# Rethinking economics: Economics as a toolkit[1]

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## Abstract

By emphasising implicit framing, conventions and rhetoric, it can be argued that economic theories, models and concepts represent analogies. These cannot be directly applied, but may give some insights into the real world if used with care. This approach allows us to identify limitations to techniques and raises additional questions that can increase the relevance of our findings.
The introductory section of this paper outlines the key concepts and framework used. Section two illustrates the approach by taking as an example the production of economics research. Section three then gives examples first of limitations in the application of economics, and second in concepts which can be useful in highlighting real world issues.

[1] Thanks are due to staff of the University of the West of England for helpful comments while visiting on sabbatical, with special thanks to Don Webber for his suggestions.

## 1. Introduction[2]

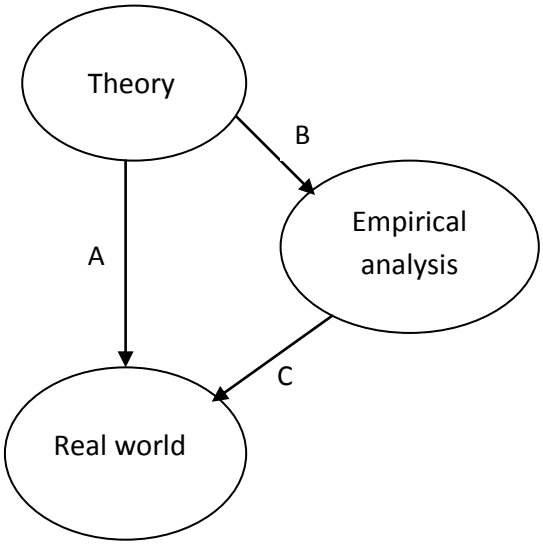
This is the fourth of six Bristol Business School Economics Papers by Stuart Birks on Rethinking Economics. The full collection is:

- 1212 An economics angle on the law
- 1213 Rethinking economics: theory as rhetoric
- 1214 Rethinking economics: Downs with traction
- 1215 Rethinking economics: Economics as a toolkit
- 1216 Rethinking economics: Logical gaps – theory to empirical
- 1217 Rethinking economics: Logical gaps –empirical to the real world

Paper 1215 gives a general overview of the "economics as a toolkit" approach. Papers 1212 and 1214 illustrate the application. The approach includes three paths or types of potential error. Papers 1213, 1216 and 1217 cover paths A, B and C respectively.

It is worthy stepping back to consider the broad approach taken by economists in their efforts to expound their discipline. One way to do this is by means of the following diagram. It presents a framework for considering the use of theory and empirical analysis to understand real world phenomena:

**Figure 1. Logical errors, Types A, B and C**




To see the point of the diagram, note that economists have put a lot of effort into theory, requiring tight specification and internal consistency, and into empirical analysis, considering appropriate estimation methods and statistical tests suitable for hypothesis testing, for example. Mainstream theoretical approaches have been criticised (Dow, 2012; Lawson, 1997, 2003), as have the statistical approaches, especially in relation to hypothesis testing and the fallacy of the transposed conditional (McCloskey, 1998; Ziliak & McCloskey, 2008). However, less attention has been given to paths A, B and C. Each of these can be a source of error in our understanding of the real world. Note that the diagram focuses on flows of information from analysis to real-world application. There are likely to

[2] Further detail on Figure 1 and Type-A errors can be found in Birks (2012a).

be flows in the reverse direction also, but my concern here is in the use of economics in decision making, hence the limitation. The paths can be described as follows:

> **Type-A errors** arise when theoretical results are assumed to be directly applicable to the real world.
> **Type-B errors** arise when empirical formulations do not accurately reflect the underlying theory. This can be due to data problems, or difficulties specifying relationships and functional forms that match the theory.
> **Type-C errors** occur when incorrect conclusions are drawn from statistical results, either through a misinterpretation of the meaning of the results, or a failure to consider additional, relevant policy dimensions.

