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A model of the representative economist, as researcher and policy advisor

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Abstract: Econ is the representative academic economist who behaves as predicted by economic theory. The paper considers an important parameter β. It assumes that economic theory predicts the sign on β, and that an empirical literature of M papers exists about β. Two cases are considered: (C1) Econ is in the academic career writing a paper with a new estimate of β. (C2) Econ is advising the Minister who is in charge of a policy using β. Economic theory gives a clear prediction in both cases: The size of β will be exaggerated in (C1) and even more in (C2).

Keywords: Rational economist, publication bias
Jel.: B4, D24

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1. Introducing Econ, the representative academic economist

A small literature compares economists to others – it concludes that economists are more rational.[2] Economics is a theory about rational behavior, which helps us to predict the behavior of others, so it should help us even more to predict the behavior of *Econ*, the representative academic economist, who is faculty at a university or similar. The paper models Econ's behavior in two cases,[3] which deal with a parameter β that is important for some policy.

(C1) Econ is in the *academic career*, and works on a paper giving a new estimate of β. The paper is written for the scientific 'market'.

(C2) Econ is *advisor* to the Minister in charge of the policy using β. In the case modeled, Econ comes from academia, and wants to keep the option of returning open. The Minister wants a one-page memo on β. The memo is written for the political 'market'.

Any estimate depends on the data sample on which it is estimated. The data represents something general and the special *conditions* in the country and time-period of the sample. The true value of β is the *ceteris paribus* estimate, which can only be found when controls for the special conditions are used. This works in the reverse in the two cases: (C1) The researcher has to include such controls. (C2) The advisor has to assess β given the *relevant* conditions, when the policy is active. This is one difference between research and policy advice.

Estimates of β are presented as (b, t), which is the estimate of β and its t-ratio, referred to as the *size* and the *fit* of the estimate respectively. To simplify, it is assumed that the choices of Econ are based upon (b, t) only. Thus, the choice has two dimensions, precisely as in the *basic textbook theory* that is our joint frame of reference. It is, of course, a heroic simplification, but we know a great deal about its strengths and weaknesses, so they do not need to be discussed at present. I think that most of us believe that it is a useful story about the representative self-interested agent. Thus, it must be a more useful story about the representative self-interested economist.

Section 2 considers Econ's preferences (for b and t) in the two cases. It also looks at the β-knowledge that Econ has to acquire in both cases: In (C1, research) Econ has to add a *new twist* to the β-knowledge, so he should demonstrate that he has the knowledge. In (C2,

2. It is done by polls and experiments comparing students of economics and other students (Marwell and Ames 1981, Carter and Iron 1991 and Kirchgässner 2005, who gives a fine survey of the literature). Independent psychological research has recently confirmed these findings (Vedel and Thomsen 2017).
3. The two cases should allow the reader to model other cases.

advice) he is chosen for his knowledge.

Section 3 looks at case (C1). The analysis concentrates on empirical research,[4] where Econ has to solve two problems of research strategy that both have a basic solution in economic theory. First, he has to optimize his effort. Optimal effort is where his marginal benefit from making estimates equals marginal cost. This is likely to require many estimates. Second, he has to choose the best one for publication. It is the one where Econ's utmost indifference curve touches his production possibility frontier. Normally he supplements the best estimate with robustness experiments giving similar results. The solutions to the problems predict that Econ's choices are too good; *i.e.*, his decision will result in *publication bias* defined as a systematic difference between the published estimates and the true value – the bias *exaggerates* the result.

Section 4 looks at case (C2). A policy advisor is appointed to give credibility to the policies of the Minister by representing the knowledge of the 'profession'. Econ has to give advice that is both academically respectable and politically possible; *i.e.*, it is useful to the Minister. This is an Edgeworth box problem where Econ's own preferences come to play a small role in his choice. The model predicts that an able advisor will reach the *same advice* as any other able advisor. It is typically (even) larger than the average research result.

When we analyze (C1), it is assumed that Econ's research paper is presented as done by the *traditional strategy*: It starts with a theory that is operationalized to a model, which is approved – or in rare cases rejected – by a regression. Fanelli (2010) found that 86% of papers in economics confirm the theory tested.[5] For long, it has been known that the traditional strategy is too malleable (see, *e.g.*, Leamer 1983, De Long and Lang 1992, and the meta-studies cited in section 2.3), but the strategy survives amazingly well, and the many economic papers analyzed for biases are nearly always of this type. However, increasingly papers in economics use controlled experiments as in medicine (see Christensen and Miguel 2016). This reduces biases, but they do not disappear as found in the literature on biases in research.[6]

Thus, we conclude that it is a *stylized fact* about research (not only in economics) that the average paper reports exaggerated results. My aim is to demonstrate that our theory provides robust predictions of Econ's decisions that explain this stylized fact.

4. My colleagues in pure theory claim that a similar process is at work – it is known as *T-hacking*.
5. He studies a sample of 2,433 papers that claims to test a theory. There is a bit more than 100 papers from each of 20 sciences, allowing a comparison of the fraction of theory confirmation across sciences. The lowest fraction is found in space science (70%) and geoscience. Economics is number 14, while psychology is number 20 (91%).
6. At present (January 2018) Google Scholar has 3.78 million hits on 'publication bias'. I have checked the first 1'000 hits, some are methodological, but the majority are empirical studies. They overwhelmingly report bias, which is nearly always an exaggeration of results. Such studies were pioneered in medicine, but gradually most sciences have followed and found the same results; see section 2.3 on the studies in economics.

