

The above problem of internal validity is directly relevant to the issue raised above as regards “*controlled laboratory conditions*.” What guiding principles are there for conducting economic experiments with relatively small groups of individuals such that conclusions drawn are valid? The main set of guidelines for economic experiments springs from an article by Vernon Smith (Smith, 1976) to which we turn shortly.

Smith, in his undergraduate days, had been a student of Edward Chamberlin (1899–1967) at Harvard University. Chamberlin, who coined the term “*product differentiation*” and along with Joan Robinson (1903–1983) is given credit for the development of the theory of monopolistic competition (or imperfect competition), conducted one of the first experimental studies in 1948. Chamberlin (1948) was interested to test whether the neoclassical theory of perfect competition stood the test under laboratory style conditions.

In a classroom experiment, sellers and buyers had been assigned by Chamberlin private information as regards the value that they placed on the good to be purchased (a demander) or the cost to the seller (a producer of the good or service). Sellers and buyers then searched each other out whereupon direct face-to-face negotiations would begin as to the price at which the good was to be bought or sold. The demander tried to haggle the price down as much as he or she could below the value that he or she had been assigned by Chamberlin; the supplier, on the contrary, attempted to raise the price as much as possible above the cost. Each potential seller and buyer had unique costs or values of the good unique to themselves.

While Chamberlin had all the relevant information – and so could work out the theoretical equilibrium price – the students did not. Once deals had been concluded, the results of each deal were recorded by Chamberlin to work out the equilibrium price. Chamberlin reported that the results of the classroom experiment did not conform to what economic theory would have predicted. He took this as evidence that the theoretical perfection of Adam Smith’s *invisible hand* had, in effect, been imposed on market participants through *deductive* reasoning rather than *induced* from actual market observation.¹⁵

Vernon Smith, having participated in one of Chamberlin’s classroom experiments, was at first dismissive of the relevance of the proceedings (as were the majority of the economics profession). Later on as an assistant professor, Smith was to have a change of heart about the usefulness of classroom experiments. He therefore re-ran the Chamberlin experiments but with important differences.

Firstly, once a deal had been concluded between a buyer and seller, this was immediately made public so other participants in the “classroom market” could see what the “going rate” was. This tended to conform to many real-world markets where individuals do not as a rule make economic decisions in isolation from what other

economic agents have already done. The above is known as the *double auction* or *double oral auction* method (also sometimes the Smith auction).

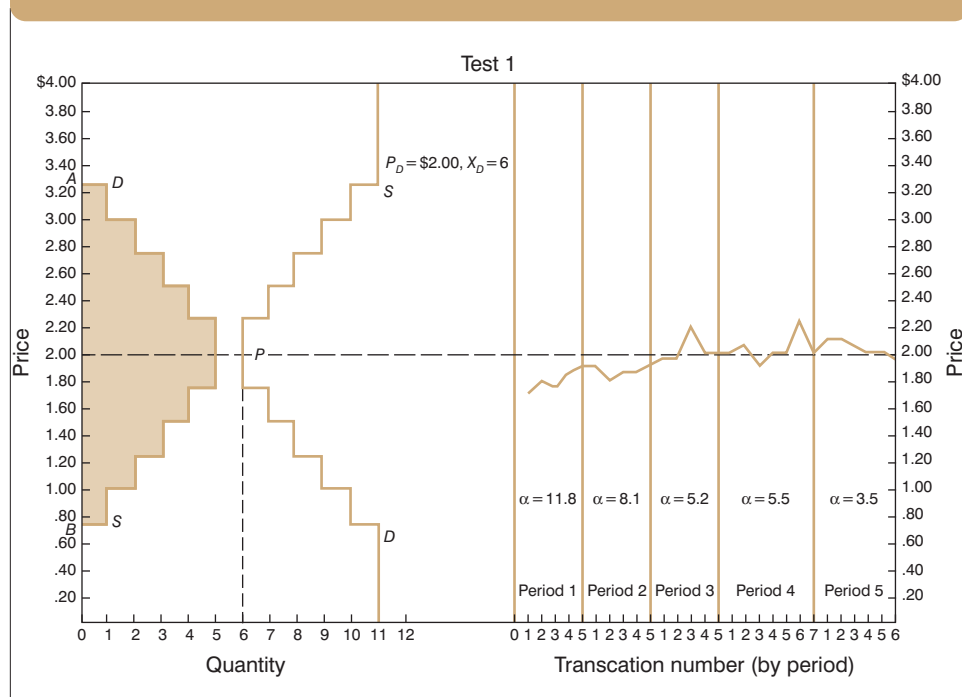
Secondly, instantaneous market clearing or market equilibrium was jettisoned in favor of the concept that markets tend to approach equilibrium over time. Therefore multiple trading sessions were organized using the same student volunteers. At the start of each session the market participants were issued with new goods to sell or new “money” to buy the good in question. This allowed the participants to learn with each session and so get better and better deals from their respective points of view.

Again this is not in and of itself unusual in the real world; many individuals may get caught out the first time round (whether as a buyer or as a seller) by paying too much for a product or service or selling below a market rate. Over time, however, they learn the going rate at any particular time by keeping their finger on the pulse of economic activity.¹⁶ Allowing the participants to get used to the market environment in which they operate in the experiments is known as *stationary repetition*.

Smith (1962) found that the results from eleven classroom experiments carried out over six years *confirmed* the theoretical idea of competitive equilibrium.

Figure 19.2 shows the supply and demand “curves” on the left-hand side of the figure. The stepped nature of the demand and supply lines indicates the finite number of offers and bids that were available during the classroom experiment. On the right-hand side of the figure the mean price per transaction over each period is shown. As can be seen, as each trading session occurs the price converges to the equilibrium price. The Greek letter *alpha* (α) is the standard deviation of the mean price achieved in deals. Notice that as each trading session proceeds there is a tendency for this deviation to get smaller and smaller.¹⁷ This indicates that students are learning from previous sessions and making deals closer to the implied equilibrium value of \$2.00.

FIGURE 19.2 Experimental Evidence on Supply and Demand Leading to Market Equilibrium





APPLICATION 19.1 South Australian Wine: A lot to whine about?

The article by Burns *et al.* (1989) is a good example of how the techniques of experimental economics can be brought to bear on real-life problems in order to come up with practical recommendations for an industry. This application is drawn from and closely follows this article. Their experiments were carried out in 1986 and 1987.

Grape-growers have tended to be mainly small independent family businesses in the three Australian states of South Australia, New South Wales, and Victoria. Most of the wineries, to which the growers sell, are private firms with the exception in South Australia of “co-operative” wineries formed by local winegrowers in the area. These co-ops must take all the grapes delivered to them by their members but the members (the winegrowers) can, if the wish, sell to other wineries. In the past there was legislation in place which set minimum prices for the grapes delivered to the wineries to ensure that the small growers were not exploited.

The experiments, by Burns *et al.* (1989), consider the effect on average winery prices and grower returns with and without minimum prices.¹⁸ It also looked at three different pricing regimes and their consequent effect in terms of surplus, that is grapes “left on the vine.”

The experiments

Half of the 60 participants or subjects were members or supporters of the charity Community Aid Abroad (the Australian affiliate of Oxfam). The other 30 subjects were final year undergraduate students of econometrics at the University of Adelaide. The former group were told (truthfully) that all profits made by them would go to their charity; and the latter group were required to participate as part of course requirements for which they would receive marks. None of the subjects had participated in such experiments before and those who saw themselves as being non-competitive voluntarily withdrew from participation. Ten subjects participated in each session which lasted about three hours and were assigned to be either a buyer (winery) or seller (grape grower) of cardboard tokens, with seven

being sellers (four of whom were assigned to be members of the co-op and three were not), and three buyers.

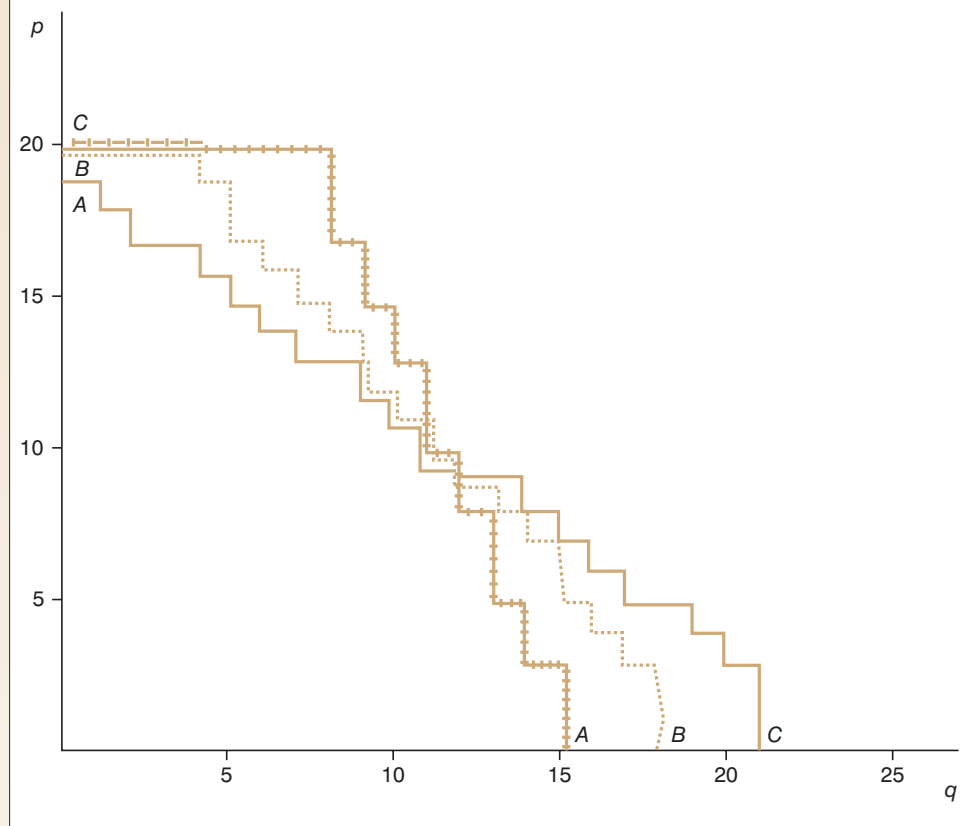
As Burns *et al.* (1989: 17) note: “It has been generally established in the experimental literature that seven competitive subjects will generate competitive, “large number” results whilst three will approximate oligopolistic behaviour. The laboratory numbers were designed to reflect the field reality.”

The buyers were given schedules showing the price which would be received from the experimenter for successive units purchased. Buyer profits were the difference between the resale values and the market price paid. The start of each trading season represented a grape season and each seller was given a number of tokens. Sellers’ costs were assumed to be zero, the logic being that variable cost in grape growing is small and fixed costs are close to zero. Hence the selling price is pure profit.

As co-ops are required (as in real life) to accept all grapes offered to them for sale by their members, this was modeled within the institutional framework of the experiment by collecting any unsold tokens at the end of the trading session and considering them sales to the co-ops. A co-op price was determined by a co-op demand schedule (which was identical to the aggregate demand curve of the wineries) and then this price was announced before the start of the next session.

Trading sessions took place under three different settings: 1) as stated above, the so-called “neutral” condition or a free market; 2) under a minimum price condition where no deals or offers could be made at less than a stated price; and 3) under an “information exchange” situation, whereby there were no minimum prices but market information was provided for all subjects by way of a centrally located blackboard in the large classroom where the experiments were carried out. Setting 3) was used since some policy makers had argued that minimum prices were needed since without minimum prices there would be no information at all

FIGURE 1 Buyers', i.e. wineries', demand schedules "A small questionnaire administered to South Australian wineries suggested that buyers differed considerably in their price responsiveness. This was reflected in the laboratory market by assigning demand schedules of different elasticities to each of the three buyers. The buyers, however, were the same general size in that their demand was equal at the market clearing when aggregate supply equaled 77 units." (Burns et al., 1989: 17)



and this would result in sellers being grossly disadvantaged.

The experimenters found that removing the minimum price legislation did not result in growers being disadvantaged although within the growers themselves there were differences in the distribution of revenues between co-op and non-co-op members. Winery prices paid to co-op members were higher than to non-co-op members. Although average prices paid by the wineries (buyers) to the sellers (grape growers) fell quite a bit, this was compensated by a greater

volume of sales to the wineries and fewer grapes "left on the vine."

With minimum prices in operation, prices were consequently higher but the volume sold was lower. Again the non-co-op sellers of grapes bore the brunt; while the co-op members could always fall-back on selling any grapes to the co-operative wineries not sold to the private wineries, the non-co-op grape growers could not and much wine was left to rot on the vine. The results for the setting where information exchange was made available were similar to the market situation of no minimum price.

