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Gerard J. van den Berg

Abstract

The process of evaluation — including its design and execution — is vital to the success of any programme. Labour market programmes are no exception to this rule. Yet, appropriate evaluation eludes policymakers, to the detriment of both the unemployed and the taxpayer. This piece explores the current situation (with its pitfalls of selectivity), and investigates the components of effective evaluation — focussing on social experiments (random selection of participants) as the preferred evaluation method.

Most European countries have extensive systems of labour market programmes designed to increase the employment perspectives of individuals without work. These programmes, which range from classroom training and job search assistance to work experience programmes, are often linked to income support programmes like unemployment insurance and welfare. If a recipient refuses to participate in a programme or does not comply in any other way with the guidelines on search behaviour required by the employment office and the agency responsible for benefits payment, then he may be given a sanction, i.e. a punitive reduction of the benefits level.

Huge amounts of money are allocated towards such programmes. This makes it extremely important to evaluate the effects of the programmes. In this respect, the Netherlands is no exception. Admittedly, the Dutch unemployment rate has dropped spectacularly during the past few years. However, to some extent this is a statistical aberration. Large groups of individuals are defined away (into the disability programme, for example), and sooner or later they must be reintegrated into the labour force.

Unfortunately, labour market programmes in the Netherlands (and elsewhere) are often not evaluated in a sensible way. Until recently it was not uncommon to implement a programme in one city, choose a “comparison” city (without such a programme), and then compare changes in the unemployment rates after a year. While this may be convenient from a logistical point of view, the results say more about labour demand in these cities than about the programmes. Even worse, programmes have been evaluated simply by counting the re-employment rate of the participants, or by counting the fraction of dropouts from the training programme (see van Nes et al., 1998).

The selectivity problem

What one would actually like to know, instead, is what would have happened to a programme participant if he had not participated. If his chances without participation are almost as good, then, in general, it makes little sense to subsidise his participation. In reality, the actual participants are often a selective sample, in the sense that without participation they would have also found a decent job relatively fast.

The drop in the Dutch unemployment rate is to some extent a statistical aberration.

The scientific literature has developed a number of tools to correct for this when estimating the effect of participation (see Heckman et al., 1999, and
Blundell 1998). These sources also discuss different measures of the effects of programme participation. Below, we discuss some of these tools. After that, I summarise some findings from the recent empirical literature.

Opening the toolbox

The method of “natural experiments” exploits institutional variation in the degree to which individuals are exposed to a treatment. If the source of such variation is otherwise unrelated to the outcome of interest, then an observed correlation between the individual value of the institutional factor and the individual outcome of interest must be due to a treatment effect. Here, the institutional variation mimics the role of true randomisation in a genuine experiment. It is not easy to recognise a natural experiment. If the analyst observes an institutional factor, then it is often also observable to the individuals under consideration. If the factor affects the probability of treatment, and the individual knows that he may be subject to treatment, then he takes his value of the variable into account in his behaviour, and this behaviour, in turn, affects the outcome of interest.

Other methods of treatment evaluation assume in one way or another that the observed data are able to capture all systematic determinants of the process of treatment assignment, such that the residual observed variation in the treatment assignment is independent of the determinants of the outcome of interest. An example of such an approach is the “matching” method (see Heckman et al., 1998). The basic idea is that if you control for a sufficiently large number of individual characteristics and features of past behaviour then you also control for the determinants of the selection into the programme. This is almost as if the treatment is determined by an expert system. This may be reasonably accurate for certain kinds of medical treatment, but it is sometimes difficult to justify for labour market programmes. Both the programme assignment and the re-employment rate may be affected by unobserved discretionary behaviour of the caseworker of the employment office. In general, though, it follows that it is useful to collect a lot of information on past labour market behaviour.

Still other approaches for treatment evaluation rely on the observation of multiple similar events or on observed variation in the timing of events. Thus if two outcomes are governed by the same determinants, then it is easier to control for “selectivity.” In a recent study, we discovered that duration data are particularly useful to estimate treatment effects (see Abbring and van den Berg, 2000). Such data allow for the exploitation of the information at the moment of treatment and at the moment of the outcome of interest. The more spells per individual are observed in the data, the more robust the inference on the effect of the programme.