Table 1. For easy reference: Variables used throughout the paper

β	The variable of interest. The β-literature is the papers with estimates of β. The β-knowledge also contains the theories and casual observations about β.
β^R	The current state-of-the-art value for β, as per the belief of the profession. It is the reservation estimate for the search of the researcher.
b_i	Estimate i of β in the literature – referred to as the estimated *size* of β.
t_i	The t-ratio of b_i, referred to as the estimated *fit* of β.
t^R	The reservation fit for Econ's search is the 5% limit, *i.e.*, 2.
M	The number of papers in the β-literature.
N	The number of estimates in the β-literature. N/M is the average number of published estimates per paper. $N/M \approx 10$.
J_i	The number of estimates made to generate b_i. Known by author only.

Note: variables only used within half a page of their definition are not included.

2. Econ's preferences and the β-knowledge

Section 2.1 looks at the indifference curves of researchers and advisors. Econ's work on β requires that he masters the existing β-knowledge discussed in section 2.2. A key part of this knowledge is the β-literature that has some typical features as surveyed in section 2.3. Section 2.4 deals with the scientific and the political 'markets', in which Econ has to sell his product.

2.1 Preferences of researchers and advisors: Interests and tastes

The research decisions of Econ are directed by his preferences that are formed by the factors listed in Table 2.

Table 2. Factors behind Econ's preferences for *b* and *t*

Interest	(i)	Career gain, as measured in money	Main case
Tastes	(ii)	Truth seeking	Section 3.5
	(iii)	Theoretical school/political party	Section 3.6
	(iv)	Goodness/political correctness	Section 3.6

Interests: Normally Econ is only marginally affected by the policies using β, and his research influences the β-knowledge marginally. In the case of policy advice, Econ may influence the policy a little more, but still not very much. Thus, in both cases Econ's own interests are almost exclusively due to (i) the effect his work on β has on his career. Sections 3.1 and 4.2 argue that the effect is substantial in both cases.

Tastes: (ii) The ideal is that Econ seeks truth. (iii) Econ may support one theoretical school or a political party. As everybody else, Econ is affected by (iv) the wish to do good in

accordance with 'political correctness'. This affects his preferences as analyzed in the literature about *expressive behavior*.[7] The weight researchers place on (i) and (ii) differs; see section 3.5.

The interests (i) of all researchers are clearly rather *similar*, though the strength varies during a career, and (ii) and (iv) are similar as well, while (iii) differs. Thus, in many cases most researchers will have similar preferences. Section 4 argues that, when Econ works as an advisor, his preferences are dominated by his position. Econ's preferences are summarized as standard indifference curves giving the fit and the size of the estimate as Figure 1 shows. The researcher has the black curve I_R, while the advisor has the gray curve I_A.

Figure 1. Econ's preferences, *i.e.* his indifference curves for the size and fit of estimates

Figure 1a. As researcher and advisor

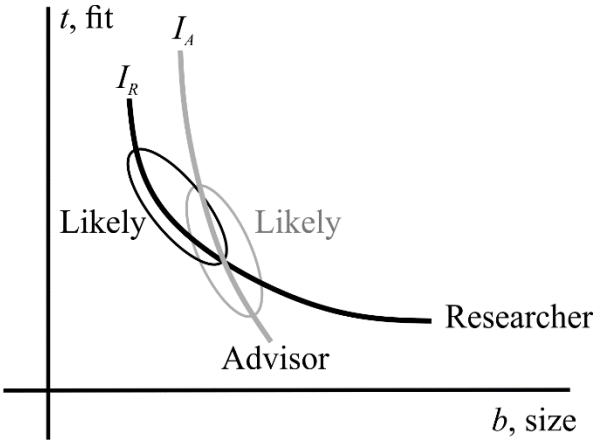
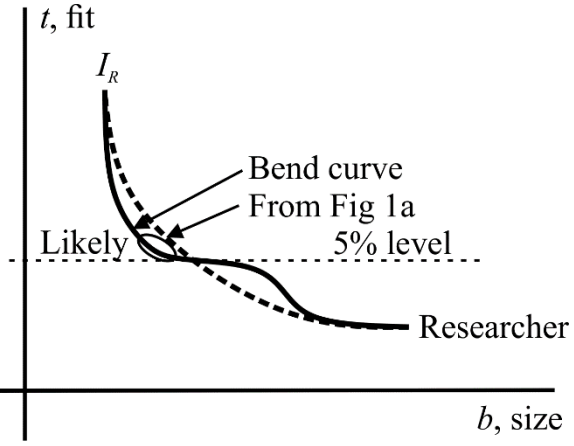


Figure 1b. A 5% bend for researchers



Note: The 'Likely' ovals indicate where most optimal solutions are likely to be found, see section 3.3.

(C1) It is sometimes claimed that researchers look at *t*-ratios only, so that their indifference curves are horizontal (Ziliak and McCloskey 2008). However, many researchers and all sponsors are more interested in size, so it is unlikely that the indifference curves are extreme. Below I argue that choices are robust to the trade-off between size and fit.

New research reports strong evidence that indifference curves for researchers have bends, with horizontal sections just above the 5% level of significance (Brodeur *et al.* 2016, Vivalt 2017). This case is the black curve on Figure 1b. Indifference curves with bends may give multiple solutions, but apart from such rare cases, the indifference curves on Figure 1b

7. The theory of expressive behavior generalizes the theory of expressive voting (Fiorina 1976, Brennan and Hamlin 1998, and Hillman 2010).

have the advantage that they give solutions close to the bend as indicated by the large reduction in the 'likely' oval from Figure 1a to Figure 1b. Below, I focus on the case of Figure 1a, as it gives a wider choice set.

(C2) Advice is useful for the Minister if it leads to policies that he can sell on the political market. Most ministers have a policy to sell, and they want people to believe that the policy is efficient (or fair). Thus, they prefer large values of β rather than small. In the same way, the opposition wants small values of β, so that they can sell some alternative policy.[8] If the policies are seen to work, it may also enhance the prestige of the Minister in the longer run, making it 'double' useful. However, much research points to the short time horizon on the political market (Nannestad and Paldam 1994).