From the perspective of the buyers, however, they would clearly prefer, it would seem, to have a straightforward market situation. Table 1 shows the buyer (winery) average profits of the three buyers.

The authors conclude with a tentative recommendation that “growers in aggregate will not be much affected by the removal of minimum prices, as the lower prices will be offset by increases in sales and less wastage on the vine” (Burns *et al.*, 1989: 25)

TABLE 1 Buyer Profits¹⁹

<i>Minimum prices</i>	<i>Market institution</i>	
	<i>No minimum prices</i>	
133.30	Neutral 206.03	Information exchange 188.37

Induced Value Theory

Smith was attempting to ensure that the subjects behaved as they would if they were in an actual market situation. Smith formalized this in his notion of *induced value theory*. There are three main ideas behind this theory, which we present below. We return to the methodology of conducting experiments when we come to look at the different approaches of economists and psychologists to experimental methods.

- 1 *Monotonicity*. This states that the participants (or the subjects) in the experiment must prefer more of the reward medium than less of it and they will not become satiated. One, for example, could reward students with alcohol for participation in classroom experiments. Leaving to one side the ethical issues surrounding payment in kind with alcohol, it would not pass the non-satiation element of our definition; there is a limit to what one can imbibe and still make sensible economic decisions. The obvious medium of payment for participants is money – pounds, euros, dollars, whatever. See Application 19.2: An Explanation of Monotonicity.
- 2 *Salience*. This is the change in the reward, i.e. the change in the money received by the participant as a result of his or her actions during the experiment which are carried out within the “rules of the game” or the *institutional framework*.

For example, simply paying participants money to turn up may guarantee a good turnout to the experiment but having “earned” their money by turning up, the motivation to actively participate in the experiment as they would in a real market is diminished. If the aim of the experiment is to study competitive equilibrium, why “bust a gut” to get the best deal when there is no reward at the end of it? The design of the experiment would then fail at the level of salience.

As such, salience assumes non-satiation; that is, more is preferred to less. Put more formally, if the subject (the participant in the experiment) is given a costless choice between two alternatives which are identical except that one gives the subject more of the reward medium, the subject will always select the one that gives more of the reward medium. This assumes also that the

individual is autonomous, that is, the decisions of the subject are not influenced by other subjects (see the *privacy* condition below).

It would be better to pay the participants a proportion of money for turning up (the experimenter needs subjects to experiment on!) and then a fixed amount of money for actually concluding a deal to encourage deals to be made.

Better still would be to pay the participants a proportion of money for turning up and then to make the amount of money paid to the subjects variable; if the rule is set such that the size of the payment will depend on how good a deal is made (in the sense of maximizing consumer or producer surplus) then a seller and buyer are more likely to engage in realistic bargaining.

- 3 *Dominance*. It is an assumption in economics that individuals try to maximize their utility or well-being. Dominance states that this feeling of well-being within the experiment will be proportional to the medium of reward *and other influences will be negligible*.
- 4 *Privacy*. In some experiments, the participants have shown concern as regards the pay-off that will be received by other participants. By keeping that information private, the individual is forced, in effect, to base his or her decisions on the reward on offer within the experiment. This last point is given its own heading as *privacy* within the experimental economics literature.

As Smith (1976: 278–279) notes,

with information on each other's pay-offs, the way is open for "equity" considerations to modify self-interest choices. Sellers, believing that it is "fair" for trading profits to be shared between buyers and sellers, try to resist price decreases more vigorously than when they do not know what constitutes such a fair price.

To elaborate slightly on the question of salience, an example of the importance of institutions may help to illuminate the role of background setting when conducting experimental economics. We have already mentioned above about salience, that it is better to offer a reward which leads to mimicking the actions of the individual within the setting he or she finds themselves in. We had concluded that, "if the rule is set such that the size of the payment will depend on how good a deal is made (in the sense of maximizing consumer or producer surplus) then a seller and buyer are more likely to engage in realistic bargaining."

To demonstrate the importance of salience, consider the branch of economics called transition economics. Transition economics looks at how planned economies (mis)functioned and also the process of how planned economies under communism (the old Soviet Union for example) have moved and in some case are still moving to a market economy.

Without going into a detailed description of how an economy was planned under communism, with no product markets or factor markets, one of the major faults of such a system was the lack of incentives for factory managers to maximize output of quality. Once pre-determined targets set by a central planning ministry had been decided upon, the incentive for factory management was *not* to exceed the target since there would then be a "ratchet effect," with central planners reasoning that if a factory could achieve this year's target then there must be room to increase the target to achieve for next year. Such extra duties and responsibilities brought, in general, no substantial reward to either the factory management or to the employees of the factory – only extra work.

If an economist, even today, wished to mimic economic behavior under the conditions of centralized planning, the incentive structure for classroom experiments would

APPLICATION 19.2 *An Explanation of Monotonicity and some Calculus in Relation to Induced Value Theory*

We would encourage the reader to consult the article by Smith (1976) for his views on induced value theory. Indeed, this short application is aimed at those who have or will read his article. For those not 100% conversant with some of the mathematics used in the article, we present some of the mathematics to be encountered in his seminal work.

Following Smith (1976: 275) if the nature of the experiment is to study competitive equilibria then it is necessary to induce on participants the known demand and supply conditions. These known supply and demand conditions are, of course, known to the experimenter but not to the participants. (The whole idea of the experiment, recall, is to observe the behavior of the participants to see, through the decisions that they take, whether they move to a position of competitive equilibrium as predicted by economic theory.)

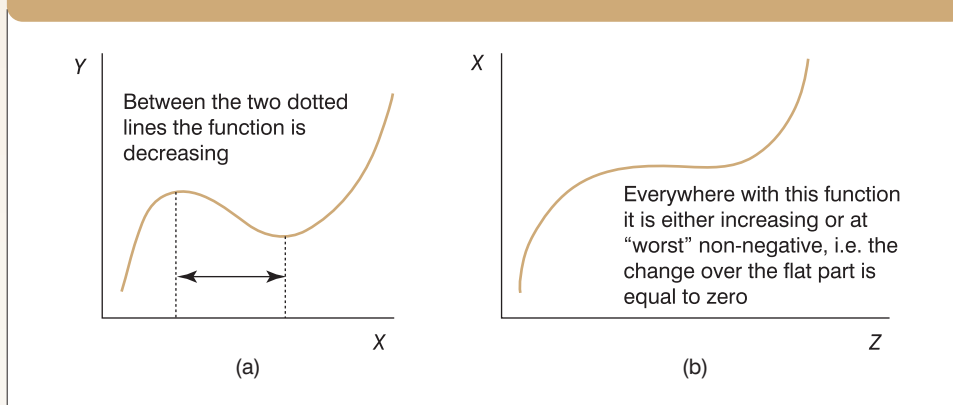
The utility from such decisions, made by subjects in experiments, are a monotone increasing function of the monetary reward, $U(M), U' > 0$. Translated into English:

- Monotone, in an everyday sense, can be defined as *sameness* or *reiteration* of something – a musical note, the pitch of a voice and so on. In

the sense used here – a monotone increasing function – it implies that the result of the function or the relationship expressed mathematically is always such that the result is increasing. For example, in Figure 1 (a) we have a relationship or function between Y and X which is not monotonic, but in Figure 1 (b) the relationship is monotonic.

- The satisfaction an individual gets from making economic decisions in the experiments depends on or is a function of the money he or she earns from such decisions (this is represented $U(M)$).
- The extra utility the individual receives from the economic decisions taken is always positive (would an individual consciously decide on a course of action that gave him or her negative satisfaction or utility?). This extra utility, from a decision which will lead to some kind of monetary reward, is referred to as marginal utility. If you differentiate (using calculus) the utility function, represented by U , then you are working out the rate of change of U for any given economic decision made by the subjects in the experiment. The marginal utility of such a

FIGURES 1(A) AND 1(B), *Non-monotonic and Monotonic Relationships Respectively*



decision(s) is represented by U' . That the marginal utility is positive (and not negative) is shown by the “greater than” sign in $U' > 0$.

Now, let the participant buyers be represented by $i = 1, 2, 3, \dots, n$. At the start of the experiments, the subjects are given a table which shows the actual money that can be had for the exchange of the tokens used in the experiment(s). For a seller, he or she will want to acquire as many tokens as possible by obtaining the highest price; for a buyer of the good in question, he or she will wish to spend as few tokens as possible such that the tokens “left over” at the end of the experiment can be traded in for actual money. The incentive for the buyer is to haggle for as low a price as possible.

Total receipts for the buyer is given by $R_i(q_i)$ where R_i is the revenue from the i^{th} good traded or token redeemed from the experimenter and the (q_i) reminds us that revenue depends on, or is a function of, the quantity of goods traded or tokens redeemed.

The instructions to the subjects, who are buyers, is such that the subject maximizes earnings from the experiment by maximizing:

$$R_i(q_i) - \sum_{k=1}^{q_i} p_k^i$$

where $R_i(q_i)$ is, as explained above, the schedule for which is in the hands of the experimenter; and $\sum_{k=1}^{q_i} p_k^i$ is the sum of the prices paid for each of the items purchased during the experiment. By keeping $\sum_{k=1}^{q_i} p_k^i$ as low as possible, the subject can maximize his or her earnings.

In general terms, if there is a market equilibrium price, the subject will pay a fixed price instead of a variable price. As such, if the subject now purchases q_i units the subject earns $R_i(q_i) - pq_i$. The subject’s utility depends on the money he or she receives. Put formally, *Utility of Money* = $UoM = \text{function}(M)$ or more simply, omitting the word “function”, and replacing it with U_i to represent the utility function of the i^{th} individual, we have $UoM = U_i(M_i)$. But the money the subject receives is given by $R_i(q_i) - pq_i$ and so we can replace the M by $R_i(q_i) - pq_i$ to give us: *Utility of Money* = $UoM = U_i(R_i(q_i) - pq_i)$.

It is an axiom of consumer choice that an individual wishes to maximize his or her utility. As such we now wish to differentiate $UoM = U_i(R_i(q_i) - pq_i)$ with respect to q_i . To understand how to proceed

from here you need to read (or hopefully re-read!) Mathematical Note to Application 15.1 on page 486 of the main text. There you will find explanations of the power rule, the product rule, and the chain rule (sometimes called the function of a function rule). Looking at $U_i(R_i(q_i) - pq_i)$ can you work out which one or more of these rules you need to use to differentiate it?

We will, of course, use the chain rule with help from the power rule. Differentiating through we have:

$$\frac{d(UoM)}{dq_i} = U'_i(R_i(q_i) - pq_i) \times (R'_i - p) = 0$$

Now let’s take that a bit more slowly and work out what we have done. Let’s divide the middle part into two parts; parts A and B.

$$\frac{d(UoM)}{dq_i} = \underbrace{U'_i(R_i(q_i) - pq_i)}_{\text{Part A}} \times \underbrace{(R'_i - p)}_{\text{Part B}} = 0$$

- For part A we have differentiated the outside function, U_i , to give us U'_i which we could also have written as $\frac{dU_i}{dq_i}$. The inside function, $R_i(q_i) - pq_i$, by the rules of calculus is “not touched.”
- For Part B, we can now differentiate the inner function of $R_i(q_i) - pq_i$ but we must recall that $R_i(q_i)$ is also a function. Revenue to the subject in the experiment depends on how the experimenter has “set up” the experiment; it may simply be that a straight one token gives you one dollar or it may be that one token gives you one euro for the first 10 tokens and thereafter you get one euro and fifty cents for each token. As such, while the power rule can be easily applied to pq_i to give us simply p (again re-read the technical appendix on page 486 if the power rule slips your mind) we write R''_i to indicate that the revenue function (the rule determining how the subject is paid) needs to be differentiated. We could also have written $\frac{dR_i}{dq_i}$ instead of R'_i .
- Finally, we set the equation equal to zero since in differentiating through, a maximum or a minimum for the Utility of Money function will be equal to zero at the point where there

is no change in the function; and where there is no change the rate of change (which is what calculus calculates!) will be equal to zero.

Note that in the article by Smith (page 275),

$$\frac{d(UoM)}{dq_i} = U'_i (R_i(q_i) - pq_i) \times (R'_i - p) = 0,$$

is simply written as, $(R'_i - p)U'_i = 0$, $U'_i > 0$ where the marginal utility of money is greater than zero by assumption.

To think about

Would you agree that it is safe to assume that the marginal utility from the decisions made by the subjects in the experiment are always going to be positive?