Central to an understanding of the significance of this diagram and the associated potential errors is the concept of **framing**. This is generally not expressly considered by economists, but it is heavily used elsewhere (Scheufele & Tewksbury, 2007; Severin & Tankard, 1997; Tversky & Kahneman, 1981; Weaver, 2007). It has been described as a process of "selection, emphasis, exclusion, and elaboration" (Severin & Tankard, 1997, p. 320). Choices are made (sometimes by default in the adoption of an approach) as to what will be included and excluded, and the stories which will be told about the included aspects.

Minsky is well aware of the problems that framing can cause, although he does not use the term. He draws on an address by James Tobin ("The intellectual revolution in U.S. Policymaking", Noel Buxton Lectures, University of Essex, 1966), to describe its significance in an economics context, writing:

> "James Tobin, who was a member of the Council of Economic Advisers during President Kennedy's first two years in office and who received the Nobel Prize in 1982, noted that "The terms in which a problem is stated and in which the relevant information is organized can have a great influence on the solution." But the way "a problem" is stated and the identification of "relevant information" reflect the economic theory of the policy adviser. That is, the game of policymaking is rigged; the theory used determines the questions that are asked and the options that are presented." (Minsky, 2008, p. 110)

The representation is one of people looking at something. Minsky states this explicitly:

> "In all disciplines theory plays a double role: it is **both a lens and a blinder**. As a lens, it focuses the mind upon specified problems, enabling conditional statements be made about causal relations for a well-defined but limited set of phenomena. But as a blinder, theory narrows the field of vision." (Minsky, 2008, p. 109)

How we look at something shapes what we see. Kuhn (1970) popularised the term **"paradigm"**, which also suggests a perspective taken and has been influential in shaping our understanding of the nature of scientific enquiry (Dow, 2012). However, it could be argued that these representations of the processes followed are themselves misleading.

Any description, including Kuhn's (and mine) involves framing. Economic models are not representations of the real world. They are simplistic structures which could be more accurately described as **analogies** for aspects of the real world. They are alternative representations which, it is hoped, under some circumstances provide information which can be useful in aiding us to understand real world events. Their applicability in any specific situation is open to question, and they will not be complete depictions on the phenomena of interest.

Further interpretation of the context in which economics research is undertaken can be drawn from literature on groups and group cultures. This is indicated by Kuhn with his reference to 'normal science', and by Galbraith (1999) when he talks of 'conventional wisdom'. This aspect is covered in more detail in Birks (2012a), as is the additional dimension of rhetoric and its significance in economics.

This leads me to the key point of this paper, namely that economics should be seen as providing a **tool kit**, a collection of concepts, structures, theoretical and empirical findings which are not enough on their own, but which, if properly used and applied with care, may give some insights which can help us to understand the real world and the ways in which we can affect real world processes and outcomes. Of course, this is itself an analogy, but it "determines the questions asked and the options raised". More specifically, with this framing and given a real world issue to be investigated or a problem to be solved, we can ask which selection, from all the tools available to us, may be of some use.

We should also ask how the chosen tools should they be applied. This is important. Even from the way economics is often taught, it is commonly suggested that a straight application of theory or estimation of a model is all that is required for the conduct of research. This may have become such a strong convention that some economists fail to see beyond it. It may be all that is required for publication in peer reviewed journals, but that does not make it sufficient for guiding real world decisions.

Tools have limitations, and so there are constraints on what can be done. Not many decades ago it was thought, wrongly, that large econometric models would be able to provide accurate forecasts. Policy instruments were thought sensitive enough for "fine tuning" the economy to be seen as a realistic aim. Over-ambitious, inflated claims are not unusual, especially in political environments.

Even within the boundaries of what can be achieved, tools do not do the whole job. A combination of tools over a number of processes may be required, and even that is not the whole story. As Keynes has written, "where we are not blindly manipulating but know all the time what we are doing and what the words mean, we can keep 'at the back of our heads' the necessary **reserves and qualifications and the adjustments** which we shall have to make later on" (Keynes, 1973, pp. 297-298). With the application of any economic analysis, there are reservations and qualifications to be made and further adjustments needed.