This approach has been applied to investigate the effect of a punitive sanction of an unemployment benefits recipient on his exit rate out of unemployment. Clearly, the imposition of a sanction is selective, as it represents a response to a particular type of behaviour by the benefits recipient. The estimation results show that a sanction often amounting to a benefits reduction of 20% doubles the exit rate, regardless of whether the individual receives unemployment insurance or is on welfare.

Social experiments: random harvest

In principle, “social experiments,” in which a random generator determines who enters a programme and who doesn’t, constitute the preferred evaluation method, as they circumvent most of the above-mentioned problems. (For a systematic discussion of the pros and cons, see Fay, 1996). Moreover, such methods are relatively cheap. Recently, some surveys have been published which summarise the findings of experimental (and non-experimental) studies of active labour market programmes. These mostly concern US-based programmes, as European experiments are extremely rare (see Heckman et al., 1999; Fay, 1996; and Bjorklund and Eggert, 1996). Perhaps the strongest conclusion from these studies is that the effects on wages and employment vary substantially — not just across programmes, but also across different types of individuals. On average, though,
References


In the Dutch context

The first Dutch social experiments of labour market policies were held just recently. In a working paper we document the analysis of a carefully designed experiment that concerned the counselling and monitoring of unemployed individuals with relatively good prospects (see van den Berg and van der Klaauw, 2000). Using administrative data on the individuals, we found no significant effects on the re-employment rate.

To understand this result, we found it useful to supplement the administrative data with a follow-up survey among the subjects involved. Apparently, the counselling amounts to a mere five to ten minute discussion per month. The amount of monitoring is regarded to be substantial, but its main effect is a shift from job searching along informal channels (such as open application letters, referral by acquaintances) to searching along formal channels (like personnel advertisements and the public employment office). This makes sense from a theoretical point of view. The monitoring focuses on search behaviour along the formal channel, and the individuals have ample opportunity for substitution, as their labour market prospects are good. Monitoring, in this context, is a waste of money.

At the end of the day...

In the Netherlands, as in other European countries, policies have been developed for a comprehensive approach to returning unemployed people to the workplace. The idea is that after one year of unemployment, the individual follows a path of training courses, work experience programmes, and subsidised work, until a more regular job has been found. There are many similarities with the “New Deal” programme in the UK. It would be useful if aspects of this approach could be pre-tested using social experiments. Indeed, it would be nice if the evaluation of labour market policies would be mandated by law — trivial as this may sound. In addition to this, it would be useful to compare estimates of programme effects across programmes (and across types of individuals and countries) and to understand the results in terms of a sound economic-theoretical model. I believe that this constitutes a challenge from a scientific point of view.
Reverse logistics: Optimised recycling

Rommert Dekker

Abstract
A well-known, accepted and longstanding tradition in cultures worldwide, product re-use, or recycling, is entering the new millennium with a renewed burst of enthusiasm and a host of commensurate challenges. Used-up products get a second wind through government-mandated processes of direct re-use, re-manufacturing, recycling, and energy recovery. Yet, the logistics surrounding these avenues of recovery are complex. Discovering the most effective and efficient ways of management and organisation is important not only for individual companies, but also for society as a whole. Reverse logistics, a new research arena in economics, attempts to sort out the collection, disassembly and processing of used-up materials. To what extent should such processes be centralised? What do recovery networks have to offer firms? How do inventory control and planning affect the recovery process? What measures must be taken in order to cope with the increasing traffic problems? In what ways is Tinbergen Institute uniquely positioned to respond to these issues?

Introduction to a new research arena
Reverse logistics can be defined as the management of all logistic activities related to the re-use of products and materials. The word reverse refers to a movement upward instead of downward in the supply chain (from user to retailer, wholesaler, collector or original equipment manufacturer). Reverse logistic activities include collection, disassembly and processing of no-longer-needed products and/or materials, in order to ensure a new use or an environmentally friendly recovery. Re-use of products is indeed a very old concept: in the early days no product with some remaining value was thrown away. The rise of the consumer society some decades ago, with its many throwaway products, such as single-use cameras, changed that picture. Surprisingly, the counter movement of the durable society has restored much of the old situation — yet in many different ways.