MICROQUIZ 19.1

As an experimenter you have just finished reading aloud the instructions to the subjects that are to take part in the experiment. You are about to say, "Begin," when one of the subjects raises his hand and asks, "Why don't we just cooperate to make more money?" How do you "deal" with a situation like this in order to ensure that the rest of the subjects are not influenced by his remark?

be *not* to have market style incentives; where they are used, incentives would be significantly different from a market economy. A payment for turning up to those students representing factory management or employees and a payment for output (regardless of quality) would be sufficient.

Payments to participants in our classroom experiment (of, say, so many students as factory managers and some as employees) would not be tied to the size of output or more importantly the quality of the output since in general such incentives were absent from the institutional setting of planned or command economies under the old communist regimes. Failing to take this into account would lead to biased results in experiments design to observe and study individual behavior under communism within the economy.

Public Goods

Chapter 18, Externalities and Public Goods, of the main text takes up the issue of the free rider problem (page 584) in relation to public goods. A public good, recall, has the property that it is both non-exclusive (individuals cannot be excluded from the consumption of the good or service) and non-rival (one person's consumption of the good does not prevent another person from consuming it; more formally, an extra unit of output can be produced at zero marginal cost). The free rider problem arises when individuals realize they can get the benefit of the good or service without the need to pay for it.

For example, in some workplaces individuals will decide not to join a trade union or a professional association despite the fact that the union or association negotiates on behalf of *all* employees in the workplace. Individuals who decline to join and pay the monthly membership dues to the union or association will still receive any wage increase negotiated between the employer and the union. Though non-membership is often seen as a democratic right not to join and the motives of those not joining may be sincerely held (and for a variety of reasons), the members often perceive it as free-riding – non-members don't contribute to the union upkeep but still receive the benefits of membership. An obvious problem with this example is that if economic theory predicts that the optimal outcome from the perspective of the individual is to free ride, why doesn't union membership simply collapse as more and more union members decide to free ride? See Application 19.3: Economists free ride, does anyone else? where the notion of *threshold* or *provision* points can help explain, in part, this example.

Many experiments have been conducted to try to work out under what circumstances the free rider problem can be overcome. The usual situation is for subjects, in isolation from one another, to be given tokens. They are then offered a choice – an investment into a private good or into a public good. The subject divides his or her allocation of tokens between the private and public good. The private good gives a higher personal return to the subject compared to investment in the public good which gives a return to all subjects.

This institutional set-up is both non-rival (one subject receiving a benefit from the public good does not prevent anyone else from receiving the benefit) and non-exclusive (if the subject does not invest in the public good then (s)he still receives a return from those who have invested).

The Nash equilibrium outcome (see chapter 6, Game Theory, of the main text and page 167 in particular for an explanation of Nash equilibrium) predicts zero investment by the subject in the public good; the incentive is to “free ride” – take the benefits but invest in the private good where there is a higher return, even though, like the Prisoner’s Dilemma game (page 167 of the main text), everyone would be better off if they cooperated together and everyone contributed to the public good.

Initially the experiments were confined to one-off games but more and more the games were repeated to see if the subjects would learn from previous rounds. In addition, variations on the game were played by having small groups or large groups; varying the return to the group through the public good; having all subjects as males or as females to see if gender plays a role in decision making; no confidentiality among subjects; the use of threshold or provision points and so on. In virtually all cases privacy is kept such that each subject does not know how the other subjects have decided to invest.

Alm and Jacobson (2007: 139) usefully summarize the findings from several studies. Although some findings can appear to be contradictory, nevertheless, some “stylized facts” appear to have emerged.

- Many subjects do contribute to a public good, sometimes in significant amounts.
- There is substantial variation in contributions.
- At least initially, subjects contribute halfway between the Pareto efficient level and the free-riding level. (See chapter 12, General Equilibrium and Welfare, of the main text and in particular page 360 for an introduction to Pareto efficiency.)
- Contributions decline with repeat plays of the experiment using the same subjects.
- Individuals can change the way they contribute from round to round depending upon how the experimenter designs the experiment. For example, higher contributions are forthcoming if there is face-to-face communication between subjects; there is a larger group size; a higher marginal return on the group investment; and a larger individual endowment, that is the subject has more tokens to start the game with.



MICROQUIZ 19.2

You are a subject in an experiment where you are given an income at the start of the experiment. You are told that you must report your income to the “government” (another person in the experiment) who will tax it at a specific rate of 25 percent. The government does not know your income. Further, at the end of the experiment you will be able to keep the income that has not been paid to the government in the form of taxes. A certain percentage of subjects will be “audited.” That is, you have a certain percentage chance, say, that the auditor (another person in the experiment) will check your original income and the tax that you *should* pay. The auditor will look for any discrepancies between what you should pay and what you actually have paid. Fines equal to a certain percentage of your tax liability will be levied if you are caught underreporting your income to the government.

What would you do in this situation? Would you fully disclose all your income and pay all taxes due? Or would you underreport your income to pay less tax hoping to keep more money for yourself at the end of the experiment? If you underreport your income, how is this a form of free riding?



APPLICATION 19.3 *Economists free ride, does anyone else?*

The title of this application takes its name from the article of the same name by Marwell and Ames (1981) which has become somewhat of a classic in the field of public economics and experimental economics itself.

The authors consider two versions of the free rider hypothesis: the “weak” version which states that voluntary contributions will be sub-optimal; and the “strong” version which argues that almost no public goods at all will be provided through voluntary donations. Marwell and Ames set up an experiment, the institutional design being deliberately such as to *encourage* the probability of free riding.

To simulate investment in a public good, subjects were provided with tokens which had to be invested in one of two “exchanges”: The “group exchange” or the “individual exchange.” Tokens invested in the individual exchange earned a set amount, regardless of what other subjects did, and would be worth roughly one cent per token. The group exchange, however, paid its cash earnings to all members of the group by a pre-set formula, regardless of who invested.

The subject received a *share* of the return on his own investment in the group exchange (if any), and also the same share of the return on the investment of each of the other group members. Thus the group exchange provided a joint, nonrival, nonexcludable, or *public* form of payoff. What made the group exchange a public good when compared with the individual exchange, was that it was possible to have the group exchange return substantially *more* than the fixed amount set for the individual exchange.

(Marwell and Ames, 1981: 297)

So while the individual exchange might return one cent for every token invested, the group exchange, in one experiment, returned 2.2 cents to the group for every token invested. Therefore everyone would be better off if all the group’s resources were invested communally into the group exchange but,

of course, an individual would be better off still if (s)he invested in the individual exchange hoping that everyone else would invest in the public exchange. If every individual were to think along the latter lines, then no public good (the group exchange) would be provided and the strong version of the free rider hypothesis would be supported.

Contrary to what might be expected from the strong version of the free rider proposition, the researchers found that people voluntarily contributed between 40 and 60 percent of their resources to the provision of a public good while keeping a meaningful amount of their resources for private investment. The authors took this as evidence in support of the weak version of the free rider hypothesis.

The experimenters carried out twelve experiments in all, varying the institutional set-up slightly each time to see how sensitive the results would be to such changes. With one exception (to which we turn shortly) each experiment corroborated one another in terms of the general results. Briefly, we explain their first and third experiments and refer the reader to the (very readable) paper for the details of the other experiments.

Sixteen male and sixteen female high school juniors and seniors were selected to perform in the experiment. However, subjects were told they were part of an eighty-strong group of high school students all of whom were making similar economic decisions. Each subject received 225 tokens which they could invest individually (for which they earned one cent) or collectively in the group exchange. The payoff for the group exchange is shown in Table 1 under the heading ‘Study 1’.

The mean investment by subjects in the group exchange was 42 percent of available resources (or 93.8 tokens). The experimenters conclude that given the “depersonalized, profit-orientated, full information nature of the experiment, the strong free rider proposition did not appear to predict behavior accurately” (Marwell and Ames, 1981: 299).

In their third study they looked to see if threshold or provision points made a difference. It may be that public goods in small amounts are not seen as

valuable or worth receiving; only when the public good is more substantial will individuals value it more. Hence public goods may be “lumpy” in nature. As Marwell and Ames put it (1981: 301), “For example, 49% of the workforce joining a union might just as well be 4.9% – in neither case does the union get bargaining power, recognition, or a contract.”

As can be seen from Table 1 under the heading ‘Study 3’, the threshold or provision point here is 8,000 tokens. Again this study confirmed the first study (and the second, not reported here) with 51 percent of resources being invested.

The one study, which was virtually identical to the first experiment, differed markedly from the other eleven experiments in terms of the results obtained. This was the only experiment to give some support to the strong version of the free rider hypothesis.

In terms of the experimental design, the major difference was in the subjects used; in this study all the subjects were first-semester graduate students in economics at the University of Wisconsin. Economic graduates contributed only 20 percent of resources to the group exchange and as such they were the most likely group of people to free ride! Out of the thirty-two students who participated, “Interestingly, when questioned later, only two of the graduate students could specifically identify the theory on which this study was

based. As first-year students they had yet to reap the full benefits of the remarkable education assuredly to be theirs” (Marwell and Ames, 1981: 306).

To think about

- 1 What weaknesses, if any, can you see in the experimental design which might possibly undermine Marwell and Ames’ results that contradict the strong version of the free rider hypothesis? (Hint: Marwell and Ames themselves acknowledge some weaknesses. See their paper and page 308 in particular for their views on the weaknesses of their own experiments. Try to work it out for yourself first without looking! Also see Kagel and Roth (1995) and pages 130 to 141 for a detailed discussion of this experiment and the responses from economists that it provoked.)
- 2 What role, if any, do you think the concept of “fairness” played in the results obtained from these experiments?
- 3 Can you explain the apparent contradiction that students of economics behaved in a manner which showed they “supported” the strong version of the free rider principle, but then did not know the economic theory (of free riding) underlying the experiment?

TABLE 1 Payoffs from Group Exchange, Study 1 and Comparable Condition in Study 3

	Study 1		Study 3	
	Total money earned by the group is	How much money you get (1.25 cent of each group dollar)	Total money earned by the group is	How much money you get (1.25 cent of each group dollar)
0 and 1999 tokens	\$0.00	\$0.00	\$0.00	\$0.00
2000 and 3999	044.00	0.55	014.00	0.18
4000 and 5999	088.00	1.10	032.00	0.40
6000 and 7999	132.00	1.65	054.00	0.68
8000 and 9999	176.00	2.20	320.00	4.00
10000 and 11999	220.00	2.75	350.00	4.38
12000 and 13999	264.00	3.30	390.00	4.88
14000 and 15999	308.00	3.85	420.00	5.25
16000 and 17999	352.00	4.40	440.00	5.50
18000	396.00	4.95	450.00	5.63

Discrimination within the Labor Market: The use of field experiments

Though not covered in the main text, the area of discrimination within the labor market is potentially rich for investigation using experimental methods with a slight twist compared to what we have been discussing up to now. The twist is that the experiments in many cases needn't necessarily take place in a classroom (although they can) but out in the "field." By field we mean in the actual, real-life labor market using economic agents who interact with the experiment in their "natural setting".²⁰ (We come to discrimination within product markets and how to conduct experiments for such discrimination shortly.)

Before looking at the mechanics of how such experiments are carried out, a little theory may be in order. Chapter 9, Profit Maximization and Supply, demonstrated that profit-maximizing firms will make input decisions such that the firms will keep hiring any input up to the point where the extra revenue generated by hiring the last or marginal input unit just equals the extra or marginal cost of the unit of input. Chapter 15, Pricing in Input Markets, developed this idea by looking at marginal productivity theory of input demand. In short, if we focus on labor, the unit of labor will be paid a real wage equal to the marginal product of that unit of labor.²¹

It follows that the wage policies of profit-maximizing firms will be determined by the productivity of the individual employee. In turn, the productivity of an employee will be determined by the "human capital" that the individual has accumulated through education and on-the-job-training; the more experienced and skilled the individual, the more human capital the individual has, and hence the more productive he or she will be. This implies that the more highly trained you are – whether through the education system or through training once you enter the labor market – the higher will be your marginal product of labor. A high marginal product of labor means that the individual will be paid a relatively high wage in comparison to those individuals with lower educational levels and work experience.²²

*The essence of discrimination – from an economic perspective it must be stressed – is that individuals with the same human capital characteristics, and hence the same marginal productivity, are paid differently for the same job.*²³

This is post-entry labor market discrimination. In some, if not many, cases even though two individuals may have the same productivity due to the same or very similar human capital characteristics, one will be denied entry to an occupation due to non-human capital considerations. This is pre-entry labor market discrimination.

This discrimination can be based on gender, sexual orientation, religious belief, age, race, ethnicity, nationality, the weight of the individual and, indeed, just about anything that can make a human being a little bit prejudiced toward someone else.