## 2. An example: efficiency in economics research

The first part of this paper indicates that formal analyses are not representations of the real world and do not cover all the issues to be addressed. This might mean that, as Keynes suggested, further work is required in addition to formal analysis. It might also mean that there can be value in less formal approaches. Economics concepts can be used in a general way to construct analogous representations which may provide insights that are relevant for the real world. It may therefore be helpful to provide an illustration of the use of a concept as a general guide to thought rather than through formal theorising or modelling. That is the aim of this section.

There are two factors motivating me to consider this particular example. They relate to the question, and to the approach. First, it is a relatively under-explored area. While economists frequently undertake research to find ways in which people can improve their position through increased efficiency, it is less common for economists to look at themselves in the same way. There are many incentives for economists to look outwards, including accepted conventions, opportunities for publication and promotion, and research funding. Inward looking critical assessments are less likely

to be well received and may give scant rewards to those undertaking them. This may mean that there are low hanging fruit to be found, and I will hopefully show you that there are.

Second, the example shows that the approach can be useful and does not require tight formalisation. Rather than mechanical application of models or techniques, economists can use the structures of economic theory as conceptual depictions for application in a range of areas. To illustrate this, the concept of the production function is applied to the issue of economics research. This can be considered as a way of **framing** the issue and hence it provides a particular perspective which, hopefully, will give some useful insights.

The basic idea of a production function is that "outputs are a function of inputs". Inputs are combined through a production process to create outputs. When economists undertake research, they are providing inputs to produce outputs. There are some simple and very general points that can be made even at this elementary stage. The efficiency of production will depend on i) what is being produced, and ii) the choice of production method from the available options.

A production function specifies a relationship between inputs and outputs, where output in a period of time is assumed to be a function of quantities of inputs, commonly capital and labour, applied over that period of time. The functional relationship reflects the quality of inputs and the state of technology that is being used. The production decision for any given output and production function involves choosing a combination of inputs for the given technology. The production function can change to reflect new options as additional technologies come available. The choice of the input combination depends on technology and the prices of the inputs. The volume of output may also take into account the value of the item produced. Where marginality is assumed, there is an expectation of substitutability and infinite divisibility. Optimal quantities of outputs and inputs would meet conditions of marginal cost being equal to marginal benefit for the last unit produced and for the last unit of each factor applied. Marginalism also means that small changes in conditions will generally result in small changes in optimal combinations.

Of course, while marginality assumptions are common in theoretical representations, they do not necessarily apply in the real world. Nevertheless, the standard findings may give some general indication of what to expect in the real world in terms of possible directions of change. Hence there are certain basic findings that we could consider. If the price of an input falls, we are likely to use more of it. If new inputs or production technologies come available, we then face a wider range of possible production methods and products. In response, if we are seeking to be efficient, we are then likely to change the way we produce and perhaps the products that are produced. If there is a change in the relative price of inputs, and if suitable technologies are available, it will be more efficient to change the ratio of inputs by substituting the input that has become relatively cheaper for the relatively dearer one. If there is a new production technology, new options become available. It may well be advantageous to take up some of these options.

When considering research, we could ask whether there are changes in the inputs that are available, in the costs of those inputs, and in the technologies that can be applied. If there are, then at least if marginalism and associated adjustments are applicable (and perhaps otherwise), efficiency suggests that there should be some change in the production of research. Even where there are limited production options, some changes are likely. Where these changes do not happen, it suggests that

we are not being efficient. Economists might then be expected to suggest a reason such as institutional rigidities, further contending that it is a sign of lack of competition.

So what changes are we seeing in the research environment? First, consider the nature of data. Mainstream economics emphasises quantitative research, and so data are commonly thought of as numerical. However, data are not just numbers or series of numbers. A broader definition would consider all potentially relevant information as data. There are qualitative as well as quantitative data. There are interviews, academic documents, policy documents, policy debates, news media reports, images, objects and so on. Through the internet, a vast quantity of information from all over the world is now readily available. The cost of obtaining that information is far less than it ever was before, both in time and in money. Electronic storage of textual information, along with word processing and word search technology, has greatly increased our ability to process that information. So we have a change in the availability of resources and a change in the cost of analysing those resources.