The usefulness aspect is often termed the area of the '*politically possible*'. The classical Tinbergen-Johansen type analysis has a clear division of labor, where the Minister takes care of preferences and the experts describe the choice set (Tinbergen 1960, Johansen 1977/78). The distinction is often blurred in practice, and the advisor's role is to help the Minister look at the politically relevant part of the choice set. An important point about political advice is that it has to be 'sold' on the political market that cares little about the fit. Therefore, the indifference curves on Figure 1a are steeper for the advisor than for the researcher.

2.2 The β-knowledge

The situation where Econ starts from a clean slate is quite rare.[9] There is normally a body of β-knowledge that Econ should master. Journals reject papers that do not demonstrate that the author has a good grasp on the existing knowledge, and advisors are selected for their expertise. The β-knowledge has three elements:

(K1) Some theory exists about β. The theory is qualitative, and it typically predicts the sign on β, assumed to be plus. Thus, Econ knows that negative estimates of β are 'wrong'. If he reaches a wrong sign, colleagues, referees and editors will point this out to him.

(K2) A literature of M papers already exists reporting estimates of β, of which (nearly) all have the right sign. Some of these papers are published in top journals, but once Econ starts to look for papers, a good many, like $M = 50$, are normally found. It is not necessary to cite all, but the most important should be mentioned.

8. Some policies are discussed in terms of a negative variable, such as unemployment and inflation. Here efficiency is measured in terms of a reduction, so that the sign is still positive.
9. Doucouliagos *et al.* (2017) study what happens when a new literature starts.

(K3) Econ's audience is likely to know some stories involving β, maybe from the mass media. Such casual observations may be mentioned in the intro to the paper. Sometimes they contradict (K2), and this may be the 'intuition' used to justify the paper.

When Econ does research, he draws mostly upon (K1) and (K2), and he has to demonstrate that he adds a new twist to the literature improving the β-knowledge. When Econ is advisor, the recent policy experience in his country (K3) is important.

2.3 The typical β-literature and meta-studies

Most economic papers claim that they try to find the true value, so presumably they do control for conditions that may distort the result to reach the *ceteris paribus* estimate. This is one important reason why papers should differ, and it suggests the most common type of estimating equation. It is derived (as $\beta = \partial y/\partial x$) from a much more elaborate theory.

(1) $y = c + \beta x + [\alpha_1 z_1 + \ldots + \alpha_n z_n]$, where […] contains the n controls

All estimating equations in the β-literature therefore contain the main term βx and a set of *ceteris paribus* controls. Equation (1) may include interaction or second order terms, lags, and the constant c may be broken into fixed effects. The setup (1) calls for regression analysis – and it is surely the dominating empirical technique in economics – and a large effort has been made to develop a range of regression estimators.

Paper j of the M papers contains n_j estimates, b_j of β, so that the sum, N, of the n_js is larger than M. The number of estimates per paper is rising – at present it seems to be around 10, so $N \approx 10M$. Most of the M papers contain a brief survey of the literature, concentrating on the papers considered the most important. The author then explains why his version of the model and his estimates are better in one way or another.

In the last couple of decades, the technique of meta-analysis has been adapted for use in economics. The technique is used to analyze literatures claiming to estimate the *same* parameter such as the β-literature. The meta-analysis has to code all N estimates b_i, their fit t_i, and as many characteristics of the way the estimate is reached as the analyst manages.[10]

A key instrument in a meta-study is the funnel that displays the distribution of the results as a (b_i, p_i)-scatter, where $p_i = t_i/b_i$ is the precision of the estimate. If estimates deviate

10. An introduction to meta-analysis in economics is found in Paldam (2015a). Readers who want to dig deeper should consult the textbook Stanley and Doucouliagos (2012).

only randomly as they should, the size of b is independent of p, so the funnel is symmetric around the mean, $\bar{b}$. Thus, asymmetries point to a non-random influence upon the results. In addition, most published estimates are significant, so that $t \geq 2$, therefore the funnel should be lean; *i.e.*, the standard deviation of the b_i's should be small.

The study of funnels gives two notable results: They are typically amazingly wide considering the *t*-ratios, and they are often asymmetrical. In about 2/3 of the studies, the asymmetry is interpreted as a publication bias. That is, most researchers in the literature have almost the same preferences, and hence the whole literature has a bias.

Economics has seen a wave of meta-studies since 2008 when T.D. Stanley proposed a remarkably simple and robust tool that detects the asymmetry and corrects for it to give a *meta-average*.[11] Through the efforts of Hristos Doucouliagos at the DelMar (Deakin Lab for the Meta-Analysis of Research), many meta-studies have been made comparable. This has resulted is several papers such as Ioannidis *et al.* (2017) and Doucouliagos *et al.* (2017). They find that the average published paper has an exaggeration bias. It is quite variable, but on average the bias is about two. That is, the (arithmetic) mean of the published result is twice as large as the meta-average estimated at the limit where the number of papers, *M*, goes to infinity.[12]

2.4 The scientific and the political 'markets'

Researchers 'sell' their papers on the scientific 'market', where publication pressure has generated certain market-like properties: Journals have impact factors that are roughly proportional to rejection rates, and individual authors and papers score citations. Both researchers and advisors 'buy' knowledge (in the form of search time) on the market. Search engines have been developed to make the market efficient.

The researcher (C1) knows that the market has three types of agents that have to be taken into consideration: Editors and referees act as gatekeepers to journals; sponsors finance research and may have interests in the results; and research administrators influence the careers of researchers. Administrators look at the publication record and, especially, at the taxable research grants researchers obtain from public and private sponsors. Thus, they have a clear interest in making their researchers accommodating to sponsors.