The field experiments carried out by many researchers have examined and tested for pre-entry labor market discrimination, which is before the individual has actually been offered a job. The pre-entry discrimination is tested for through what are known as *correspondence tests* and *audit tests* (also known as *situation tests*). Post-entry forms of discrimination, that is discrimination of the individual once he or she is working on the job, tend to be tested using statistical methods such as the Oaxaca Decomposition method.²⁴ Here we focus on an explanation and examples of correspondence and audit tests.

Correspondence tests use e-mails, or letters, to examine for pre-entry discrimination. How is this done? Suppose the objective of the experiment is to find out if there is any kind of discrimination against individuals with a Muslim faith. In such a case, take two (fictitious) individuals who are identical, or nearly identical, in every respect

as regards their human capital and personal characteristics: they have the same educational qualifications (but gained at different educational institutions of the same standing²⁵), they are of the same age or near as damn it the same age, they have the same amount of years of work experience in similar jobs, they both have “good looking” references that can be contacted, they have attended various training courses, their hobbies and interests are “normal,” they have postal addresses from similar neighborhoods,²⁶ they are either both single or both married, and they are of the same gender.

Now place all this information down on two CVs but with one difference: on one CV the name of the candidate is, say, Peter Smith.²⁷ On the other CV the name of the job candidate is, say, Mohammed Khan. To make the (subtle) message clearer, in the CV under the section headed “Hobbies and Activities,” Mohammed Khan’s CV contains “charity fundraising carried out at the local mosque.”

Now, search for job vacancies in the press, government job sites and so on and send off both CVs to these employers and then . . . wait. A real address will need to be placed on each CV in case an employer replies by post offering a job interview. Valid e-mail addresses in case interviews offered by this route should also be supplied.

One of four options is possible: 1) only the “English” named person, Peter Smith, is invited for an interview; 2) only the Muslim sounding named person is invited; 3) both are invited; 4) neither is invited. Depending on the response rates, statistical tests can be carried out to work out whether any difference in the response rates between the two individuals is down to mere chance or whether it indicates a more deliberate pattern of potential discrimination. In the event of an employer offering an interview it is quickly and politely declined to minimize inconvenience to the employer.

Audit tests (or situation tests as they are known in the United Kingdom) take the experiment a stage further in so far as the test here is at the level of the interview. It may be thought that if an employer or the HR department will potentially discriminate at the level of inviting an individual to the interview then what point is there in testing at the interview stage? It should be recalled that the HR department may act as a filter with little input from middle or senior management or the owner of the company. At the interview itself, it will be a selection of management and owner(s) (depending on the nature of the firm) who conduct the interview.

Focusing on firms where there may be potential discrimination, you could have discrimination at the stage of invitation but not at the actual interview or indeed vice-versa – equal opportunity and access for all qualified job candidates but discrimination at the level of the interview. It really depends on how employees are recruited – is it done by one individual (the owner of a small firm, say) or is it a multi-task procedure as more commonly found in larger companies.

It is possible to see correspondence testing as a first stage. If both candidates, a black and a white person, say, are invited for interview and the CVs make clear (subtly) that one person is white and the other black then the firm has cleared the “invitation to interview” stage.

Alternatively, if the whole intention of the experiment is to directly test for discrimination at the interview stage itself then the two CVs can be “neutral” as far as indications of minority status are concerned but as mentioned earlier very similar in terms of qualifications and work experience. Only when those conducting the interviews actually meet the interviewees at the interview is the race, ethnicity, gender, age whatever of the minority job candidate revealed. Notice that for audit or situation tests, though the CVs can still be fictitious, real people will be needed to go and take a real interview.

The above seems straightforward which, of course, it is not since the two job seekers who attend the interview need to be coached or trained such that they “come



APPLICATION 19.4 Correspondence and Audit Testing: Is it ethical or is all fair in love and war?

At this point it is worth dwelling, if only briefly, on the ethical nature of these types of experiments. Is it ethical to involve individuals in an experiment without actually informing them that they are part of an experiment? The classroom style experiments up to now have all used subjects who knew in advance what they were going to take part in. They volunteered; no employer volunteered, however, to take part in these correspondence tests. In the same way that you, as a researcher, should always seek permission from an individual before you record an interview, what advanced warning, if any, should be given to those employers looking to fill vacancies that they will be part of an experiment? Or should they at the very least be told retrospectively that they have been part of an experiment? Of course, the experimenter will contend that it is precisely because the employer does not know that makes the experiment useful in uncovering the “true” behavioral response of the subjects, that is those responsible for hiring.

Some have argued that this type of “testing the water” is not uncommon among workers in general. Employees often send out applications for jobs even though they have no real intention of going for an interview if it is offered. The idea is to see how competitive they are within the job market – do they still attract potential employers? If they do, then it may embolden them in their current job to seek higher wages or better conditions.

One may also point to local councils in the United Kingdom who use a type of experiment when testing to see if local shopkeepers obey the law in the selling of alcohol and tobacco. Council officers, known as trading standards officers, will use a teenage boy or girl aged, say, 15 to 17, to enter a shop on their own with money supplied by the council with the intent of buying alcohol or cigarettes. The point is that it is illegal to sell alcohol or tobacco to someone under the age of 18.²⁹

If the shopkeeper sells the goods in question his license to sell these goods will be revoked and he will face prosecution under the law. Given that discrimination on the basis of age, race, and gender

are outlawed in the United Kingdom, employers should “have nothing to fear” from the odd fictitious CV if they hire according to legitimate practices. Is this, however, along with the correspondence tests and audit tests, what the American legal system calls entrapment?³⁰

On the other hand, what of the job candidates “nudged off” the end of the interview list? Employers or human resource departments may draw up a list of, say, five people to be interviewed. If seven people applied for the job and the two fictitious people from the experimenter are short-listed for an interview then obviously two real job-seekers have missed out on the possibility of an interview.

Once the experimenter declines the interviews for the fictitious applicants, there is no guarantee that the two real job candidates who were not short-listed will be contacted, especially if directors, line managers and HR people need to re-assemble to confirm two new additions to the list. They may decide to see the potential of the individuals who turn up and only after the first lot of interviews, if there is no suitable candidate, will they get back in touch with the two job candidates who had been dropped to make way for the fictitious candidates. What do you think?

To think about

Rightly or wrongly, one of the most famous (or infamous) names connected with political machinations, skulduggery, and cunning is Niccolò Machiavelli (1469–527) such that now his surname is synonymous with deviousness and intrigue. To describe a politician as *Machiavellian* is not seen as a complement! One proposition put forward by Machiavelli was that “*The ends justify the means.*” That is, an act carried out and seen in isolation may at first seem abhorrent, in some cases, but if the end result is something that turns out to be beneficial for individuals or society at large then the means to accomplishing the end result were justified.

An example, that is sometimes put forward, would be the dropping of the first atomic bomb on

Hiroshima, Japan; hundreds of thousands died but, it is claimed, many more lives were saved due to the fact that American forces did not have to launch a full-scale invasion of Japan which would have cost far more lives. But, others retort, the act of using atomic weapons took warfare to a new level of barbarism which in the even longer term would have a

debasing effect on humankind in its attitude to what was normal or legitimate in warfare, leading to human losses on an even larger scale.

Naturally no-one is comparing experimental economics with the dropping of an atomic bomb! The principle is, however, very similar in terms of the ends justifying the means.

across” to the interview panel as being as similar as possible in terms of attitude, enthusiasm, responsiveness, fullness of answers, an ability to describe their (fictitious) work experience and so on. It has even been emphasized that physical appearance and personality need to be similar. Only when this has been done can one then assume that if the white person is hired but not the black then color may be an issue.

The above is difficult to achieve and indeed within the United Kingdom many experimenters have gone and do today go to the extent of employing actors to play the two roles. “We agreed with the Equity argument that a good character actor will be better at playing an archbishop than will the Archbishop of Canterbury; that is, when it comes to playing a part, an actor is more “real” than a type-cast non-actor²⁸ (Daniel, 1970: 354, cited in Riach and Rich, 2002: F483). In Application 19.4: Correspondence and Audit Testing: Is it ethical or is all fair in love and war? we kick-start an initial discussion for you on whether you believe the above techniques are ethical; they are after all, experimental techniques and all experiments run the risk – to a lesser or greater extent – of violating ethical standards.



MICROQUIZ 19.3

If you are conducting an experiment to test for discrimination in the labor market from employers, and you use the correspondence approach, what would you conclude if neither the “majority” candidate nor the “minority” candidate were invited for an interview? Would this show evidence of equal treatment and so point to non-discrimination on the part of the employer or does it show us nothing at all? Depending on your choice, what effect might this have on your reported statistics of discrimination?

Are Individuals Rational in their Economic Decision Making?

Preference reversal

Chapter 2 of the main text, Utility and Choice (page 47), describes the economic theory of choice by beginning with the idea that individuals are able to order their desires for various consumer goods in the form of preferences. Clearly, the more preference or desire you have for a particular good the more you will be willing to pay for it in comparison to those goods for which you have a lower preference. (Would you agree with that last sentence?) These preferences stem from the individual wishing to maximize his or her individual utility.³³ By utility we mean the satisfaction or the happiness which an individual will receive from the consumption of the goods or services purchased.³⁴

Within chapter 2 we explained that these preferences follow “axioms” or certain rules, which although not proved, are taken as self-evidently true. (Compare with the English word “axiomatic” meaning self-evident.) For example, the consumer is able to always decide or make a choice between different alternatives (what we called complete preferences). In addition we stated (page 51) that consumers have



APPLICATION 19.5 *Ethnic Discrimination in the Swedish Labor Market – a field experiment*

Using the technique of correspondence testing, Carlsson and Rooth (2007) tested for ethnic discrimination in the Swedish labor market. Fictitious applications with identical skills were sent to real job openings. Each application was randomly assigned a Middle Eastern or Swedish-sounding name.³¹

An innovation on their part was to also collect data on the characteristics of the firms advertising the job openings – the size of the firm by employee numbers, whether the recruiter was male or female, the economic sector of the firm, and the occupation of the job opening – and, indeed, to conduct interviews with the recruiters of each company.

Experimental data were collected between May 2005 and February 2006 by sending two applications – one with the Swedish-sounding name and the other with the Middle-Eastern-sounding name to job openings covering twelve different occupations in Stockholm and Gothenburg labor market areas. The selected occupations for the CVs varied in skill and educational requirements, from restaurant workers and shop assistants to computer specialists to different categories of teachers. A total of 1,552 employers were contacted with applications (producing a total of 3,104 applications). The applications had been listed on the home-page of the Swedish Employment Agency.

Carlsson and Rooth found that:

- The callback rate of applications with a Swedish-sounding name was roughly 50 percent higher than those with a Middle Eastern-sounding name.
- There is a negative correlation (-0.72) between the relative callback rate and the occupational skill level. This implies that there is less unequal treatment in highly skilled occupations. Carlsson and Rooth put this down to the specific nature of the jobs: a job which requires a high level of individual productivity will mean that employers are concerned first and foremost to get the right person for the job regardless of other factors (such as race, age, etc.).
- Using regression analysis, they found that for the ethnic-sounding names there was anywhere between a 6 to 14 percentage points less chance of being called for an interview in comparison with those with a Swedish-sounding name, the difference being due to the statistical manner in which the problem was examined.
- Difference in callback rates appears to also be related to the sex of the recruiter. The chance of being called for an interview is 6 percentage points lower for Middle-Eastern-named individuals when a man and not a woman is responsible for whom to call to an interview.
- If applying to a workplace with fewer than twenty employees, this lessens the chance of being called to an interview by 5 percentage points compared to applications to firms with more than twenty employees.
- Firms with high personnel turnover are more likely to call Middle-Eastern-named individuals for an interview. A rise in new hirings by 10 percentage points is associated with these firms, with a 1.3 percentage-point higher probability to be called for an interview for Middle-Eastern-named individuals compared to Swedish-named applications.

The upshot of the research is that, as Carlsson and Rooth themselves write (p. 726), “the results imply that Swedish-named applicants get called to interview three times for every ten jobs they apply to, while Middle Eastern applicants need to apply up to fifteen jobs to achieve the same number of callbacks. The impact of this differential treatment depends on the availability of jobs. Only when jobs are scarce is this effect likely to be strong.” In other words during an economic upturn there are plenty of jobs to go round and the difference in the callback rate will not be “felt” that much. However, when the economy turns sour those with Middle Eastern names will be the first to feel the effects of a downturn in the labor market.