Although product re-use is indeed an old tradition, the research into its efficient logistics is new. This contribution sketches its development and how Tinbergen Institute’s contributions are shaping the research effort.

What’s new under the sun?
Re-use of products is done for legislative, environmental and economical reasons that have compelled the formation of a new industry to undertake re-use activities. While in Europe legislation and environmental aspects have been the main driving forces, in the United States also economic aspects have stimulated re-use. Re-use may take place in
four different ways. To begin with, after inspection and cleaning, some products, like refillable bottles and containers, may be re-used directly. Another possibility is the disassembly of certain products, which yields some re-usable parts that may be used in the assembly of new products. Such “re-manufacturing” happens, for example, in the case of photocopiers. The parts may also be used in a separate or downgraded market (such as refurbished engines). A third avenue of re-use is when a product is dismantled, ground up and separated into re-usable materials, which happens with discarded cars, glass and paper. In this case the re-use takes place at the material level, which is called recycling. Finally, a product may be burned and its energy used in heat or electricity generation (energy recovery). Of course, the first type of re-use is often preferred, and burning is least desirable.

Although product re-use is indeed an old tradition, the research into its efficient logistics is new.

Juggling costs and benefits: too many balls in the air?

Reverse logistics encompasses several research areas. First is the distribution (or rather, the collection) side, where products are retrieved from their users, handled in warehouses and transported to places where they can be recovered. Next comes the production side, where planning and inventory control are modified according to returns. Also to be accounted for are aspects of accounting returns and environmental aspects: is it worthwhile to put so much effort into transports for recovery? Finally, IT and organisational aspects also play a role: how should collection schemes be set up, and how should they be financed? Obviously, such a spectrum of inquiry is too broad for a single research project. Our research has therefore focused on the first two aspects, since they are most related to the already existing research.

Dividing up the research pie

Research on reverse logistics at Erasmus Universiteit Rotterdam started some ten years ago with the Ph.D. thesis of Martijn Thierry in the Rotterdam School of Management. Thierry invented reverse logistic issues and developed models for product recovery networks. The Tinbergen Institute got involved through the author of this article, who supervised with Marc Salomon some follow-up Ph.D. research done by Erwin van der Laan on inventory control within reverse logistics, a typical operations research problem in which Ad Ridder, from Vrije Universiteit Amsterdam, co-operated. Subsequently, Moritz Fleischmann and Ovidiu Listes carried out more Ph.D. research. The alliance between Economics and Management was further deepened by co-operation with the European Union network on reverse logistics and by the work of several postdocs who obtained a fellowship from EUR or the Dutch Science Foundation.

Whereas the Netherlands used to be an importer of raw materials, it is now a net exporter of recycled materials, such as paper and glass.

Re-use, re-manufacturing and recycling of products have become popular in north-western Europe. In fact, one may wonder which product is not yet collected for re-use. All these activities have also changed traditional economic positions of countries. Whereas the Netherlands used to be an importer of raw materials, it is now a net exporter of recycled materials, such as paper and glass, which are even exported to the Far East. The wide availability of recycled materials has also been a reason to establish all but one of the newsprint mills in the last decade near big population centres (see Brown-Humes, 1999). Apart from many successes, there have also been failures in re-use initiatives. An expensive plant to reprocess pig manure into pelletised fertiliser failed because of a shortage of supply. Numerous debates have raged over whether the re-use of plastic bottles is preferable to the recycling of glass, as the costs and benefits of the re-use activities are unevenly distributed over the parties in the supply chain. Moreover, reverse logistic activities often generate a lot of traffic, with the inevitable pollution, and the question is whether these expensive collection activities outweigh the benefits of recapturing the economic value left in products. Governments have stimulated re-use by making alternative disposal either costly or forbidden and by setting up collective schemes for funding collection. Individual companies have struggled with the many new questions that surround re-use activities. All these aspects have stimulated the creation of a new field within logistics that has been named reverse logistics.