11. The tool is the FAT-PET MRA, *i.e.*, a regression on regression coefficients. The FAT is the funnel asymmetry test, and the PET is the precision estimate test (*i.e.*, the meta-average) that corrects the mean for asymmetry.
12. Meta studies often code the impact factor of the journal in which the paper has appeared as a proxy for quality. It has proved difficult to obtain significant results to this variable, so the results of scientific papers do not depend upon the quality of the study. This is surely an intriguing result, but its implications are not discussed at present.

Most western countries have national research policies of 'research integrity' as further discussed in section 3.5. The interest of research institutes is at odds with the official policy of research integrity. It can be argued that the policy of research integrity is needed precisely to keep the interests of sponsors and research administrators at bay.

The advisor (C2) writes memos to the Minister, who operates on the political 'market', which also has some market-like properties. The advisor has to consider two types of agents: The Minister, who has to sell his policies at the political market, and econ's academic colleagues, who may undermine his credibility by signaling to the market that he is 'too' political. Thus, his advice has to be both useful to the Minister and academically acceptable.

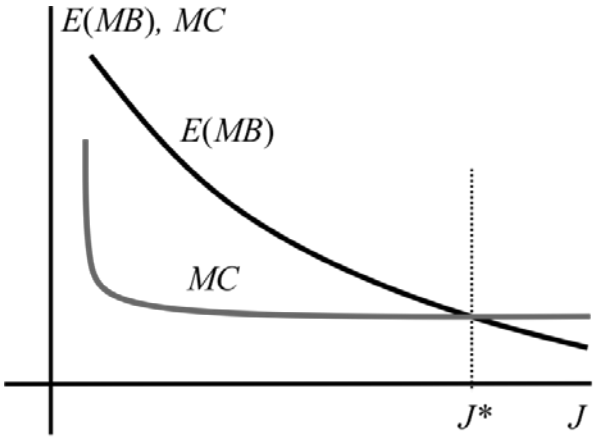
3. Econ as researcher

Section 3.1 looks at the optimal research effort seen as the number of estimated regressions, *J*. Section 3.2 considers the *PPF*, or production possibility frontier, while section 3.3 combines the PPF and the researcher's indifference curve to find the optimal estimate.

3.1 Running regressions: marginal costs and benefits

Econ's optimal effort is the number of regressions *J**, where his *MC* equal his *MB*, as depicted in Figure 2.

Figure 2. The optimal number of regressions, *J**, per estimate published



Note: *E*(*MB*) is the expected marginal benefits, and *MC* is the marginal costs, *J* is effort measured as the number of regressions run. The figure is from Paldam (2013), where it is used to analyze the downward shift of the *MC*-curve over time due to the great improvement in computers and econometric packages. In addition, it discusses the effect of new estimators that give a temporary upward shift in the *MC*-curve until the new estimator becomes another command in the next version in the econometric packages.

MC: The first regression is expensive, but once the data is in the computer, it takes a couple of minutes to choose the variables, run the regression and look at the result. Thus, *MC*(*J*) quickly becomes horizontal as *J* rises.

E(*MB*): There are often surprises when you run regressions, so the benefits have a random element. Thus, the expectation operator *E*() is used on the benefits. Econ starts with the most promising regressions, so the expected benefits are a falling function of *J*. The fall will cause *E*(*MB*) to converge to zero. The *MC*-curve and the *E*(*MB*) intersect once to yield one solution *J**, which is the optimal number of regressions.

It is easy to go one step further and assess the orders of magnitude: Once the MC-curve is horizontal, Econ may run 15 regressions and consider their merits per hour. If his hourly salary is € 30, the marginal cost per regression is € 2. Econ's academic career depends upon his *publication record*, which is the number of papers weighted by their impact factors. The success of the career can be measured as the present value of his remaining life income, *W*.[13] Let σ be his time preference, *R* his expected remaining life, and y_t his future annual earnings. Let y_t be constant except for career steps. One such step is Δy_t:

(2) $W_t = y_t\, C(\sigma, R)$, where $C(\sigma, R) = \sum_{i=0}^{R}(1+\sigma)^{-i} \approx 20$, for $R = 50$ and $\sigma = 0.05$

(3) An upward step in the career gives the gain: $\Delta W_t \approx \Delta y_t \cdot 20$

If one step is worth, *e.g.*, Δy_t = € 10,000 per year, then ΔW_t = € 200,000. Let us further imagine that approximately 10 papers extra are needed to make the step. Then the expected income gain from a paper is $\Delta W_t/10$ = € 20,000. Fine empirical results may account for half of that. Thus, as a crude first approximation, the regression search is worth about € 10,000 for Econ.[14]

If he runs *J* = 5,000 regressions to find a fine result, the average regression has the benefit of € 2. However, *E*(*MB*) is higher at the start, and then it falls gradually to zero. Thus, *E*(*MB*) will intersect *MC* well before 5,000, *e.g.*, at 500. There are some stochastics involved; researchers with a strong intuition may find a good result quicker; researchers with a large risk aversion may go on longer, etc. Anyhow, it is likely that *J** is quite large.

Searches with large values of *J* have a problem known as *data mining* or *overfitting*. As *J* goes up, this reduces the degrees of freedom. This should reduce *t*-ratios, but the amount

13. Researchers also derive *pure* utility and the esteem of their peers from the work and the publication of a paper. The money-equivalent value of that utility should be added. If the paper goes nowhere, this utility is small. Thus, the pure utility is roughly proportional to the expected income gain. The key point is that Econ expects a substantial welfare gain if he makes a paper that does well on the market.
14. For researchers who are tenured professors, the gain is smaller, but even then, there are incentives.

of mining done is a private matter for the researcher. To demand that he reveals precisely what he has done invites an unfair burden of revealed moral hazard. Data mining decreases the probability of making Type I errors (rejecting the true model), while it increases the probability of making Type II errors (accepting false models). Thus, data mining causes overfitting (Clark 2004). When J is large, some results are surely too good. If Econ chooses these results, his research is biased.