It might be suggested that the change is not providing the "right" information for use, but this cannot simple be assumed. An approach in which research is seen as being the application of a technique implicitly constrains the types of suitable information irrespective of availability and cost. A production function analogy highlights a problem with this attitude. If economists were to consider this situation for the production of some other good in a competitive environment, they might contend that, alternatives, perhaps close substitutes, could arise. They would then drive the inflexible, and hence less competitive producers out of business.

A similar point about change could be made for numerical data, suggesting that the cost of processing information has fallen cross the board. However, the change for qualitative data in recent years is likely to be more significant simply because of the magnitude of the change from a low base. Much of the policy information would not have been readily available to academic researchers in the past, especially in relation to information from other countries. The availability of textual data in electronic form means that large volumes of data can be accessed and word-searched very rapidly, internet search engines can perform global searches for words and phrases in fractions of a second. Similar documents or sections of documents can be compared almost at the click of a button, and textual data manipulation and storage can be done in ways not even imagined 30 years ago.

For many, economics research is seen as the estimation of a model, conducting an experiment, perhaps undertaking a survey. The research is essentially the application of a technique. By this approach, data requirements are set by requirements of the technique. Except in terms of the feasibility of the research, therefore, data availability has little influence on the research itself. By default, all other available information is being ignored. From an efficiency of research perspective, it could be asked why no consideration is given to the use of other available data that are relevant to the issues to be investigated. How can the researcher justify not using these other data? A question such as this suggests issues in the institutional structures and incentives faced by economics researchers. Consideration of these factors could lead us to a different perception of the process of research. As with research in general, the selection of questions to ask can be as important as the process of answering those questions. Setting the questions also frames the issues and determines what we see.

This example has illustrated the application of the concept of a production function in a general, informal way. It has been a useful tool which, as a conceptual structure or representation, has provided important insights in to an issue. As with any application, we should be aware of its requirements and limitations. To show to type of concerns I am referring to, some of these are listed below. Points such as these may be relevant whenever production functions are used in an analysis:

- I have been talking of many different inputs, so we do not have homogeneity of input.
- There are different approaches needed for the various types of data, so the production processes and outputs are not homogeneous.
- The end result is more evocative of a composite good with many separate components brought together to make a completed product.
- There is uncertainty about the nature and quality of the output, and this can persist even after the production is complete.
- There are unlikely to be many of the same product produced.
- The end result may depend on the individual researcher.

The production function analogy is therefore not a precise and complete representation. However, it can give useful insights. When applied as above to the issue of research in economics, it can lead us to question the nature of that research as commonly taught and conducted. It indicates alternative directions and suggests that we should be reassessing prevailing directions. More generally, the example suggests that economic concepts can be applied to raise questions and suggest answers. It can be useful, but we must not forget that for this, as for any analysis, what we see depends on the way we are framing the issues. There are many possible frames, and they are all simplified representations, or analogies.

## 3. Some useful tools

If we are to consider applied economics as making use of a tool kit, there are two ways in which this can be considered. These will be considered in turn. First, as Keynes suggested, we should be aware of reserves, qualifications and adjustments that are needed when relating findings to the real world. Some brief examples of this are given. Second, tools can also useful for indicating possible relationships of phenomena that might be observed, some of which are illustrated here.

### 3.1 Reserves, qualifications and adjustments

These concerns are illustrated with one example for each of the three paths and types of error covered in Figure 1.

#### 3.1.1 Lags (Path A)

While static analysis and comparative static analysis have been heavily used by economists, we should be aware that this framing ignores the processes of adjustment, the time taken and the paths followed (and if such paths do actually lead to the assumed end-point). Things do not happen instantaneously. There are several steps that must be taken, as in making and implementing policy. Lags have been classified in varying levels of detail. The structure outlined here draws on Vane and Thompson (1993, pp. 195-198). A simple breakdown would consider **“inside lags”** and **“outside lags”**. The former refer to lags before a policy is implemented, whereas the latter consider the time taken for a policy change or new policy to have an effect on the target variables.