Research at Tinbergen Institute

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Coping with centralisation problems

In many new cases for product re-use, firms have had to set up new recovery networks. Individual companies or independent foundations created for this purpose were charged with carrying out the collection for a group of companies. Our research (see Fleischmann et al., 2000) indicates that individual companies were often hired for re-manufacturing (e.g. for photocopiers). Of concern were high valued complex products for which dedicated knowledge is required for disassembly and in which case the parts are company specific. Independent foundations were most often used for recycling, where the companies considered wanted merely, an environmentally safe and cheap recovery and were not interested in the remaining product value. Quite a number of recycling cases have a strongly centralised structure, as capital intensive installations are needed for recycling (e.g. for carpet recycling, car glass recycling, etc). The disadvantage of this centralisation is that extensive transport arrangements are necessary for low valued goods. In one of our case studies on the recycling of sieved sand from building waste, we therefore advised making use of barge transport, and showed how that advantage could be used in a location study. Apart from studying the structure of these networks in general, we also developed mathematical location models (see Barros et al., 1998) to assist in making location decisions for facilities in these networks. Since these networks were created under situations of high uncertainty, it seemed strange that the existing models (including our initial models) all treated these problems in a deterministic way, whereas a more stochastic approach was preferable. Stochastic models are far more difficult, however, and are computationally demanding; research is therefore attempting to tackle these problems.

Complications with planning and inventory control

Re-manufacturing implies that returned products or parts enter a new production process. The planning of these processes, however, is complicated considerably by the high variation in quality and timing of returns and by the uncertainty in disassembly yields. Common production concepts like Materials Requirements Planning (MRP) seem to fail in reverse logistic situations, because they cannot deal with the uncertainty in the yields and throughput times. This uncertainty can be counteracted by disassembling returned products directly upon return — but this policy may give rise to high stocks, and is in many situations outperformed by pull policies (re-manufacturing is started only when the parts are really needed), as our research shows (van der Laan et al., 1999). Large-scale Markov models have been used in this respect. One important result of this research was the observation that total inventory costs are not really related to the variation in lead times, but to another type of stochastic ordering (see Ridder et al., 1998). Evaluating inventory policies appeared to be much more difficult for returns, as there are basically two ways to obtain items: buying new ones or re-manufacturing old ones. Substantial research was done in developing approximation methods in this respect, and by finding appropriate classes of policies within which an optimal policy could be established. This research also raised the issue of how to value returned products and how to set inventory costs. A standard way is to take a fixed percentage of the purchasing value. Yet this value is not really known for returns, and it is questionable whether a product should be valued on its sales value or on the way it has been made. The inconsistency between average cost and the more appropriate discounted cost models has not yet been fully resolved.

Companies and governmental authorities should learn from the successes and failures in other areas and countries, because environmental friendly recovery can only be achieved if the underlying processes are carried out in the most appropriate way. Reverse Logistics is therefore a topic with many challenging scientific problems in economics and business. Yet, the process of meeting these challenges transcends mere scientific interest.
Econometrics invades marketing

An interview with Prof. Dr. Philip Hans B.F. Franses

Philip Hans Franses is Professor of Applied Econometrics and Marketing Research at the Erasmus University of Rotterdam. His academic focus seems to be undergoing a transition from traditional econometric research in macroeconomics to applied econometrics in business economics. This interview focuses on Franses’ opinion regarding recent developments in applied econometrics — more specifically, his vision and expectations of (business) econometrics in the fields of finance, marketing and, perhaps, management.

You have a background in econometrics, an area that is usually related to economics. How did you become acquainted with marketing?

I did my undergraduate work in econometrics in Groningen, where econometrics students typically follow a lot of marketing courses. I was no exception. I’ve always been interested in marketing, and in the combination of applying econometric models to marketing problems.

In general, scientists tend to focus on either theoretical developments or empirical testing within a specific research area. What balance have you found between theoretical and applied econometrics?

Standard methods can be used for some practical problems; for others, you have to develop new methods. Interestingly, the area of marketing poses a lot of problems that call for new econometric models. Together with some graduate students and post-docs, I’m working on developing these new models. The econometrics part is quite oriented towards marketing, but I also consider financial or macroeconomic applications. It doesn’t really matter, as long as there are data — and interesting questions of course.
"...the area of marketing poses a lot of problems that call for new econometric models"

Success in science depends heavily on the degree of personal fascination for an issue. What are your favourite topics in applied econometrics? What thrills you most?