3.2. PPS, the production possibility set, and the PPF, its frontier

In most cases a model search gives some negative estimates, so the PPS is an eight-formed object with a positive slope as drawn on Figure 3a.[15] However, in some cases, where β is large and large data samples are used, there may be no negative estimates, as on Figure 3b.

Figure 3. The production possibility set of estimates

Figure 3a. Small to moderate data samples

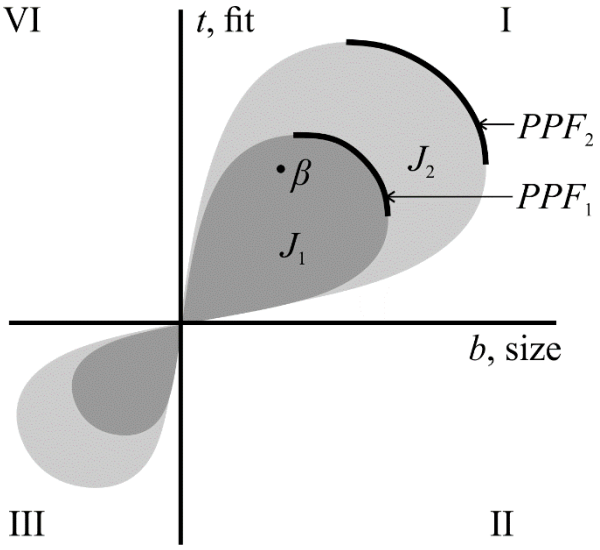
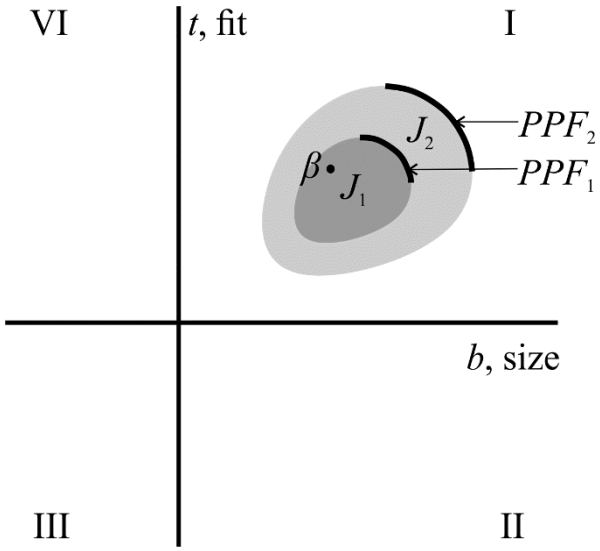


Figure 3b. Large data samples



The t-ratio has the same sign as the estimate, so quadrants II and IV are empty by definition. It is difficult to approach the axes; *i.e.*, large estimates rarely have a fit that is close to zero, and vice versa. Thus, the fit and size are positively correlated – simulations show that the typical correlation is about 0.85 in the case of Figure 3a, but it may fall to 0.25 in the case of Figure 3b. The *PPS* is a function of two factors of production: The *ingenuity* and *effort* of the researcher. The ingenuity causes the width of the *PPS* area, while the effort is the size of J. If

15. The assessments of the PPS draw upon *simulations* (Paldam 2015b and 2016).

J increases from J_1 to J_2, the object increases as shown.[16]

The β-theory says that the sign on β is positive, so the estimates in quadrant III are 'wrong'. Only the segment in quadrant I makes sense. Given that the β-theory is sound, it is likely that the true value is within the *PPS* as shown.

The bolded part of the rim of the *PPS* is known as the production possibility frontier, as it is the efficient part of the set where the size can be increased only if the fit decreases and vice versa. The two *PPF*s drawn are for two values of *J* as mentioned, and they are drawn to be roughly homothetic with respect to the origin of the coordinate system. While the eight-shaped production possibility sets look somewhat special, the *PPF*-curves look as in the standard textbook case, just as the indifference curves on Figure 1a did.

3.3 The optimal solution

Figures 1 and 3 are drawn in the same diagram, so they can be merged in the usual way, as is done on figure 4 that – once again – is straight out of our textbooks.

Figure 4. The optimal solution: The solutions S_1 and S_2

Figure 4a. C1: Econ as researcher

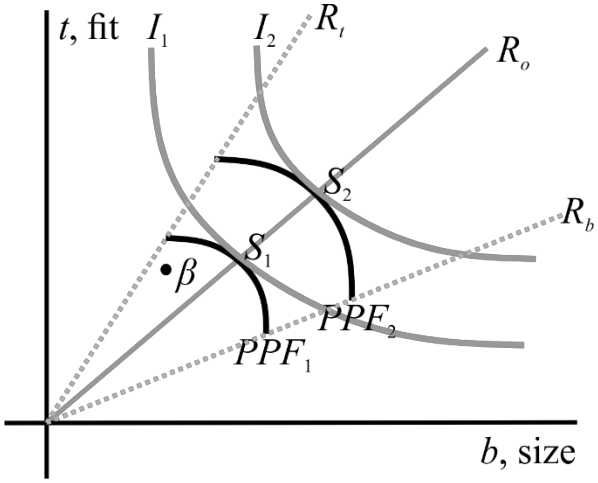
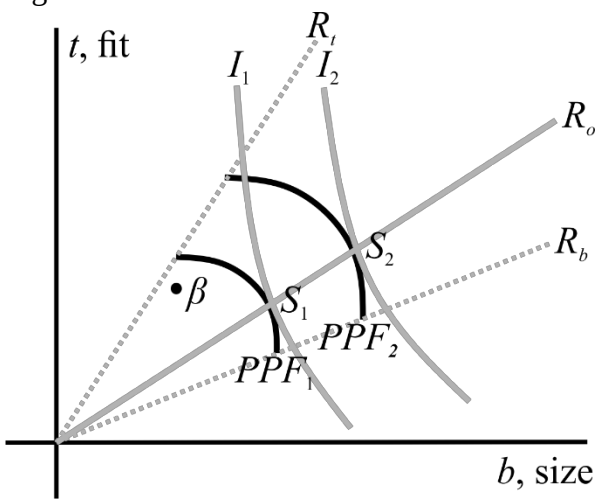