Inside lags have been further subdivided. For example, we could start with an **identification** or a **recognition lag**. This is the time required to realise that there is a potential policy issue to consider

(not only that something is happening, but that it is serious enough to merit policy attention). We do not monitor everything all the time. Hence, some problems are only identified once they are already serious. Even some monitored phenomena, such as the price level, may only give us a clear signal of a problem after some time. For example, price index data are not instantaneously available, being released some time after the quarter to which they refer, and one relatively high figure may be an aberration rather than an indication of a sustained period of inflation.

Once a concern has been identified, there could be an **action** or **policy lag**. This could be divided into a **decision lag** and an **administration lag**. The decision lag refers to the time required to decide on and obtain required approval for a course of action. This could be quite fast if an individual has the authority to make a decision on the spot, or could take a long time if, say, parliamentary approval or support through a referendum is required. The administration lag is the time required for the necessary components to be put in place for the policy to be ready for implementation. A decision to increase the number of doctors or police officers will not have an immediate effect on numbers. It is necessary to find suitable people or train others so as to get the desired number of suitably qualified individuals willing to work in the required locations at the offered pay rates and conditions.

There is then an **outside**, **implementation**, or **effects lag**. This is the time from the actual introduction of the policy to its effects being felt. For example, in macroeconomics we refer to expansionary multiplier effects, which require many rounds of increased spending, associated income rises, and subsequent increased spending. If this was initiated by a policy with the aim of reducing unemployment, there are further possible delays to consider between an increase in aggregate demand and an expansion in employment. This is why outside lags are sometimes divided into lags in impact on intermediate variables (such as demand), and subsequent lags before they impact on the target variables (such as unemployment).

An awareness of these types of lag can aid an understanding of the potential time required for policy interventions. It also indicates information constraints, the role of political and other decision making processes, the number of distinct decision makers on which outcomes may depend, and the adjustments required. These are important dimensions to policy, but can be overlooked if a static theory-based perspective is taken. This is further illustrated in relation to the former Soviet transition economies in Hare (2012).

### 3.1.2 Control variables (Path B)

A Google Scholar search for “vector of control variables” conducted on 27 February 2009 produced “about 4,140” results. Repeated on 2 January 2010 the number had grown to “about 4,980”. It has become common practice to convert basic models with a few variables into ostensibly more complex and realistic models simply by adding “control variables”. It is then claimed that the effects of those variables have been taken into account, with the results for the variables under investigation being those observed having made full allowance for the other effects.

Without further explanation of the functional form, this is pure rhetoric. Consider standard approaches to the use of data in different currencies (adjusting for exchange rate differences by converting to a common currency) or different price levels (adjusting for inflation by converting from nominal to real values). Instead of these adjustments, would it be considered acceptable to add an exchange rate or a price index as an additional variable in a linear regression? The implication would be that the effect of say a price level change is independent of the magnitudes of all other variables. If such an approach is unacceptable, why should it be assumed sufficient when controlling for any other influences?

As an alternative perspective, note that it has to be assumed that, for a unit change in a control variable there is a fixed effect on the dependent variable. This fixed effect is assumed always to be correct, although it depends also on the specific form of the dependent variable. How can it always be correct? Consider, when the dependent variable is:

- A number - the control variable has a fixed numerical effect;
- A log - the control variable has a fixed proportionate effect;
- A total value (such as GDP) - the control variable has a fixed total effect;
- A per capita value - the control variable has a fixed per capita effect;
- A nominal value - the control variable has a fixed nominal effect;
- A real value - the control variable has a fixed real effect;
- A first difference - the control variable has a fixed effect on the first difference.

Should it be simply assumed that, whichever of these is used, it results in the relationship being correctly specified? As alternative specifications are chosen for the dependent variable, can it be expected that the functional form for the control variable will always be correct? These would appear to be highly implausible.