In applied econometrics, I am mainly interested in developing models — often for time series data — that can be used either to describe the data or for forecasting. For example, together with Dick van Dijk, who graduated last year, I wrote a book on non-linear time series models and empirical finance. Non-linear time series models are fascinating. The advantage of applications in marketing is the availability of lots of data, together with stimulating and simple questions, which sometimes call for more complicated methods of analysis. The nice aspect of it is that the people who get the results of my analyses actually use them. Together with people from Robeco, for example, we developed methods to investigate the degree of willingness of people to take risks in the financial market.

"The nice aspect of applications in marketing is that the people who get the results of my analyses actually use them."

In your inaugural address you made a critical reflection on macroeconomics from an econometrics point of view. Do you think that results are not used enough in macroeconomics?

I don’t think that econometricians have much to say about macroeconomics. Econometric methods can be useful in summarising data or learning more about them, but as far as policy analysis is concerned, econometricians can’t add much scientifically. Of course, you can always try to answer questions, but still, it all boils down to politics. You run the risk that if your results are not convenient from a policy point of view, someone may insist that they be changed.

Your inaugural lecture also stressed that econometrics should be applied to fields other than macroeconomics. What do you mean by this? And could you give some examples of ‘general’ econometric modelling?

The point is that econometrics, as a scientific discipline, has usually focused on applications in macroeconomics. Nowadays, econometrics is being applied to other disciplines — finance and marketing, for example. In fact, some econometric models that are considered standard now were actually first developed specifically for financial applications. A good example is the ARCH model, proposed by Robert Engle in 1982, which was uniquely developed for financial returns because it describes their volatility. Similar developments can be observed in marketing. At econometrics conferences, you come across many people studying financial problems, and also others who are starting to analyse marketing problems as well. What both fields have in common is that you have lots of possibilities to test out things — without having to consider time and time again, say, the same GDP of the US for the last forty years.

Econometricians in marketing have been quite successful in marketing — if we look at the list of publications in international top journals like Journal of Marketing and Journal of Marketing Research. Which underlying factors determine the success of econometrics in marketing?

New challenges in the fields of finance and marketing stem from the existence of large data sets with highly specific, often longitudinal, data. In marketing, for example, the rise of scanning data presented both new opportunities (for topics related to consumer behaviour), as well as methodological problems (related to data analysis and interpretation). Econometric methods can be of great help in the process of structuring and analysing marketing data.

Psychology and economics have greatly influenced the direction of marketing. How does econometrics relate to these two disciplines within marketing? Is it a matter of competition or co-operation?

In the past, economic scientists believed that econometrics was the key for grounding and justifying fundamental economic theory. Both economists and econometricians proved to be wrong. Econometrics can be of great help in structuring and understanding economic phenomena, but it is by no means a cure-all for theoretical hindrances. Both economics and econometrics have become more realistic with respect to feasible research findings.

Within the field of marketing nowadays, economic and psychological approaches go hand-in-hand with econometric methods, as a result of the complementary character of econometrics. Economists and psychologists work on the theoretical foundation, while econometricians focus on the method of approach.
A new development in marketing is the “information revolution.” Do you think that marketing will become more influenced by econometrics because of developments in telecommunication and information technology?

I don’t think that marketing will be influenced by econometrics — at least not for the moment. The information revolution makes it possible for us to learn more about all kinds of transactions. For example, there is a company in the Netherlands that sends mailings to households. Until now, about 1.5 million households have responded and are now in their database. That is roughly one out of every four households in the Netherlands. The only thing an econometrician does is conveniently and usefully summarise the huge number of observations. This may require more advanced and complicated models and methods, which makes this field of research fascinating.

Critics maintain that marketing is just one of the new ‘playgrounds’ for econometrics. What is to be learned for econometricians in the field of marketing?

Both data on actual human behaviour and the perception or beliefs of individuals contribute to the construction of new econometric approaches and methods, which perhaps can be applied in analogous situations in other research areas. Research on latent consumer classes, consumer heterogeneity in modelling (asymmetric market response models), direct marketing (econometric and decision-theoretic aspects of direct marketing), and models for consideration sets are examples of econometric challenges for future research.