Figure 4b. C2: Econ as advisor



Two cases are drawn. Figure 4a is for the typical researcher, while figure 4b is for the advisor, as discussed in section 4. As I_2 is better for Econ than I_1, it follows once again that it pays to make many regressions. If both the indifference curves and the *PPF*s are homothetic as regards the origin (0,0) of the coordinate system, the expansion path for the optimal solution

16. As *J* is finite, the points in the gray area are a point scatter, and the rim consists of straight lines, but the continuous presentation is used for ease of presentation.

as a function of J becomes a ray, *i.e.*, a straight line from the origin as drawn. It is likely that the two sets of curves deviate a little from the strict homothetic forms so that the expansion path bends a little, but it is not clear if upwards or downwards.

Econ's optimization can only reach the true value of β if it is on the *PPF*. Section 3.4 will argue that β is an internal point, so that two key results follow: Econ produces a bias due to his *rationality*; the rationality bias is in the *direction of his priors*.

As good results are big and significant estimates, Econ chooses estimates that are systematically *too* big and *too* significant. As Econ is the representative economist, it follows that most researchers make much the same choices. Thus, the estimated b's and t's in the whole of the β-literature are too big. In other words, the literature has a publication bias, precisely as found in most meta-studies. Also explained is why papers testing a theoretical result have a confirmation bias, so that the theory is accepted too easily, as mentioned in the introduction.

3.4 The robustness of the bias

Figures 4a and 4b demonstrate the effect of different preferences, and it looks as if the choices generated are close. Simulations compare the results produced by extreme vertical and horizontal indifference curves (Paldam 2015b and 2016). It appears that the gap between the results is small – typically less than 10%. The results for more reasonable indifference curves are always in the interval between the two extremes. Thus, all reasonable indifference curves give much the same result. Two lines of argument suggest bias:

The true value β is a point in the possibility set of estimates, which is an area that has infinitely more internal points than rim-points. Thus, the probability of hitting the rim by chance is zero. With no strong reason for β to be on the rim, it will not happen.

This point also applies for a finite set of estimates when the behavior of researchers is considered. As mentioned, searches with high Js are likely to find both the true model and some false models. In our perspective, the false models are models with false controls:

$$(4) \qquad y = \beta x + [\alpha_0 + \alpha_1 z_1 + \ldots + \alpha_n z_n] + \{\gamma_1 q_1 + \ldots + \gamma_m q_m\},$$

where [..] holds the Z-set of true controls and {..} contains a Q-set of false ones.

The false controls should not be in the model. However, sometimes the q's are correlated with x due to chance or for spurious reasons, so some researchers have used one or the other of these controls. From studies in the literature, the Q-set becomes part of the *β-knowledge* of the

researcher. Econ does not know if they are false or true, and he will thus experiment with such variables, and sometimes one or the other work to give a 'better' estimate of β.

An extension follows from *search theory* where a key concept is the reservation estimate the searcher seeks to reach. This estimate is also known as the 'state-of-the-art' estimate $\beta^R = (b^R, t^R)$. From the argument until now, it is likely that $\beta^R > \beta$. We like to believe that the estimates in this literature converge to the true value β. That is, hopefully $\beta^R \rightarrow \beta$, but at any point in time researchers may consider β^R as the reservation estimate they have to reach.

When Econ sends his paper to a journal, the editor will assign referees. They are likely to be authors of the β-literature. They have helped making the estimates that have made the profession believe that β^R is 'reasonable'. Econ will know that most referees belong to that group. They will surely like that he has a reasonable result that is close to β^R.

The search process in the labor market has a realistic market price to which the search process will converge. That is, if the searcher sets his reservation wage too high, he will be disappointed and will lower his goal. However, in the estimate search discussed, it is clear that it is doable to find too high estimates. Thus, the adjustment process of β^R down to β due to disappointment is not strong at all.

3.5 An altruistic researcher and mimicking: The rotten researcher theorem

As already mentioned, an official policy demands that researchers have a high level of *research integrity*.[17] This is in accordance with the ethos of research that sees the researcher as a pure seeker of truth. Imagine a researcher who seeks truth only. Her results will be below β^R in both dimensions. Thus, she will be an underachiever. It is likely that neither referees nor editors will like her paper(s). It will also cause sponsors to disregard her.

The university administrators will soon note that she does not deliver the goods: Neither publications that attract research foundations nor results that sponsors like. Therefore, she will bring in no funds to tax. Consequently, her preferences will harm her career. Thus, pure truth seeking is altruistic in the sense of giving away personal gain for the greater good of truth.[18]

In contrast, Econ is shrewder and finds an estimate that is a little 'better' than β^R. Thus, he will add to the β-knowledge that the 'state-of-the-art' estimate is β^R, or maybe even a bit

17. The official Danish report on the Code of Conduct for Research Integrity (2014) is typical of such reports. It was made by a committee of 12 leading administrators of academic institutions citing 24 similar reports and declarations from other countries and international organizations.

18. Economists recognize altruism as a fact, and empirical studies regularly find altruism, but it is also a main finding that it plays a limited role. A famous quote by Gordon Tullock is that 'people are 5% altruistic'.

higher. Consequently, Econ's research gives a small divergence from the truth, not convergence to the truth.