### 3.1.3 Policy questions (Path C)

Not only are there statistical issues to consider when drawing policy conclusions, but there are also a number of specific policy questions to ask. An "ideal" economic approach to policy decisions (assuming perfect information and zero costs of analysis) involves identifying all the available policy options, determining their effects, valuing them to calculate costs and benefits, and then applying a decision rule to select the best option. A statistically significant relationship in a regression equation tells nothing about alternative options. Nor does it address the question of costs and benefits. All it demonstrates is that it **may** be possible to alter the value of Y by changing the value of $X_1$. Outstanding questions[3] include:

a. Can you change X?
b. How can X be changed?
c. At what cost?
d. How much control is there over this change (how precise are the changes in X)?
e. How variable are the effects on Y?
f. What lags are there?
g. What is the **value** of the resulting change in Y (what is the benefit, does it outweigh the cost)?[4]
h. Are there any distributional effects (gainers, losers)?
i. Are there any side-effects?
j. Are there other policy options available (including changing the relationship)?

In summary, it is important to consider the ability to change the target variable, and the costs and benefits of such a change, along with those of alternative policy options to address the same problem. This information is not provided through a t-test.

[3] While these questions are raised in relation to econometric studies, they apply to all policy options where one (policy) variable is altered so as to bring about a change in another (target) variable.

[4] This is one of the key concerns raised in Ziliak and McCloskey (2008). Note that effects on Y, and the policy significance of the resulting Y, may not always be continuous. This can cause particular problems, especially where variability of outcome assumes particular significance. Consider the difference, for a non-swimmer standing in a tank of water, between a situation where the water level is exactly at shoulder height and one where the water level is, on average, at shoulder height. Econometric estimation gives average impacts only.

### 3.2 Stand-alones

It can sometimes be helpful to apply economics tools to an issue that may be of general concern, or receiving news media coverage, or about which deliberation it occurring. In these circumstances the issue is generally not chosen and framed within academic economic debates. Consequently it is unlikely to be well proscribed by economic theory or models. Nevertheless, aspects of economic thinking may provide useful insights that can contribute to the debate. Here are three examples.

#### 3.2.1 Unanticipated consequences – multiplier effects

It is commonly said of policy that there can be "unanticipated consequences" (Merton, 1936). This is not surprising if we consider theories to be analogies that give simplified representations which may have some relevance to the issue at hand. Economic theory does suggest some relationships which could indicate consequences of actions. A common example is that of multipliers and multiplier processes. If a problem is observed, say low income for a particular group, it is unlikely that a change to that specific area (raising income, or increasing benefit payments) will eliminate the problem and have no further repercussions. The multiplier process illustrates a change that has ongoing repercussions. It may be directly applicable as when a change of income changes consumption, which changes income and so on. Even without this close link, the process suggests a series of questions. If we change X, what else (Y, Z) will then change? If Y or Z change, what effects will that have on X and elsewhere? And so on.

#### 3.2.2 Exit and voice

The general economics view of markets is that competition involves customers facing the options of purchase or non-purchase, the choice being participation in the market or **exit**. A broader approach could consider an additional option, speaking out, or **voice**. The concepts of exit and voice have been described in detail by Hirschman (1970, 1992). They raise important questions about the effectiveness of markets and other mechanisms as vehicles for conveying signals between suppliers and consumers.

Consider schooling when schools are zoned, compared to when there is free choice. In this example, rather than gathering less information under zoning, people may gather different information. Behaviour may be different. With zoning, the response to dissatisfaction is likely to be voice (what changes do you seek in the school?), whereas with free choice exit is more of an option (what alternative school should you choose?) (Hirschman, 1992, Chapter 4). In either case, people are likely to learn more about the things they believe they can influence. Hirchman (1970) saw "exit" as being considered in the realm of economics, and "voice" within politics. In brief, Hirschman (1970, p. 17) suggests that withdrawal or "exit" is presented by economists as "the 'direct' way of expressing one's unfavourable views of an organisation". In contrast, "A person less well trained in economics might naively suggest that the direct way of expressing views is to express them!" This is what is meant by "voice". He contends, "In a whole gamut of human institutions, from the state to the family, voice...is all their members have to work with". Exit is not always an option, nor is it the only option. Economic theories of competition and markets tend to ignore this.