Finance and marketing draw the attention of econometricians. Is management and organisation the next station on the “railroad” of econometrics?

In the domain of management, new technologies provide possibilities for data collection, data storage, and data analysis on, for example, personnel issues. In practice, large organisations already collect management information longitudinally, to a certain extent. Necessary conditions for successful quantitative research in this specific field depend upon a grounded theoretical foundation and on hypotheses based on literature and prior research. Pure data mining is undesirable — not only from a theoretical point of view, but also from a business perspective.

How do you think the field of econometrics will develop in the near future?

I see the econometrics discipline developing towards constructing models and estimation routines that have a specific application in mind. Econometrics research will move away from estimation toward more interesting and relevant practical problems, developing new models to solve those problems.

“Econometrics research will move away from estimation toward more interesting and relevant practical problems...”
two-player, two-period game, the pension game. This is a simplest of such games: believe that the other will defect now (because both defects now the other will each knows that if she players co-operate (because overlapping generations games. For example, two be developed for infinite dilemma may expect one of two outcomes: either both players play trigger strategies. If a a player believes that the next player in line will provide her with a pension only if she gives a pension to the previous player, then she will find it in her best interest to provide the pension. But there is also a safe equilib-rium in which each player chooses not to provide the pension. Recent theoretical work shows that folk theorems can be developed for infinite overlapping generations games. For example, two players facing a prisoner’s dilemma may expect one of two outcomes: either both players cooperate (because each knows that if she defects now the other will defect in the future), or both defect now (because both believe that the other will defect, anyway). We focus on the simplest of such games: the pension game. This is a two-player, two-period game, with one player in each of the two periods. When young, a player decides whether or not to provide the present old player with a pension. When old, s/he may or may not receive a pension from the present young player. This paper investigates experimentally whether co-operation actually occurs in the pension game. Subjects both play the game and formulate strategies. Our main finding is that subjects fail to exploit the intertemporal structure of the game to achieve co-operation. Even when we provide subjects with a recommendation to play a trigger strategy, most will still employ safe history-independent strategies. These results cast doubt on the stability of pay-as-you-go systems, such as the Dutch public pension system (AOW).

Curtailing cross-border fuelling through spatial graduation

Given the substantial differences that exist among fuel taxes in various countries, governments that impose higher fuel taxes must cope with cross-border fuelling. Differences in fuel taxes represent a form of fiscal competition that leads to cross-border fuelling and hence to extra kilometres driven. Our analysis of cross-border fuelling data reveals that consumers tend to underesti-mate the costs of cross-border fuel-fetching trips. Governments may tackle the problem of low fuel taxes in neighbouring countries by introducing a spatial differe-ntiation of taxes: low near the border and higher farther away. We present an empirical analysis of the consequences of such a spatio-graduation of fuel taxes for the Netherlands. The slope of the graduation curve should be low enough to prevent fuel-fetching trips (as one moves away from the border the fuel tax increase should preferably not exceed 0.25 Eurocent per km). However, even when fuel-fetching trips per se do not pay, many con-sumers will visit places with lower fuel taxes, given their weekly activity patterns, and are expected to change their fuelling location accordingly.

Pay-lanes: consumer gridlock?

The effects on the welfare distribution of second-best, public or private road pricing depend on the extent of product differentiation. We consider how the design of a pricing scheme affects its economic efficiency and political viability. We have designed a model with the following features: (1) some links are priced, others are not; (2) the population is heterogeneous with respect to willingness to pay for travel-time savings; and (3) product differentiation arises from either inherent traits (road length) or endogenous-ly determined service quality (amount of congestion).