To think about³²

- 1 The issue of discrimination in the labor market due to sexual orientation is well documented. That said, studies would seem to show that unlike other minorities, such as gay men, lesbian women receive higher wages than heterosexual women when in employment. If there is indeed discrimination against women due to their sexual orientation, what reasons can you think of that might explain why lesbian women appear to earn higher wages than heterosexual women?
- 2 In testing for pre-entry discrimination against lesbian women, correspondence tests have been used (see Weichselbaumer (2003: 633) for the design of the experiment). Four CVs were made up and, by various methods, used in testing for discrimination. Given that the experimenter is trying to compare employer-reaction between straight females and gay females why do you think four CVs would be used and not simply two? (*Hint: You need to distinguish between gender and sexuality.*)

preferences that are transitive. That is, if I prefer to go to the cinema rather than roller-skating but prefer roller-skating to hill-walking then you can conclude that I would prefer to go to the cinema rather than go hill-walking. (Not an active type of person!) Such a person, whether active or not, is nevertheless rational in their decision-making process. It is this assumed rationality that we wish to look at in this section.

Why is this important to look at? Well, in chapter 2, after assuming rationality we built on this by introducing indifference curves; brought in the income or budget constraint; and then demonstrated with these tools of analysis how the individual maximizes his or her utility. From that we went on in chapter 3 to look at how (from what we had learnt in chapter 2) we could derive a consumer demand curve. Many of our findings in later chapters also flowed from this initial innocent-looking assumption of consumer rationality. In chapter 5, for example, we looked at how consumers make choices under uncertainty and developed the model of expected utility. If the initial assumption of consumer rationality is wrong then we may at best have only an approximation to economic behavior described by our models; and at worse we may be misleading you, the reader, and ourselves!

We now look at one aspect of this which would at first sight appear to challenge this view that economists have of the consumer behaving in a rational manner. This is the phenomenon of *preference reversal*. Preference reversal is the phenomenon where in one situation A is preferred to B but in another seemingly identical or very similar situation B is preferred to A. See chapter 2, Utility and Choice, of the main text and in particular, Assumptions About Utility on page 50 for a description of transitivity. In brief, transitivity states that if A is preferred to B and B is preferred to C, then A must be preferred to C. Preference reversal has C being preferred to A!

The work of two non-economists, Lichtenstein and Slovic (1971), has now become the classic experiment to which many have responded either to confirm or deny the results of the experiment. The experiment involved two lotteries, the main difference being as follows: bet one involved a small chance to win a large prize, whereas bet two involved a small prize (if the bet was won) but with a much larger chance of winning. The first bet was dubbed the \$ bet (due to the large \$ cash prize) and the second bet was known as the P bet (after the large *p*robability of winning). The subjects are asked to state how much they value each of the bets. This should then be reflected in the choice the subjects make when asked which bet they would like to participate in: if you value one bet more than the other, then the more valued bet should be the one you wish to participate in. Correct? Wrong. The anomaly of preference reversal “takes the form of many people placing a higher value on the \$ bet, but choosing the P bet

in a straight choice between the two. The opposite disparity – placing a higher value on the P bet but choosing the \$ bet is much less frequently observed” (Loomes and Taylor, 1992: 357).

The result of this preference reversal is like a consumer deciding to buy good Y when he or she prefers good X to good Y! To give another example from the realm of public goods (cited by Loomes and Taylor, 1992: 357), when a government is deciding what public goods to provide or it wishes to weigh up the costs and benefits of various government programs, one way to estimate what programs to run or what public goods to provide is to ask the public in surveys how much they personally value the public good or program being provided.

Implicitly the value placed on the various programs on offer is seen as an index of willingness to pay. The programs and public goods with the highest willingness to pay give guidance to the government on what programs to provide and, indeed, how much to charge for them. But with the phenomenon of preference reversal it can no longer be taken for granted that what the surveys reveal is actually what taxpayers want!

Faced with this challenge to conventional economic theory from two psychologists, Grether and Plott (1979), two economists, conducted experiments with the aim of discrediting the findings of Lichtenstein and Slovic. In their own words, and speaking of the results from their experiments, they wrote (page 623):

Taken at face value the data are simply inconsistent with preference theory . . . The inconsistency is deeper than the mere lack of transitivity . . . It suggests that no optimization principles of any sort lie behind even the simplest of human choices.

See chapter 2 of the main text, Utility and Choice, and in particular, Utility –Maximization: An Initial Survey on page 59, for reading material regarding the importance of the optimization principle in economics. To give one example, and in brief, when an indifference curve just touches the budget constraint, the individual has reached the optimal point that he or she can and has consequently maximized his or her utility.

There has been (and no doubt will be) a voluminous output of experiments from experimental economists (and of experimental psychologists!) on this theme. In the author’s opinion this is not a settled issue and the reader is referred to the further reading section at the end of this chapter. That said, the reader new to this area of controversy could do a lot worse than read the one-and-a-half pages by Gravelle and Rees (1994: 6–8) on the subject area of *Rationality*. The authors answer preference reversals and other issues raised by experiments from psychologists and economists which have contradicted economists’ notion of economic rationality (without, it should be said, actually acknowledging their existence in the text). Following closely Gravelle and Rees, rational decision making can be adduced by the following rules:

- 1 The decision—maker sets out all the feasible alternatives before him or herself, rejecting any which are not feasible.
- 2 He or she takes into account whatever information is readily available, or worth collecting, to assess the consequences of choosing the alternatives.
- 3 In the light of their consequences he ranks the alternatives in order of preference, where the ordering satisfies certain assumptions (which we touched on in the main text on page 50).

- 4 He or she selects consecutively the alternative highest, that is he chooses the alternative with the consequences he prefers over all others available to him or her.

While some experiments have seemed to draw conclusions that a decision maker may be behaving irrationally, it is not always so straightforward. The most important point above out of the four is point 2. Information does not “fall from the sky”; it takes time and on many occasions money to gather information. Even when the explicit monetary costs are low there are the opportunity costs of people’s time to consider.

Given that all the information which could possibly be relevant to a decision is not readily and costlessly available, we may observe behaviour which is rational on the basis of principles [1 to 4], but may be labeled irrational by a careless observer (or one determined to prove that *homo economicus* does not exist).

(Gravelle and Rees, 1994: 7)

For Gravelle and Rees the important point they emphasize is that it is very difficult to test hypotheses of rationality by actually observing individuals as they go through the process of decision making. It is not even necessary that every single individual does act rationally by points 1 to 4 above; it is sufficient that in aggregate enough people act within the points above, and so act rationally by economic definitions, to make the theories of economic behavior relevant and applicable. From their perspective a practical test of rationality should flow from testing the predictions or hypotheses which come out of or are derived from the initial premise of economic rationality.

Smith himself gives a very nice analogy concerning rational economic behavior on the part of the individual in an attempt to explain why it is that experimental psychology seemed to have uncovered, in the words of the Royal Swedish Academy of Sciences (2002: 12), “a non-trivial amount of deviations from the traditional model of rational economic behavior.”

Smith (1991: 894) poses the question,

Why is it that human subjects in the laboratory frequently violate the canons of rational choice when tested as isolated individuals, but in the social context of exchange institutions serve up decisions that are consistent (as though by magic) with predictive models based on individual rationality?

Smith, in reply to himself, goes on to give the analogy of how children learn to speak:

Without contact with people, children do not learn to speak. If they have such contact, they learn to speak in the total absence of formal instruction. But the same can be said of decision making: I could substitute “make market decisions” for “speak” in the last two sentences and they would apply to what we have learned in the laboratory about adults. On the basis of cognition alone, without the language of the market and ongoing social interaction with other agents, rational decision is frustratingly illusive.

(Smith, 1991: 894)

In conclusion, the distinction between psychology and economics as regards the concept of rationality may fruitfully be described by way of a comparison with art,



MICROQUIZ 19.4

Without discussing with your colleagues in class or with your lecturer, which of the following bets would you select? An *H* bet with an 8/9 chance of winning €4 and a 1/9 chance of winning €0 or an *L* bet with an 8/9 chance of winning €0 and a 1/9 chance of winning €40? Secondly, what is the lowest price at which you would be willing to sell each gamble?

and in particular the school of art known as Impressionism. Impressionism was a movement in painting that started in France in the late nineteenth century. Emphasizing the overall effect rather than the detail, the Impressionists worked with very short, broken brushstrokes. If you have ever gazed upon a painting by one of the Impressionist masters, such as Monet, Sisley, Morisot, or Pissarro (as opposed to a printed version in a book), then you will notice that the overall effect the artist is trying to convey is better viewed at a distance. A psychologist viewing the work would stand fairly close to observe the detail of the painting. In standing so close, however, he or she (correctly) observes that the brushstrokes are unfinished, lack detail, and the paint is everywhere densely textured to the eye; not much can be gleaned from what the

artist has intended to convey to his or her viewing public: such irrationality on the part of the painter!

The economist, however, is, like the artist, more concerned with the overall impact on the eye and so stands back to perceive the effect or the outcome which is only observed at a distance. He or she too also perceives correctly and concludes that the painter must indeed be rational to convey such deep feelings of light.

Rationality and irrationality are two sides of the same coin and how one perceives these two interconnected concepts is probably down to the perception on the individual as much as any objective set of criteria.

Willingness to pay (WTP) versus willingness to accept (WTA): Endowment effects, framing effects, loss aversion – a challenge to economic theory?

A columnist in a British newspaper once noted that the Chinese population in the 1950s and 1960s would never go into revolt over the fact that they “only” cycled around, for the most part, on bicycles and did not have access to motor vehicles. However, take those bicycles away and it would be a different matter.³⁵ Likewise today in China, if economic boom turns to bust, the fury of the new middle classes at losing their cars would probably exceed the discontent felt by many who have yet to possess a car; even when referring to relations between people one might say that a love lost is more painful than a love never gained.³⁶

The above are examples of what psychologists would call endowment effects.³⁷ Like many issues uncovered by experimental economists and psychologists, it remains unclear to what extent these present a major challenge to economic theory. Economic theory would say that a person’s willingness to pay (WTP) for a good or service should be equal to his or her willingness to accept (WTA) compensation to go without the good or at worse there would be a negligible difference. Many experiments from experimental psychologists have, however, shown that there can be a gap between what the individual is WTP and what he or she is WTA, with the WTA usually about twice the size of the WTP. If, indeed, WTP and WTA are different then this could have implications for areas of economics such as cost-benefit analysis. How do you weigh up all the benefits and costs for a new government project (for example a new runway at a major airport) if what individuals declare as their monetary value of losing peace and quiet is actually different from what they would be prepared to pay for it by moving elsewhere? Which monetary value do you select?

The endowment effect or reference effect, first identified by Thaler (1980), says that once a person comes to possess a good, it is immediately valued more than before it was possessed. The good passes into part of the individual's reference set, the implication being that he or she will then make any future decisions (on what to buy and sell) based on what they already have. That individuals should value the loss of a good or service higher than the acquisition of the same good is closely linked to loss aversion and framing effects. Loss aversion, to give a simple example, says that losing €100 will result in the loss of more satisfaction, happiness, utility (call it what you will) than gaining €100.

Framing effects refer to how the question or the issue of buying and selling is posed. For example, which of the following sounds more reasonable or moderate in their stance on pay – the trade union or the employer? “The trade union at the factory demanded a 5 percent pay rise; management has offered 2.5 percent.” or “The trade union at the factory has offered to accept a 5 percent pay rise; management has demanded they accept 2.5 percent.”

Words are powerful! How they are combined leads an individual down a certain route toward drawing particular conclusions. The example often quoted (and we will follow this trend) is the so-called Asian disease, where participants in an experiment, first carried out by Tversky and Kahneman (1981), are told that the health authorities in the United States are expecting an Asian disease which is expected to kill 600 people. One set of participants is presented with the choice of two health programs:

- 1 Program A will lead to 200 people being saved.
- 2 Program B will lead to a one-third probability that 600 people will be saved, and a two-thirds probability that no-one will be saved.

Note that the expected outcome from program A is 200 people being saved and the expected outcome from the alternative program is that $(\frac{1}{3} \times 600) + (\frac{2}{3} \times 0) = 200$ people will be saved – in other words the expected outcomes for each program are identical. Despite this, 72 percent of participants preferred program A.

A second group of participants were presented with:

- 1 Program C will lead to 400 people dying.
- 2 Program D will lead to a one-third probability that no-one will die; and a two-thirds probability that 600 will die.

Again the expected outcomes for program C and D are the same, but 78 percent preferred program D with the remainder preferring the other program. If you look at each program carefully, then programs A and C are effectively the same and B and D are the same. Therefore, if A is preferred to B then C should be preferred to B (since A and C are effectively the same). And if C is preferred to B, then C should be preferred to D (since B and D are effectively the same). But, of course, from the experiment they are not! This is another example, of preference reversal which we have touched on earlier.