In relation to the research integrity ideals, Econ is a 'rotten' researcher, but he does not want to appear so, as it would harm the publication chances of his paper and his career in general. Thus, Econ will mimic the altruistic as much as he can, and he will be terribly offended if anyone suggests that he accommodates sponsors, referees etc. Thus, for the reader, it is difficult to know if the researcher is rational or altruistic. It follows that both rational and altruistic authors do their best to create credibility by the same devices.[19]

One method is to present *robustness* experiments. The average paper publishes about ten estimates in order to show the robustness of the main result. The main problem with robustness experiments is that what matters for the bias is the number of experiments per published one, not the number published (Paldam 2015b). A second method is *out-of-sample projections* (Clark 2004). It is not as common as robustness experiments, but it is not rare either. Obviously, the rational researcher may mine both the sample and the out of sample data. This is likely to be a stepwise process, but it can surely be done.

Some processes are working to help a convergence to the truth: The main characteristic of a true estimate is that it survives *independent replication*.[20] What is needed is another researcher who tries to replicate *exactly* the same model on another data set. If the new estimate of β does not differ significantly from the old one, it increases the probability that it is the true model. After repeated independent replications, it is likely that the true model has been sorted out, but it is well known that replication studies are difficult to publish. It is also possible to approach the true value by making meta-studies of the literature as mentioned.

3.6 Jumps, schools and the confirmation bias

The above analysis concentrates on an individual researcher who writes a paper for a market where a reservation estimate exists. However, sometimes jumps occur, and some fields have several schools with different reservation estimates.

Imagine that the twist in Econ's new model is so big that it generates an estimate that is substantially different from the going reservation estimate. That will make his paper difficult to publish – it is likely to take one or two years longer. If he succeeds, it is possible that his paper will be cited more than most papers, but it will take several years for the extra citations

19. This theory is inspired by the 'rotten kid theorem' from Becker (1974); see also Frey (2003).
20. See also Dewald *et al.* (1986), McCullough *et al.* (2008) and Duvendack *et al.* (2015).

to start. Thus, it is a risky strategy where the costs are quick to materialize and the benefits come after 5-6 years. If Econ is at a critical step in his career, the risk may be forbidding.

If truth prevails in the longer run, it may pay in that perspective. From the argument above, it follows that the longer run may be rather long. The career of the economist takes place in the short to medium run. Truth seeking has two more problems. The second is that it is difficult for the researcher herself to know if she has found truth or confirmed her priors and the ones of the market. The third problem follows from the fact that everybody else pretends that they seek truth only and have great 'research integrity' as demanded by official policy.

In addition, in some cases, two or more schools exist in the market with different reservation estimates. There are even cases where the schools differ as to the signs of the parameter researched. Here Econ can choose his market.

4. Econ as policy advisor

Econ is appointed policy advisor as he is assumed to have the β-knowledge, and one of his jobs is to write a one-page memo with his best assessment, β^A, of β to the Minister, and through him to the political market. The memo has to be written so that it does not embarrass the Minister if it reaches the media, and it may be based upon a technical background paper. The advisory position gives Econ an extra salary and maybe other advantages.

Section 4.1 gives some background. Econ has to give advice that is useful to the Minister, who may find another advisor if this is not the case. His advice has to be academically respectable, and he may quit if he has to give advice that is too 'politicized'. Thus, he functions between the sacking and the quitting point. Section 4.3 considers some extensions.

4.1 Some background: Great expectations, their disappointment and myopia

A robust general finding in the political economy of elections is that the average government loses the support of about 2.5% ($\pm$5%) of the voters from ruling a normal election period.[21] A simple way to understand this result is to note that to have majority in an election, a party (coalition) has to promise too much. When elected, a government comes to reveal that some of

21. This result is based upon 283 elections in 19 established 'western' democracies. The result does not depend upon the size of the country or the election law (Nannestad and Paldam 2002).

the promises were exaggerated. Thus, economic policies have exaggeration cycles.[22] Another commonly found result in studies of elections and politics in general is that the political process enforces a short time horizon (Nannestad and Paldam 1994). The political myopia is one of the mechanisms causing exaggeration cycles.

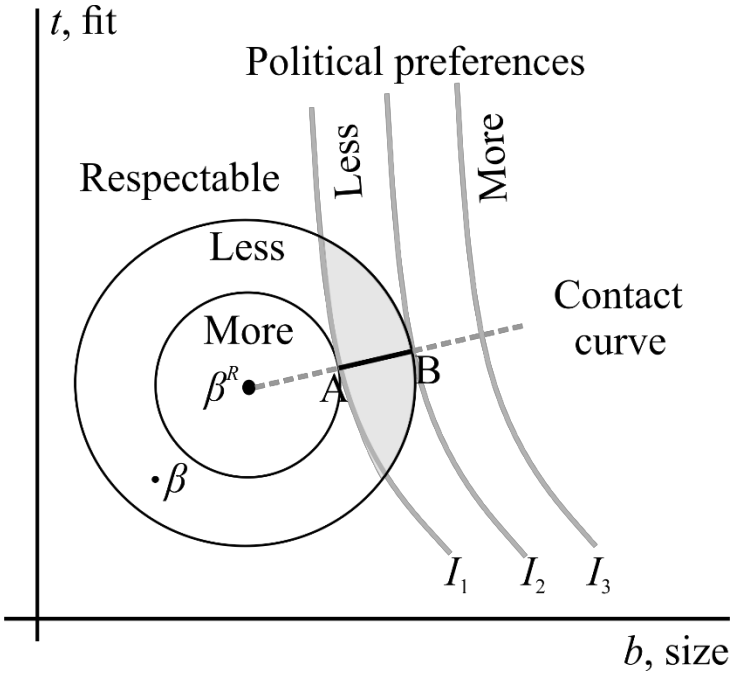
This creates some distrust towards the political system, including the Minister. Outside advisors are chosen to give credibility. Thus, the advisor has to give politically useful advice – that is, advice the Minister can 'sell' on the political market – and at the same time he needs to keep his credibility relative to his academic audience. It is a problem for Econ, in the longer run, if many in the academic audience see his political advice as overly politicized. Part of the cyclical nature of policy-making is that policies that have been oversold come to be seen as discredited. This is an important part of (K3) the casual observations in the β-knowledge. That is, if an announced value of β has been used for a policy that did not deliver (fully) on its promises, this reduces the size of β that can be sold on the political market for some time.