Ignoring heterogeneity in values of time may lead to a dramatic underestimation of the welfare benefits of public policies in situations where not all lanes of a highway are tolled, compared to no pricing at all. A large share of the benefits result from product differentiation: users separate themselves according to their value of time; those with a high value of time use the toll lanes (pay-lanes). Private pricing — aimed at maximising toll rev- enues rather than social sur-
We have constructed a simulation model, calibrated so as to reflect traffic conditions during a typical peak time on a Dutch highway. The relative performance of the various tolling regimes can be summarised with an efficiency indicator, taking the value of one for first-best pricing, and the value zero for no pricing at all. This indicator takes on the value of 0.92 when the public operator is restricted to charging equal tolls for all users (i.e., no separation of traffic by value of time, and hence no product differentiation possible). The indicator becomes 0.23 for a policy of pay-lanes, where toll is collected on only one out of four lanes on a highway. In contrast, the mirror-image of pay-lanes — free-lanes, where only one lane remains free of toll — performs more than twice as well from an efficiency viewpoint, with a score of 0.49. Private revenue-maximising toll systems typically lead to welfare losses, which is reflected in negative values of the efficiency indicator varying between −0.27 for a private pay-lane to −2.6 for full monopolistic control of the entire road network.

The way to more realistic credit spreads and term structures

We present a new framework for the joint estimation of the default-free term structures of interest rates and corporate credit spreads. By using a data set of German mark-denominated bonds, we show that the new model yields more realistic spread curves than the conventionally obtained curves that result from subtracting independently estimated government and corporate term structures. The model specifies the discount curve of a credit rating class as the sum of the government discount function and a discount spread function. Both functions are modelled using splines, i.e., piecewise polynomials, so that we can jointly estimate the default-free government curve and corporate credit spread curves with least squares. The estimated spread curves are now smooth functions of time to maturity, as opposed to the twisting curves one gets from the traditional method; this is illustrated in the figure, which shows credit spreads of AAA-rated companies versus time to maturity. The spread curves are less sensitive to model specifications, and the implied corporate term structures have tighter confidence bands, indicating that the new framework does a better job in extracting interest rate and spread information from the data. The credit spreads and term structures that result from the framework are therefore more suitable for use as input to models that assess the credit risk in derivatives, pricing models for credit derivatives and corporate bonds, risk management procedures, and time series analyses of credit spreads.

Credit Spreads AAA-rated companies

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*Erik T. Verhoef (VUA), Kenneth A. Small, University of California at Irvine

"Product differentiation on roads." TI 99-066/3

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*Patrick Houweling (EUR), Jaap Hoosk (Robeco Group), Frank Kleibergen (UvA)

“The joint estimation of term structures and credit spreads.” TI 99-027/4

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*Credit Spreads AAA-rated companies

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traditional method

joint estimation framework

confidence interval joint model
Survival of the fittest?

Evolutionary dynamics in financial markets

William Brock (University of Wisconsin) and Cars Hommes (UvA)

Why are internet stocks fluctuating so heavily these days? Why do stock market indices fluctuate more heavily world wide than underlying economic fundamentals seem to justify? Brock and Hommes (JEDC, 1998) apply their evolutionary theory of Adaptive Rational Equilibrium Dynamics (ARED), developed in Brock and Hommes (Econometrica, 1997), to a standard asset-pricing model. Financial markets are viewed as complex evolving systems consisting of many traders having different expectations or ‘beliefs’ about future earnings and prices of stocks. Traders use different trading strategies, such as fundamental versus technical analysis. Agents choose their prediction or trading strategy from a finite set and revise their beliefs according to evolutionary fitness (measured by accumulated realised profits or wealth). Market instability and complicated, chaotic asset-price fluctuations may arise with increases in the agents’ sensitivity to differences in fitness, the diversity of beliefs and/or the fitness memory. Technical analysts may survive evolutionary competition and are not necessarily driven out of the market by fundamentalists. Asset prices fluctuate around a benchmark ‘fundamental price.’ Evolutionary dynamics are characterised by an irregular switching between quiet phases (in which fundamentalists dominate the market and prices are close to the RE-fundamental price), and turbulent phases (in which technical analysis dominates, and prices deviate from the fundamental following a self-fulfilling upward or downward trend). Technical analysts are not ‘irrational’, but are boundedly rational and may, in fact, earn above-average net profits—sometimes achieving higher accumulated wealth than fundamentalists. The multi-agent boundedly rational equilibrium model may explain recently observed speculative deviations from an uncertain benchmark fundamental.