Consider also a highly regulated economy. There is a strong incentive to invest in lobbying, rather than to understand the markets, but this is reversed in a less regulated environment. If the laws and legal structure are amenable, you might see competition by means of litigation or, in other words, by means of "voice". In more traditional markets, trade was not on a take-it-or-leave-it basis. Instead, bargaining would occur. We could debate whether this is viable or desirable when dealing with

workers in large organisations, but it highlights a dimension to economic interaction which may be overlooked by economists (or devolved to other academics such as political scientists for analysis).

### 3.2.3 The shadow of the law[5]

Economic analysis is based on the idea that people react to their environment. The institutional structure, including law, affects the constraints that people face and their perceptions of those constraints. Standard microeconomic theory on market failures and regulatory interventions includes underlying assumptions about behaviour which may not match the real world. In particular, enforcement aspects may be given inadequate attention. The abstract to Heyes (2002) begins:

> "Enforcement of any rule or regulation is where 'the rubber hits the road'. Many economists and policy analysts have been guilty of proposing and promoting legal and regulatory instruments having given scant or no regard to the problems that might surround their implementation."

The shadow of the law is essentially an umbrella term for the law's possible indirect influence on behaviour. It refers to the way laws can affect people's actions even when there is no direct legal involvement.

There are clear signs that people respond to signals. This can be illustrated by a simple exercise. If people are divided into pairs and asked to decide how to share some coins, say, then in an unconstrained situation many will voluntarily allocate equally. If, instead, they are told that, failing to come to an agreement, an adjudicator will allocate the majority of the coins to a particular, named member of the pair, then the voluntary outcome is likely to be unequal. A difference in observed behaviour occurs while the transactions still appear to be voluntary. The outcomes arise in a different situation, however, because in the second case the allocations occur "in the shadow of" the adjudicator's ruling. The adjudicator may not be required to rule at all, but outcomes are affected nevertheless. This is a simplified illustration of the effect of bargaining "in the shadow of the law".

This might be thought a desirable phenomenon in that laws intended to change behaviour may do so with little need to actively implement them. However the situation is not so simple. The wrong signal may be given. Consider when the cases heard in the courts are not representative (and recall how often judges make a ruling "to send a signal"). Also, decisions in the courts may not be as intended buy the law makers.

Even when the desired signals are given, some people may be more influenced than others:

> "By the time I had finished my research, I had spoken privately to chief constables who said it was a waste of time arresting criminals; judges who said it was a waste of time sentencing them; and prison governors who said it was a waste of time locking them up. I was confronted with the realisation that **the criminal justice system is rather an effective way of regulating the behaviour of law-abiding citizens, who pick up the deterrent signal and react**; but a strikingly ineffective way of controlling offenders." (Davies, 2008, p. 38)

The concept is significant for economists for several reasons. Observed behaviour is not just an expression of preferences, and it may be influenced by factors that are not directly observed. Policy implementation involves changing behaviour, but the signals may not be clear or appropriate.

[5] This section draws on a more detailed discussion of the concept in Birks (2012b).

Responses may vary over individuals, with equity and efficiency implications. And at a most basic level, economists should not assume that it is enough to recommend a legal intervention on the assumption that it will give the desired behaviour change with few costs or distortions.

## 4. Conclusions

This paper gives a glimpse of a potentially rewarding approach to investigation. It calls for recognition that theories, models and concepts are analogies, and therefore just tools for analysis. By this means, it is possible to identify limitations to a theory-based view of the world, along with a range of additional directions and qualifications that should be considered. This suggests ways in which a broad approach to economics can both increase understanding and improve communication with those outside the discipline. Economics is not able to stand alone in explaining the world, so it is important that economic thinking contribute to wider debate with recognition of its limitations. The paper suggests ways in which other concepts can be incorporated into a less tightly structured and closed body of economics knowledge. For those who have a cross-disciplinary background, whose real world experiences do not seem to be well addressed within mainstream economic theory, or are just uncomfortable with economics as a comprehensive explanation of the real world, this may well suggest a way forward. This paper is a brief sample of an extensive body of work developed in a cross-disciplinary and applied policy context over many years. While not fitting the conventional economics journal approach, it had proven to the author to be illuminating and rewarding. A more detailed exposition of these ideas is in preparation at present.

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