An early experiment by Kahneman *et al.* (1990) tested for the presence of endowment effects. Mugs, worth roughly \$5, were given randomly to one group of students while another group did not receive the mugs. The two groups were allowed to bargain with one another to see if the buyers (those without mugs) could buy the mugs from the sellers (those who had been given the mugs). The potential buyers consistently placed a lower median buying price on the mugs than the potential sellers by as much as two-to-one.

The results of their experiment (and others) have far-reaching implications for economic theory. In chapter 2 of the main text, *Utility and Choice*, we looked at indifference curves (page 52 onwards). Indifference curves, recall, do not cross; this would violate the axiom (rule) of transitivity. The presence of an endowment effect or reference effect is such that,

Contrary to the assumptions of standard economic theory that preferences are independent of entitlements, the evidence presented here indicates that people's preferences depend on their reference positions. Consequently preference orderings are not defined independently of endowments: good A may be preferred to B when A is part of the original endowment, but the reverse may be true when initial reference positions are changed. Indifference curves will have a kink at the endowment or reference point . . . , and an indifference curve tracing acceptable trades in one direction may even cross another indifference curve that plots the acceptable exchanges in the opposite direction.

(Kahneman *et al.*, 1990: 1344)

In chapter 18, *Externalities and Public Goods*, we looked at the Coase theorem (on page 570). In the presence of public goods (for example common fishery grounds) and the absence of transaction costs, if property rights are randomly allocated for the ownership of such fishery grounds, negotiations or bargaining between those who own the grounds and those who wish to access them for fishing should produce an efficient outcome that satisfies both parties while recognizing the true social costs involved in the fishing of the grounds and not simply the private costs of doing so.

Again, in their own words (p. 1345),

Endowment effects can also be observed for firms and other organizations. Endowment effects are predicted for property rights acquired by accident or fortuitous circumstances, such as government licenses, landing rights or transferable pollution permits. Owing to endowment effects, firms will be reluctant to divest themselves of divisions, plants and product lines, even though they would never consider buying the same assets; indeed stock prices often rise when firms give them up . . . the prediction [from endowment or reference points – PL] is not an absence of trade, just a reduction in the volume of trade.

The point is that the efficient outcome predicted by the Coase theorem will be heavily influenced by the initial allocation of property rights. So the game is up! Let's abandon all that nice, elegant, economic theory that you have been taught and learnt in your undergraduate microeconomic classes? Not so fast! As mentioned above the issue is far from settled.

Reviewing the literature, Plott and Zeiler (2005) come to the conclusion that there is no consensus regarding WTA–WTP gaps; some experimenters have observed it while others have not. They do not dispute that there are gaps or that they can be replicated. Rather they dispute, through their experiments, the interpretation of the gaps observed and conclude that “the observed WTP–WTA gaps do not reflect a fundamental feature of human preferences. That is, endowment effect theory does not seem to explain the observed gaps” (p. 542). A total of thirty-nine different reported studies of experiments carried out by various

researchers over the period 1984 to 2002 is given by Plott and Zeiler (2005: 533).³⁸ Out of the thirty-nine, twelve report no gap found while the rest, twenty-seven, report a gap.

Now although we have attempted to give general principles as to the methodology of how to conduct experiments within economics (Smith's induced value theory) and, indeed, below we outline in some detail the differences in methodology between experimental psychologists and experimental economists (from the perspective of economics), the actual mechanics of conducting class-based experiments can vary quite widely. It is this variability in how experiments have been conducted that lead economists to believe that the so-called endowment effect which is put forward as one of the reasons for the WTA–WTP gap is not a part of the everyday preferences of economic agents. In Application 19.6: A Few Differences in Experimental Techniques, we outline some of the differences in the way in which the experiments surveyed by Plott and Zeiler were conducted.

Why are these differences important? It may well be that different procedures for conducting experiments can lead to subject “misconceptions,” to use the word of Plott and Zeiler. By misconception is meant confusion which by implication can lead to an individual subject reporting WTA and WTP valuations different from what he or she would do in a real market environment.

These misconceptions are not developed into any kind of theory by Plott and Zeiler but they do speculate about possible reasons why these misconceptions arise. They give three reasons: Firstly, when using the BDM procedure (see Application 19.6: A Few Differences in Experimental Techniques for an explanation of the BDM technique) participants don't behave as they should! “Some subjects do not realize that overbidding (underbidding) in the buying (selling) task exposes them to a loss (if the price falls between the true valuation and the bid). Other subjects do not realize that underbidding (overbidding) in the buying (selling) task exposes them to an opportunity cost of a foregone profitable transaction” (footnote 15 of Plott and Zeiler, 2005: 540).

Secondly, and in their words, “In some cases subjects do not understand statistical independence” (footnote 15 of Plott and Zeiler, 2005: 540). This is referring to the random price during the experiments where, apparently, some participants think they can guess the outcome or that past random prices are a guide to future random prices.³⁹ “Experience seems necessary for subjects unfamiliar with random devices to incorporate true notions of randomization and the nature of probability” (Plott and Zeiler, 2005: 540).

Thirdly, when lotteries (as opposed to tokens which can be redeemed for money) are used in the experiment and subjects have to value what they would pay to take part in the lottery, this involves working out what the expected value of the lottery is: *a one-third chance of winning this but a two-thirds chance of losing that, therefore if this is what I can expect to win I should pay no more than this in order to take part* would run the logic. Unfortunately the concept of expected values, and hence the ability to work out expected winnings (or losses) is beyond the ken of some subjects. The above point in some respects merely confirms the observations of the “Asian disease” scenario outlined above.

By incorporating all of the different experimental methods into their own experiments, Plott and Zeiler controlled for or took account of the different techniques that have been used by various experimenters, such that if they were to find a gap between the WTP and the WTA then it must be genuine and not related to the experimental technique used.

Having incorporated the various techniques into their experiments, Plott and Zeiler report that the WTP–WTA gaps observed are sensitive to the experimental



APPLICATION 19.6 *A Few Differences in Experimental Techniques*

We list the differences in experimental techniques below which Plott and Zeiler (2005) controlled for.

- Explanation of optimal response. In some cases experimenters would explain to the subjects the main features or purposes of the mechanism they were using in an attempt to bring forth true, optimal valuations of the good being traded – potentially or otherwise. The level of detail, however, varied significantly, with some experimenters describing the situation in very general terms while others would give numerical examples.
- Practice rounds and payment. Some experiments give the subjects practice rounds before embarking on the “real” experiment while others do not. In some cases practice rounds were provided but not paid for but others were paid for. Some studies paid a small subset of the subjects or a small subset of the rounds. In some experiments the data from all rounds – whether practice or not – was used to calculate the WTA–WTP gap.
- A major issue for economists is whether the method used to elicit valuations of goods being traded is incentive-compatible. You do not simply go up and say, “What is this worth to you?” but you need to set up your experiment in such a way that the subject reveals his or her true valuation of the good. (This ties in with the concept of salience which has been raised already.) Some experimenters do use incentive-compatible mechanisms, others do not.

There are various incentive-compatible mechanisms which the various studies exploited: the Smith auction; binary choice designs; sealed-bid one price auctions; double auction call markets; Vickery auctions; and the Becker, DeGroot, Marschak (“BDM”) mechanism; with the first being the least and the last being the most incentive-compatible.

We do not explain all methods here but the BDM method is fairly well used in the literature

and as such it warrants a brief explanation.

“The BDM mechanism pits each seller and buyer against a random bid. All sellers stating bids lower than the random bid sell the good, but receive an amount of money equal to the random bid. All buyers stating bids higher than the random bid buy the good, but pay an amount of money equal to the random bid. Sellers who bid higher than the random bid, and buyers who bid lower than the random bid do not transact” (footnote 9 of Plott and Zeiler, 2005: 536).

By way of example, take a subject in an experiment who is a seller of a coffee mug. He or she values it at €10 but declares their valuation to be €15 in the hope of making “excess profits.” If the random price is between €10 and €15, the seller will not have a chance to sell and make €10 which is what they really value the mug at. (Since a random bid below the declared valuation means the sale does not proceed.)

If they, for whatever reason, declare their “true” valuation to be €5, say, then if the random bid is over €5 but below €10, this will result in a transaction but also a loss to the seller. The same points apply to an overvaluation of €10.02 and an undervaluation of €9.98 on the part of the seller. Only when the subject declares his real, true valuation to be €10 will the subject (who in this case is the seller) avoid either not getting a sale or avoid selling at a loss. See Review Questions and Problems for the case of a subject who is a buyer.

- In addition, the method of measuring the gap varies. In the experiments surveyed by Plott and Zeiler some experimenters looked at the difference in the number of trades from what economic theory predicted and the actual number of trades. Other researchers measure any gap using the mean or median of actual WTP and WTA responses.

procedures used. “By implementing different procedures, the phenomenon can be turned on and off” (page 542) and consequently the WTA–WTP gap is not consistent across experiments and a feature of everyday preferences by consumers. As well as looking at some of the theoretical implications from the results of various experiments between experimental economists and experimental psychologists, we also need to look at some of the methodological differences in more detail. It is to this we now turn.

Experimental Economics and Experimental Psychology – Methodological differences

Recall that Daniel Kahneman comes from the field of psychology and not economics. The branch of psychology which has most closely been linked with the study of human behavior and how such behavior impacts on economic decision making is cognitive psychology.

We have actually already begun to look at the differences between economists and psychologists when we looked at the concept of *rationality*. The cognitive psychologist would emphasize how decisions taken depend as much on the surroundings and circumstances that (s)he finds himself in, at the time the decision is to be taken, as on any future knowledge of possible outcomes. In this section, however, we examine some of the major differences between experimental economics and experimental psychology in terms of the *methodological approach*.⁴⁰

Incentives

Incentives to subjects participating in experiments are important to experimental economists. We have touched on this already when discussing induced value theory and in particular the concept of salience. It tends to be the case that within experimental psychology, flat fees are paid for student participation. Experimental economists want to ensure that the pay-offs from any decision made reflect the underlying theory being tested.

Economists see the need to mimic the market or more accurately to mimic the incentive structure in the market. Economists do not deny the existence of other incentives within the market – power, prestige, the wish to do some good for your fellow man and so on – but these are *conditional* on the drive toward maximizing the utility of the individual, be that of a consumer or producer. Psychologists, according to Friedman and Sunder (1994), are more casual about defining a clear incentive structure within an institutional framework. “The admonition to subjects to ‘do their best’ is acceptable” (p. 133).

Secondly, the payments subjects receive should compensate them for their time and for the “thinking costs” they incur during the experiment. This would imply that for non-student subjects, the opportunity cost of the subjects (their foregone wage) should be paid as a minimum.

Sometimes the cost of this can be reduced by telling participants *in advance* that only one round will be paid for (if the experiments are repeated) which will be chosen at random. Apart from reducing the cost of running the experiment this also reduces what are referred to as “wealth effects” or “income effects.” If subjects can accumulate money in every round an experiment is run, their behavior may alter as they can become blasé in their decision making, knowing they have money “to burn.”⁴¹ This is sometime also referred to as “house money effects,” as the money

from the experimenter might be more freely spent by subjects in an experiment than money from their own pockets.⁴²

Croson (2005: 136) concludes,

My recommendation to psychologists who want economists to use their work and to cite their results is simple – pay your participants. And pay them not a flat fee, but an amount contingent on their decisions.⁴³

The areas of interest

One of the main differences is the setting in which the individual is placed. The psychologist is interested in how the individual processes the information (s)he receives internally through the mental working of the conscious and unconscious mind through processes such as categorizing, memorizing, and remembering. The economist is interested in how the individual behaves in the setting of the market as an institution.

Psychologists generally prefer to study behavior in the absence of such institutions, apparently in the belief that they will observe the fundamental human cognitive or social processes more clearly in less constrained laboratory environments.

(Friedman and Sunder, 1994: 132–133)

That said, the reader should not confuse the above with context-neutrality. While incentives through appropriate pay-offs should be in place to mimic the market institution under study, the experimental economist will give as little information to the subjects as possible regarding the purpose of the experiment. Participants are not told they are providing a public good as they are in many psychology experiments; if the theory being tested is meant to apply generally, then giving the subjects context can possibly “channel” them down a particular road of thinking.

Context in an experiment can also add what is known as “demand effects.” For example, if the goods or services in a market experiment (to test for equilibrium) are specified as economic bads (see page 58 of the main text) then how a subject behaves in terms of prices that are offered or accepted will be influenced. Better simply to say good A or good B. “For psychologists who want their work to be accepted by economists, the use of context is not as serious a methodological deviation as lack of incentives. However . . . (*psychologists*) . . . need to argue that the results (*from psychological experiments*) are not being driven by the particular context chosen” (Croson, 2005: 137; words in italics added to enhance meaning of sentence).