Probing musical preferences:
Modelling preference rankings of classical concerts

Hans van Ophem (UvA), Piet Stam (Agis Groep) and Bernard van Praag (UvA)

Regular visitors of the Concertgebouw Orchestra, the Dutch Philharmonic Orchestra and persons interested in classical music were asked in the summer of 1994 to answer questions with respect to their musical preferences. They were shown a list containing short descriptions of 32 fictitious, but realistic concerts. First they were asked to evaluate these concerts by choosing the best 16. They were then asked to choose the eight most preferred from these 16, and finally, they had to rank the remaining eight best options. This article develops an econometric model to analyse these data on incomplete information on preferences. The resulting model is a generalisation of the multinomial logit model. It was applied to data concerning preferences with regard to classical concerts. Five alternative models were estimated, differing in the extent to which they used the available information. Factors like the programme, price and quality of the conductor or soloist were found to have a strong impact on the ranking of the concerts. The full information model performed only marginally better than the model that did not use the information on the ranking of the most preferred alternatives. The model also yields estimates on the amount of money people are prepared to pay for another programme of the concert or if the orchestra is would be led by a renowned conductor. For instance, individuals are prepared to pay an additional 28% if the conductor is famous, or an additional 40% if a well-known soloist is on the programme.

True or false:
Economic growth benefits environmental quality?

The economics literature has recently discovered an inverted-U-shaped relationship between various types of pollution and income per capita (see Grossman and Krueger, 1995). This is consistent with the observation that pollution is increasing in developing countries but has started to decline in developed countries. Various writers have naively suggested that this would imply that economic growth benefits environmental quality, as higher per capita incomes are correlated with lower emissions after the turning point of the inverted-U curve. My thesis investigates this suggestion for four developed countries (the UK, the US, the Netherlands and Germany) between the 1960s until 1995. It is shown that the inverted U curve does not represent the long-run equilibrium relationship between income and emissions in these four countries, and that conclusions from this relationship are spurious. Emissions of NOx and especially SO2 have declined over this period, but a higher rate of economic growth has resulted in a (potential) increase in emissions. The observed reduction in emissions can be explained by the application of cleaner technologies (especially end-of-pipe technologies), which has been enforced or encouraged by environmental policy. A comparison of environmental policy plans shows that a higher level of income results in stricter environmental policies, and that economic growth therefore has a
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long-term benefit for environmental quality. Nevertheless, this effect is small and does not outweigh the short-term environmental costs of economic growth that arise from higher consumption of materials and energy. Emissions may start to rise again in the long run, due to rising marginal costs of abatement, which prohibit a further decrease of emissions.


Getting medicine to the patient:
The political economics of spending choices

Policymakers often pursue economic policies that differ from what most economists view as sound economic policies. Prominent examples include the enormous rise in public debt in OECD countries during the seventies and eighties and the slow and sporadic reform of labour market policy in the light of the dramatic increase in unemployment. A gap obviously exists between economic diagnosis and prescription, and political implementation. Building on modern political-economic theory, this research attempts to explain this gap by dealing with the political environment in which economic policy is made. Political uncertainty plays a major role in the book. We have built on the idea that uncertainty about the preferences of the future government may induce the current government to insulate its favoured policies from the future exercise of public authority. Moreover, policymakers may be biased towards spending now rather than later because they are not certain whether future resources will be spent in a way they desire. Thus, excessive budget deficits may arise. A possible institutional remedy is to impose a binding debt rule. We have shown that such a rule may eliminate excessive borrowing, but may induce the policymaker to spend too little on public investment. Effectively, removal of one distortion induces the policymaker to create another, possibly more costly, distortion. As an alternative, we have examined the effects of a capital borrowing rule. Under such a rule, the government is permitted to run a budget deficit equal to the amount of public investment. This rule is shown to eliminate strategic behaviour if public investment can be meaningfully distinguished from public consumption.


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Erasmus Universiteit Rotterdam,
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Tinbergen Magazine highlights ongoing research at the Tinbergen Institute and is published twice a year.

Photographs
Henk Thomas, Amsterdam
Levien Willemse, Rotterdam

Editorial services
JB Editing, Breda

Design
Crasborn Graphic Design, Valkenburg a.d. Geul

Printing
Drukkerij Tonnaer, Kelpen

ISSN 1566-3213

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