4.2 The choice of Econ's best advice: An Edgeworth game

The advisor is engaged in a game that can be explained by two sets of preferences. A key to the academically respectable advice is that the β-knowledge about β contains a 'state-of-the-art' estimate, β^R, which is a bit larger than β. In principle, β^R is the value that Econ should use as his key advice. However, Econ also wants his advice to be useful for the Minister, who has the political preferences drawn on Figure 1a. The two sets of preference curves give the Edgeworth box depicted on Figure 5.

22. In a set of influential papers, Alesina (1987, 1989) showed how rational political business cycles may occur in the short run when election outcomes are uncertain. However, the evidence may also be interpreted as unsuccessful attempts by new governments to implement electoral promises (Paldam 1991).

Figure 5. Econ as advisor to the Minister



Econ has some leeway: The literature does not fully agree about the state-of-the-art estimate, β^R, and it is possible for Econ to stress the quality of some study that produces a more desirable estimate. In addition, β^R is supposedly a ceteris paribus estimate, which is surely not what is needed. Thus, β^R should be adjusted for the relevant conditions. This is not easy to do. Here a background paper with estimates on recent national data may come in handy, and by a careful search, a range of results will surely appear. Thus, the respectability preferences are a set of circles around β^R that become less respectable the further away from the center they are. The political preferences from Figure 1a are, as mentioned, rather steep, indicating that the Minister does not care much about the fit, but wants a big size. The contact curve is the line that starts in β^R and goes to the right. A is the sacking point, and B is the quitting point.

Economic theory predicts that a point on the AB-line will be chosen. The choice depends upon the power and negotiation ability of Econ and the Minister. The typical Minister is surely good at such power games; this is precisely why he is minister. Therefore, it is likely that β^A will be close to point B. This gives the following sequence:[23]

23. Two recent meta-studies compare estimates in research papers and official reports. They confirm the sequence (8) (Royuela 2016, Fidrmuc and Lind 2017). Other meta-studies compare estimates of independent and dependent (who work in an administration) researchers, they also confirm (8); see *e.g.*, Doucouliagos and Paldam (2008).

(5) $\beta < \beta^R < \beta^A$

This is the case if β is a measure of policy efficiency. The Minister wants to increase some good or decrease some bad, y, by a measure x, so that policy efficiency is $\beta = \partial y/\partial x$. If Δx is unpopular, such as a tax increase, the best would be if the tax is very effective in collecting revenue, so that only a small increase is necessary.

The model explains how an able advisor comes to choose the best advice. It shows how the two sets of preferences generate the choice, but neither of these is Econ's own preference. Thus, any other able advisor will choose almost the same choice. Consequently, *able advisors are interchangeable*. However, in spite of the problems of 'exaggerating' advice, it is likely that the exaggeration would be larger without the advisor.

4.3 Extensions: Many types of advice and advisors

It is easy to extend this analysis: There are cases where the Minister wants a small effect. For example, he wants to abolish a policy made by a former government, so he wants to be able to argue that the policy is inefficient, or he may want ammunition to shoot down policy proposals from the opposition. In such cases, equation (8) breaks down. It may even happen that $\beta^A < \beta$.

Some advisors are appointed to give independent advice to both government and opposition. Thus, they may advise the Parliament or the public at large. The idea behind this may be that the advisor is to help the government and the opposition to agree more easily by discrediting extreme policies. Here the advisor works in the interval between the government and the opposition – an interval that may or may not include β.

In addition, a whole set of additional possibilities occur when Econ advises about several issues. Here he can give advice that is more pro-opposition on one issue if he gives advice that is more pro-government on another issue, so a particular kind of log-rolling results.

5. Conclusion

Economists, notably public choice scholars, often assume that politicians, civil servants, etc. are not *only* working to maximize social welfare, but have their own interests as well. The analysis above is an attempt to look at ourselves in the same perspective. It considers the representative academic economist, Econ, who seeks truth, as he should, but who also has interests that allow us to model his behavior by economic theory. The paper models his choices as regards an important parameter, β, when he works as researcher and as political advisor, and

finds that his choices follow straight from the theory. The key result is that it is rational for Econ to exaggerate his results.

When Econ is researcher, the model predicts that his published results are both too large and too significant. This confirms the results in most meta-studies. However, about one third of meta-studies find no publication bias. The Econ model allows us to identify cases where no bias is produced. This may happen, *e.g.*, when economic theory does not predict the sign on β, or when the interests of sponsors differ sufficiently.

When Econ is policy advisor, he enters in a game of some complexity, as he is dealing with two sets of preferences. On one hand, his job is to give useful advice that is politically possible. On the other hand, he wants to give respectable advice that is acceptable by the economic profession. Here the analysis suggests an even greater exaggeration, but some cases have been mentioned where this prediction becomes blurred.

It is easy to criticize the analysis: The reader may look inwards and conclude that his or her decisions are more complex or less rational than Econ's. However, the theory is not made to describe any particular individual, but the representative economist.

It has been a main effort in writing this paper to use only theory that everybody likely to read this text has learned and most have taught. That is, everything is based upon standard textbook microeconomics, which is known to give results that largely generalize to more advanced theory. Thus, if the reader thinks that the analysis is wrong, it is an important question just how much of our general theory is wrong and how it should be revised.

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