What comes first: the chicken or the egg? A case of HARKing up the wrong tree?⁴⁴

As has been mentioned above already, one of the main driving forces for conducting experimental economics is to test actual pre-existing theories or to contrast and compare two or more economic theories. It tends to be the case in experimental economics that *the experiment springs from the economic theory or theories which already exist*. In psychology, in many cases, *new theories can spring from experiments* which seem to better describe or explain the results of the experiment carried out; if the results of a new experiment appear to contradict an existing theory then a new theory that can explain the results of the new experiment will be in a strong position to gain credence and widespread acceptance if and until a new experiment discredits it.

In reality, of course, any good (social) scientist will or should pursue an iterative or helical process of research: testing pre-existing theories in experiments and perhaps modifying the theory in the light of the results from the experiment, only then to return to the field of experiments later to test whether the modification made to the theory is backed up by the results from a new experiment taking the theory to a new and higher level.

Tied in with the above is the issue of HARKing. HARKing stands for *hypothesizing after the results are known* and “is defined as presenting a post-hoc hypothesis (i.e. one based on or informed by one’s results) in one’s research report as if it were, in fact, an a priori hypotheses” (Kerr, 1998: 196).

Translating the above into lay terms in relation to the preceding discussion, economists through their body of theories establish a hypothesis or hypotheses (an educated guess or guesses) as to how an aspect of economic behavior should operate. The experiment tries to test for this hypothesis. Results generated from such an experiment will be the basis of discussion and ultimately recommendations. The results may either support or not support the hypothesis that had been put forward *before* the experiment took place (and on not a few occasions may even be inconclusive). HARKing, in effect, is giving the impression that the researcher “cleverly” thought of a hypothesis before the experiment which was subsequently confirmed by the results when in actual fact this was not the case.⁴⁵

You can often spot *possible* HARKing when, in the preamble of a journal article, the author(s) write, “One would anticipate in advance that X or Y will occur.” And then lo and behold, X and maybe even Y do occur. If you are knowledgeable about the theory upon which the research is based you may, indeed, be able to see the logic of the argument advanced but if the anticipated effect does not seem to flow from the existing theory one might suspect that HARKing is afoot.

According to Croson (2005: 144), who cites a study by Kerr (1998: 200), 156 researchers in social psychology, clinical psychology and sociology were asked how many times they had observed some form of hypothesizing after the results were known. Responses indicating that this had been observed in one form or another ranged from 32 to 48 percent. Croson on the basis of her experience as an economist asserts that this happens much less frequently within the economics profession.

Subject pools and deception

The use of students from the course that the experimenter lectures on is usually avoided. According to Croson (2005: 137) this is “common practice” among experimental psychologists. Why is this a “no-no” from an economist’s perspective? The use of economic students would create *demand effects* whereby the students (at least those who have been paying attention in class!) who already know or have guessed the theory that is about to be tested will, even unconsciously, behave according to their training/education. The vast majority of economic agents “out there” have not had economic training and they are more reliable when it comes to behaving and making decisions such that they are more representative of economic agents at large. The use of economic students in economic experiments, or psychology students in psychology experiments for that matter, introduces selection bias. We touch on this at the start of this chapter.

For psychologists who want their work to be accepted by economists . . . recruiting participants from across the university is a relatively painless way to avoid selection biases that may result from using only students in psychology courses, and demand effects from using one’s own students as participants in experiments.

(Croson, 2005: 139)

With regard to deception, one of the strictest rules is that you do not deceive your subjects before, during, or after the experiment. This applies whether it is about the purpose of the experiment, the pay-offs to participants, or anything else. For example, if subjects are told they will be paid by results but then are paid a flat-rate fee, then you have lost the trust of the subjects which may lead them to change their behavior in future experiments.

“In contrast, psychology experiments often deceive participants about the purpose of the experiment, the payoffs that will be earned and the existence (or nonexistence) of counterparts.”⁴⁶

(Croson, 2005: 139)

The preceding sections may have unintentionally given the reader the view that the conflict is experimental economics versus experimental psychology; not quite “Alien vs. Predator” but a serious confrontation of sorts. Well, to give the classic economist’s answer: yes and no. Smith (1991: 878) himself does not see it in this black and white fashion but does see a “third way.” The yes part, in terms of methodological and theoretical differences (preference reversals for example), has already been stated above; the no part is Smith’s third way which sees the large body of results from experimental psychology used to further “deepen the concept of rationality and simultaneously increase consistency between the observations and the models” (Smith, 1991: 878). We leave that, however, to the reader to pursue further with his or her own reading.

One may consider, if it is helpful, the distinction between experiments on animals in a laboratory and examination of animal behavior in the wild. Naturally, one is aware that animals have no say or choice in whether they wish to be part of an experiment in a laboratory, unlike many students at universities who volunteer for participation. Leaving that important difference to one side, one wouldn’t use the same methodology to study animals in the wild as one would in a laboratory. In the laboratory, there is a great deal of observation and intervention with the animals whereas in the wild they tend to be simply observed with limited intervention into their natural habitat. The analogy is not meant to be perfect; merely to indicate that dependent on the setting of the phenomenon to be considered, this will dictate the appropriate methodology.



MICROQUIZ 19.5

When we discussed field experiments within labour economics earlier in the chapter, we discussed whether the ends justify the means with regard to the deception perpetrated on employers through audit and correspondence testing. Yet in the discussion on the methodological differences between experimental psychologists and experimental economists we stated that the lack of deception on the part of economists was one of the defining features between economists and psychologists.

How do you explain or justify, if at all, the apparent contradiction on the part of economists between ruling out deception in the classroom and seeing it as acceptable in certain field experiments?

Further Reading

The branch of economics known as experimental economics is huge. The preceding material scratches the surface of the discipline but hopefully sufficiently enough to give the student new to this area an idea of what it is about, to arouse interest, and to suggest where to start if this is something he or she wishes to investigate more.

One of the reasons why this field is huge is that unlike, say, labor economics or environmental economics, which focus on their specific fields, experimental economics is as much a *tool of analysis* and as such it can be applied to virtually any field of economics. Below we give details of websites and further reading which the student of experimental economics is encouraged to explore.

Where to start reading? Many of the references cited in this chapter are very accessible for the student of intermediate microeconomics. Here and there, of course, the authors of the various journal articles and books will “lapse” into mathematical notation. While such mathematical exposition should, at some stage, be mastered, it is often quite possible to read a large part, if not a majority part, of the article and “come away” with a good feel for the subject area.

One also needs to distinguish between *how to carry out an experiment in economics* and *results from economic experiments*. The former is best represented by Friedman and Sunder (1994), whose book mainly concentrates on the practicalities of how to conduct an economic experiment. The book is by and large non-technical and readable!

As regards results that practitioners of economic experiments have uncovered, then a comprehensive, but incomplete, starting point is the *Handbook of Experimental Economics* (Kagel and Roth, 1995) already mentioned in the text. We say incomplete since, of course, it was published in 1995 and many new results have come along since then. We suggest not starting at page 1 and reading till the end. Instead, once you have mastered the methodology of experimental economics, decide on the branch of economics you are interested in: auctions, game theory, public economics or whatever. Then study the sections pertaining to your specific interests.

For regular up-to-date coverage of new experiments, many of the major journals will publish papers but there is a dedicated journal for experimental economics. See <http://www.springerlink.com/content/102888/> for the journal *Experimental Economics*. Both the *Handbook* and the *Journal* cover the experimental research in a bit more depth and sections of it will be a little heavy going. Be selective in what you read and once you have built up your knowledge from various sources you can always return to the two above-mentioned sources.

Concerning areas covered in this chapter, a list of articles using experimental methods as applied to the field of public economics is helpfully provided by Andreoni and List (2005) in an introduction to a special edition on experimental economics in the *Journal of Public Economics*. As well as this detailed list of 41 articles published by the *Journal of Public Economics* from 1981 to 2005, the special edition has some up-to-date articles that take the reader to the edge of the latest thinking.

Within the realm of labor economics, and in particular discrimination, Riach and Rich (2002) provide a good chronological narrative of the early field experiments carried out initially within the UK but also in other countries. In addition they touch on discrimination within diverse markets for housing, insurance, and car sales.

As regards the differences (and similarities) between experimental economics and psychological economics, apart from the references already mentioned see an accessible article by Rabin (1998).

Websites

A quick Google search will throw up many sites. However, we list three below which will lead to many, many more:

- 1 “Al Roth’s Game Theory, Experimental Economics, and Market Design Page”. Go to: <http://kuznets.fas.harvard.edu/~aroth/alroth.html>.
- 2 The State University in New York also has a brief but useful list at: <http://www.oswego.edu/~economic/exper.htm>.
- 3 A visit to Charles Holt’s Home page is also recommended, at: <http://people.virginia.edu/~cah2k/home.html>.

Even after a brief visit to these three sites, the reader will realize how little has been covered in this chapter!

Classroom-based Games

These cannot really be called experiments as such but are more for pedagogical purposes, that is for the teaching of the concepts of economics. *The* book for lecturers (and students of economics) is *Experiments with Economic Principles: Microeconomics* by Bergstrom and Miller (2000). This book presents a series of class-based economic games that the tutor can use instead of, or as a complement to, traditional seminar style lessons. The games themselves give the students of economics a chance to learn the principles of the subject area through interaction rather than simply through “chalk and talk.” The games, nevertheless, will give the student and indeed any lecturer new to experimental economics, a feel for the latter.

SUMMARY

This chapter has provided a brief introduction to the methodology of experimental economics and to a very small number of findings from some of the various branches of economics where these techniques have been applied.

In addition, the differences in approach between experimental economists and experimental psychologists has been raised, along with one or two of the major disagreements between the two professions, namely to what extent are individuals rational in their economic behavior?

As well as highlighting major differences in interpretation at some experimental findings (preference reversals and the WTA–WTP issues) we have also taken up the major methodological differences between the two disciplines.

While the above has probably tended to emphasize experimental results that have contradicted economic theory, it should not be thought that this is the general case. Many economic experiments have supported standard economic theory, including the basic supply and demand apparatus shown in the work of Vernon Smith which is taught in introductory and intermediate courses. The chapter wouldn't stand much chance of being even slightly interesting if all we emphasized was how much experimental economics confirmed economic theory!

The applications have also given insights into how the techniques of experimental economics have been applied in various fields. It is to be hoped that readers new to this subject area will pursue their reading in this field further not just in the areas covered here but in the many other areas not covered, from Game theory to Auctions.

REVIEW QUESTIONS AND PROBLEMS

- 1 How might one overcome the survey research problems outlined in the text in terms of some well-off people not being accessible or only a minority of less-well-off people having access to telephones?
- 2 Suggest ways in which the staff development unit in our university example may overcome the self-selection bias resulting from their current evaluation strategy?

- 3 How do you reconcile the fact that Vernon Smith's experiments show that the market mechanism operates according to economic theory and Daniel Kahneman's work (and others) that individuals are irrational in the sense of the standard axioms of consumer choice theory are often violated? (See <http://nobelprize.org/mediaplayer/index.php?id=535> for an interview of the two Nobel Laureates where this question is posed. Having listened to the answers from the two Nobel Laureates, do you find their answer convincing?)
- 4 In Application 19.6: A Few Differences in Experimental Techniques we listed some of the experimental differences observed by Plott and Zeiler among various experiments that might account for the gap between willingness to accept and willingness to pay. Later, we also summarized the views of Croson, and Friedman and Sunder on the methodological differences between psychologists and economists.
Having read these methodological differences between economists and psychologists regarding the implementing of experiments, which of the experimental methods listed in Application 19.6 would economists "approve" of and which would they not approve of?
- 5 In application 19.6: A Few Differences in Experimental Techniques we looked at some of the experimental techniques that have varied from experimenter to experimenter. The Becker, DeGroot, Marschak (BDM) method is one of the most incentive-compatible methods that can be used to elicit the true valuations of subjects for the "goods and services" that experimenters trade in experimental economics. As asked in the application, and using the same approach as the seller in the BDM explanation, show why a buyer would always wish to declare his or her true valuation of the good in an experiment.
- 6 The WTA–WTP gap disappears when all the more important and different experimental techniques are used by the experimenters. Plott and Zeiler make the point that the misconceptions disappear after "instruction" through "experience." To what extent do you think that it is legitimate to explain to subjects "the right way" to proceed? Is this not simply "steering" them in a particular direction? Shouldn't the whole point of economic experiments be to see how subjects behave in isolation from the experimenter? There are 1.3 billion consumers in China with varying levels of purchasing power; how should one instruct them to behave correctly according to economic theory?
- 7 In the article by Smith (1976: 275) he says that $(R'_i - p)^2 U''_i + U'_i R''_i$ is always less than zero for certain classes of functions of U'_i and R'_i . What does this tell you about the importance of the "rules of the experiment" and the "pay-off function" for subjects in order to ensure that $(R'_i - p)^2 U''_i + U'_i R''_i$ is less than zero?

Notes

- 1 This chapter has not had the benefit of input from the American authors of the main textbook. As such, any mistakes or omissions are due to the writers of the European adaptation. In addition, though every effort has been made to keep the level of difficulty at the same level as the main textbook, the style is inevitably different although hopefully just as easy and as enjoyable to read. One major difference worth pointing out is that there are more quotations given; it is hoped that for deliberately students new to this field, reading some of the contributions from leading experimenters will not only allow them to see that this material can be very accessible but will alert them to the correct places to explore for additional material.
- 2 Strictly speaking The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2002.
- 3 Cited in Friedman and Sunder (1994) and by the Information Department of the Royal Swedish Academy of Sciences (December, 2002. See http://nobelprize.org/nobel_prizes/economics/laureates/2002/ecoadv02.pdf. Accessed 19 May 2008.)
- 4 It may even be that I am mistaking skepticism for inquisitiveness.
- 5 *The Handbook of Experimental Economics* also differs from this chapter in so far as this chapter, while touching on some results uncovered by actual experiments, also focuses to a large degree on the methodology of conducting experiments; the *Handbook* focuses primarily on results.
- 6 Roth (in Kagel and Roth [1995: 21–22]) answers the question, “Why do economic experiments?” a touch more eloquently by way of the following three expressions: “Speaking to Theorists” – that is, do the experiments support or contradict existing theories in economics; “Searching for Facts” – where no theory is prominent in an area under investigation but the uncovering of facts may lead to the development of a theory; and “Whispering in the Ears of Princes” which concerns the need of policy makers to know how this or that government policy may affect a market outcome. Experiments are then conducted and analyzed, and conclusions and recommendations are made to policy makers.
- 7 For those students reading this who are fans of Wikipedia (and in the author’s experience many are, especially when it comes to handing in course work) then it does present a nice example of this as regards the comparison between the production of aspirin in the laboratory and the large-scale commercial manufacture of the same drug and the major differences with ensue when scaling up. See http://en.wikipedia.org/wiki/Chemical_engineering (accessed 2 June 2008) where the example is presented.
- 8 Of course, even at the level of the individual firm, cutting wages will not always boost profitability. For example, employees may become demotivated leading to lower productivity so off-setting lower wages; or the most productive employees may simply resign and take their talents elsewhere for a higher wage.
- 9 Okay, we grant you that “funny things” seem to happen when particles travel near the speed of light or travel near massive objects such as black holes. Then Newtonian mechanics need to be replaced by the theories of relativity developed by Einstein. Making some claim to be economists but absolutely none at being physicists, we will not pursue this line of reasoning further!
- 10 See page 000 for a definition of salience.
- 11 The author, through his own experiences, found this to be the case in the city of Kaliningrad in the Russian Federation. The canvassers of a field survey in 2006 reported back that in many households in the “up-market” areas of the city, access through a main gate to the front door was prevented by very large Dobermans or Rottweilers.

- 12 “Lo and behold,” sometimes wrongly written as “Low and behold,” can be read as “Look and see!” and is used to give the impression of wonderment that the user of the phrase is about to bestow on those looking on.
- 13 In many countries in the past the only way the armed forces could enlist new recruits (given the horrendous living and working conditions in the services at the time) was to “press them into service.” In England in the eighteenth century this often involved press-gangs roaming the streets and drinking establishments of sea-ports on the look-out for any able-bodied persons (sober or otherwise) who were then physically taken to a ship to serve against their will. Such press-ganged individuals did not usually have their heart in the job when it came to serving in the navy!
- 14 Alas, lecturers at teaching institutions are no more exempt from the ever-present bell-shaped curve than many other phenomena within nature and society. If you do not understand this term – bell-shaped curve – consult your statistics or economics lecturer for an explanation.
- 15 “Deductive logic begins with one or more *premises*. These premises are statements or assumptions that are self-evident and widely accepted ‘truths.’ Reasoning then proceeds logically from these premises toward conclusions that must also be true.” Contrast with, “Inductive reasoning begins, not with a preestablished truth or assumption, but with an observation . . . In other words, they [researchers – PL] observe a sample and then draw conclusions about the population from which the sample comes.” Both quotes from Leedy and Ormrod (2005: 29–30).
- 16 The students themselves were not actually paid real money with which to trade but were only asked to maximize points. Points are maximized by the difference between what a good is sold at and what it costs if you are a seller and the difference between what you buy it at and what you value it at if you are a buyer. Recall that the cost of an item to the seller and the value of an item to a buyer are determined in advance by the experimenter, in this case Vernon Smith. Later, however, subjects were actually given real money to help induce behavior that would occur if the subjects were actually in a real market situation.
- 17 Recall that the standard deviation is the positive square root of the variance. The variance, and hence the standard deviation, measures the spread of prices struck in deals between buyers and sellers (in this case) around the mean value for the particular trading session. The higher the standard deviation, the larger differences there will be in the deals struck.
- 18 The reader may wish to consult the main text chapter 11, Applying the Competitive Model, and in particular pages 326 to 327 on Price Controls and Shortages for some theoretical background within the Nicholson *et al.* text.
- 19 For those who know a little about statistics, the difference in buyer profits between the three market institutions is statistically significant at the 5% level. Translation for those without stats: the figures produced in Table 1 are not likely to have been generated by chance but probably do reflect the situation in the “real world” although there is a 5% chance that the preceding is wrong!
- 20 By the term “economic agent” we mean an individual who goes about his or her daily business, be that as an employee in a firm (say, working in a human resources department) or as an entrepreneur in their own company, or as a consumer genuinely out to buy something they desire.
- 21 We deliberately use the term “unit of labor” since it could be an individual worker who is hired or it could be an extra hour of paid work through overtime for example. We do not make the distinction clear at this level.
- 22 There are other theories on wage determination which do not see education or general work experience as being paramount in determining an individual’s wage. We leave these to one side for the time being. See Bosworth *et al.* (1996) for a comprehensive,

but accessible, treatment of the various issues such as signaling, labor market segmentation, internal labor markets, implicit contracts, efficiency wages.

- 23 This is a slightly loose definition. Increasingly throughout the world, anti-discrimination legislation passed by legislative assemblies focuses not simply on whether two people are doing the *same* job in the same company *and* are being paid differently, but whether they are doing *work of equal value* and being paid differently even if the job they do within the same company is *different*.
- 24 See Bosworth *et al.* (1996), p. 337 for an explanation of this technique.
- 25 To give examples of comparable educational institutions in the United Kingdom, Oxford University and the London School of Economics would be comparable as would London South Bank University and Kingston University but Oxford and London South Bank would not be comparable. Despite, no doubt, the high standards of education at all universities in the United Kingdom there is no doubt that many employers still judge, *in part*, a job candidate by the reputation of the educational institution from which the job candidate graduated. Within the United Kingdom, this predilection of employers to prefer job candidates from the more prestigious universities, was, and to an extent still is, known as “the old school tie” effect. It is an open question as to how much weight is attached, these days, by employers to the graduating institution when making hiring decisions. This despite the fact that students at the elite universities in the UK represented by the “Russell Group” (see <http://www.russellgroup.ac.uk/home.html>) are far more likely to be taught by non-academics than at the less prestigious “new universities,” many of which in the UK are often referred to as “Post-92 Universities” since many became universities only after 1992. (See <http://www.hepi.ac.uk/downloads/33Theacademicexperienceofstudents2007summary.pdf> and paragraph 28 in particular. Accessed 23 June 2008.)
- 26 Postcode or ZIP code discrimination is not unknown among employers or at least is believed to occur. You may be the best job candidate in the world but an employer *may* judge your eligibility for the job based on the area of the city/town where you live. If you live in a “dodgy” or rough area so to speak then this may be (unfairly) held against you. The employer forms a view of the type of productive person who lives in these areas and then everyone is “tarred with the same brush” regardless of other characteristics of the individual applying for a job. This is a form of discrimination known as *statistical discrimination*.
- 27 In the United States, a CV, or *curriculum vitae* which means *course of life*, is more commonly known as a résumé.
- 28 Equity is the name of the union which represents artists across the entertainment spectrum within the United Kingdom. See <http://www.equity.org.uk/default.aspx> for more details.
- 29 At the time of writing the government of the day is planning to increase the age limit at which one can buy tobacco from 16 to 18. Alcohol, however, can only legally be bought by those of 18 years and over.
- 30 We explain entrapment here as the situation where individuals who are normally not predisposed to commit a crime are tempted into it by the persistence and style of the “offer” made by the authority or, in the case of experimental economics, the researcher. “To determine whether entrapment has been established a line must be drawn between the trap for the unwary innocent and the trap for the unwary criminal” (part of a U.S. Supreme Court judgment made in a case in 1958. Cited in Wikipedia at <http://en.wikipedia.org/wiki/Entrapment>. Accessed 14th June 2008. Also see Hay (2003) for a more in-depth discussion and technical presentation of the issues. This latter paper can be downloaded at <http://lsr.nellco.org/cgi/viewcontent.cgi?article=1229&context=harvard/olin>. Downloaded by the author on 14 June 2008).

- 31 The Swedish first names of Erik, Karl, and Lars along with the last names Andersson, Petersson, and Nilsson were used. For the Middle Eastern names Ali, Reza, and Mohammed and the last names Ameer, Hassan, and Said were used.
- 32 These questions are inspired by the article by Weichselbaumer (2003).
- 33 At a slightly higher level of economic analysis one can introduce the idea that the individual wishes to maximize the utility of his or her family and not simply that of him or herself.
- 34 It is also possible that certain consumers maximize their utility not simply from the *consumption* of consumer goods and services but from the *process* of buying and from having *been seen to have bought* certain consumer goods and services. The latter two acts are sometimes known colloquially as “retail therapy” and “keeping up with the Jones.”
- 35 Alas, I do not recall the name of this newspaper writer but do recall the example.
- 36 This despite Alfred Lord Tennyson’s poem:
 “I hold it true, whate’er befall;
 I feel it, when I sorrow most;
 ’Tis better to have loved and lost
 Than never to have loved at all.”
 From *In Memoriam*, 1849.
- 37 The endowment effect, and some of the other concepts which follow, like loss aversion, are closely tied in to Prospect Theory developed by Daniel Kahneman and Amos Tversky in 1979 where preference formation is sensitive to the initial reference point of the individual. In exploring the endowment effect and the WTP–WTA gap commented on in the text, we are also touching on Prospect Theory.
- 38 Although as they themselves point out, theirs is not an exhaustive list.
- 39 This is similar to the fallacy that if a coin is tossed and it comes up heads, say, six times in a row some people make the mistake of assuming that there is now a greater chance of tails coming up on the seventh toss of the coin, whereas in reality it is always 50:50 (for a fair coin) as to what will come up. Each toss of the coin is independent of the previous one.
- 40 The following is based on Friedman and Sunder (1994: 132–133), and Croson (2005).
- 41 The above seems to be slightly at odds with footnote number 5 in Plott and Zeiler (2005: 534) where they report the work of Holt (1986) that randomly selecting one round for which subjects will be paid will not necessarily produce truthful revelations as regards valuations of lotteries over several rounds.
- 42 See Plott and Zeiler (2005: 541) for a brief discussion of this concept in relation to WTP and WTA gaps which we cover later in this chapter.
- 43 Contingent means depending on; conditional on.
- 44 My sincere apologies for this bad pun; it is a rare lapse on my part. For the reader whose first language is not English, the expression that the title is implying is “Barking up the wrong tree.” This conjures up the picture of hunting dogs, I have read, barking at the base of a tree in the belief that the quarry their master is after is hiding in the tree when it is not. In other words “Barking up the wrong tree” = “to make a mistake.” “What comes first: the chicken or the egg?” is another way of asking, “What is the origin of the process under review?” or “What phenomenon is cause and what phenomenon is effect?”
- 45 Quoted in Kerr (1998: 196): “A reader quick, keen and leery/ Did wonder, ponder, and query/ When results clean and tight/ Fit predictions just right/ If the data preceded the theory” Anonymous.
- 46 The verb “to deceive” is an emotive one which when used against individuals will bring forth reactions of anger or at least irritation from the people accused who, as in the case of the psychologists, may feel that their use of this practice is a legitimate

methodological approach. Hence economists use this word guardedly and on rare occasions as a factual description and in a non-pejorative sense. My old Collins *New English Dictionary* from 1968 defines deception as, “n. the act of deceiving; the state of being misled; fraud; imposition; illusion; snare; fallacy.” Please do not rush up to your nearest student friend who studies psychology and accuse them of being a “deceiving little so and so.” You will end up losing a friend!

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