Acquiring Knowledge over the Economist's Lifetime

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Abstract:

In this paper the reading behaviour of economists is examined to see whether particular types of knowledge - basic and applied - imply different investment patterns. As it turns out, the reading intensity of advanced theoretical and empirical literature declines with three to four percent per year of experience, although researchers and economists with a mathematical background start with a higher initial stock of knowledge of this type of literature. Business and government economists concentrate on applied literature and news magazines; a type of literature which is not frequently read by mathematical economists. However, the mathematical economists catch up with their non-mathematical colleagues in 12 to 15 years time. Furthermore, the introduction of graduate schools in Dutch academia has not brought about a fundamental change in reading habits. The biggest factor in explaining the divergence in reading behaviour among economists remains the mathematical, c.q. econometrics background in undergraduate training.

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1. Introduction

It is generally acknowledged that age affects the human capital investment profile on the grounds that working life and life itself are finite. Once the retirement date comes within the horizon of the investor the payback period declines rapidly. As a consequence of this investment profile it is often asserted and shown that individual productivity over the lifetime follows an inverted U-shape.[1] At the beginning of a career the productivity moves in line with the increasing human capital stock. Once an employee is past the age of, say, 45 the productivity declines slowly as investment slows down and the human capital stock starts to diminish. Of course, if capital does not depreciate or does so very slowly, the age-related investment profile loses its hump shape and becomes a downward-sloping curve. It is hard to imagine a capital good which does not depreciate as time passes by. However, it does seem plausible that the knowledge derived from basic research depreciates at a slower rate than the knowledge of applied research.

The central question of this paper is: do different types of knowledge also imply different investment patterns? In answering this question I will focus on a particular brand of investors: economists. One way of acquiring knowledge by economists is to invest reading time in various types of journals and reports. Investing in human capital is in the present set-up tantamount to the reading intensity one displays in everyday working life. Furthermore, it is of importance to trace the type of knowledge economists invest over their lifetime. It is indeed shown by Holub *et al.* (1991) that once one has accumulated basic knowledge of a particular specialisation in economics one will rarely come across an important article which adds substantially to an individual's stock of knowledge or which destroys the insights gained so far. For instance, in order to keep track of the developments of growth theory (thus reading about 12 articles per year) an economist will find at least one important article every third to fifth year. It seems to be a fact of scientific life which one cannot escape from very easily. It does, however, give a rationalisation for the slowdown in reading intensity as one accumulates experience as an economist.

Of course, there is also knowledge which depreciates rather rapidly and knowledge of this type is usually of an applied nature. In order to keep up to date in 'practical' economics one has to maintain a steady reading rhythm throughout a career and on that count age should not matter. Needless to say, there are numerous other reasons why age can matter in reading behaviour, even when this concerns the pedestrian economics literature. The time constraint which the economist faces becomes more and more important as one ages and as responsibilities cumulate. For most economists research time becomes a residual which naturally prohibits an economist from keeping in shape. Administrative duties, consultancy practices, refereeing for learned journals, supervising students, lecturing; they are all the tolls of fame of some sort and they impinge on the age structure in science (cf. Zuckerman and Merton, 1972). Listen, e.g. to the eminent economist Jan Tinbergen who admitted at the age of 83 that: "I simply cannot read the larger part of *Econometrica* anymore; [..] simply because of lack of time. There was a time when I would read *Econometrica* as a whole, also probably because I was younger and had fewer responsibilities." (cited in: Magnus and Morgan, 1987, p. 136).

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1. See Diamond (1986), Goodwin and Sauer (1995), and Oster and Hamermesh (1998).

In discovering the investment patterns of economists a survey among (Dutch) economists will be used. There are, of course, other methods of determining 'investment' behaviour. The most simple one is to explore the works cited in officially published journal articles (as in Stigler, 1994; and Stigler *et al.* 1995), but then one confines the sample of economists to a particular brand of practitioners, viz. the successful publishers. The large majority of economists do not publish in the internationally recognised journals as screened by the Social Science Citation Index. They are merely users or consumers of knowledge of a very applied nature. A priori one would expect economists to differ in their demand for knowledge. Journals and mimeographed papers are the academic economist's main input in constructing new knowledge, for the economists working inside government or private business reading an issue of *Econometrica* or the *Journal of Economic Theory* may not be - to put it mildly - a worthy investment since those economists are more interested in profitable knowledge which they can directly apply. *The Economist* or *the Wallstreet Journal* will probably contain more knowledge for those economists. As we will see shortly, the economist's investment behaviour seems rational. We stress the verb 'seem' because the survey data do not allow us to disentangle other motives and constraints which one would expect to be of importance in reading journals. For instance, some economists read the pages of the *American Economic Review* for mere fun, while others are perhaps incapable of reading the contents of this journal, because they cannot comprehend the lingo academic economists use or because they have not kept 'in shape' by formal training or by learning-by-doing.

With all these caveats in mind, exploring the reading behaviour of economists may prove a worthwhile enterprise because it shows how a particular profession deals with the ever ongoing information explosion (Lovell, 1973). The questions that spring to mind are equally thought-provoking as the question of the age-related investment profile. For instance, do economists working in the field of pure theory keep in touch with developments in economic policy or are they as preoccupied with the self-defined research questions of pure theory as Frey and Eichenberger (1993, 1997) argue they are? And do left-wing economists only consider evidence of their own *Weltanschauung*?

The contents of this paper are quite simple in structure. First, I will introduce and summarize the relevant survey data in section 2, to be followed by an empirical analysis of the reading behaviour of economists (section 3). Section 4 closes with a discussion of the results.

2. A Survey of Economists' Reading Intensity

The data on which the statistical analysis relies is a six-page questionnaire which was sent in the spring of 1995 to some 1,200 Dutch economists randomly drawn from the records of the Dutch Royal Economic Society (a total of 3,200 members).[2] In addition to this sample the entire population of Dutch graduates in economics

2. For matters of comparison, in 1994 37,000 'economists' worked in the Netherlands, approximately 18 percent of them are comparable to what the English and Americans call 'economists', the rest of the group of economists would be comparable to MBAs and economists with a business school degree. Hence approximately 50% (3,200 of 0.18*37,000) of the economists are organised in the Royal Dutch Economic Society and 37.5 percent of those members were asked to fill in a questionnaire.

(approximately 300) were sent a more elaborate questionnaire (reported in Van Dalen and Klamer, 1996, 1997a). Besides questions concerning their opinions about the state of economic science and economic phenomena we inserted a question about their reading intensity of a particular type of papers. The exact frequencies are presented in Table 1.

Table 1: Reading intensity of economists by type of paper (in percentages)[a]

Type of paper/journal	Reading intensity of the different types of papers/journals				
	Every week	Every month	Every quarter[b]	Irregular[b]	Never
Pure economic theory	4.5	12.7	13.5	28.2	41.1
Theory mixed with empirics	8.6	20.1	20.3	20.8	30.3
Applied general	6.7	22.1	26.2	25.1	19.8
Radical economics	1.8	7.4	12.5	26.9	51.3
Applied at national level	34.3	27.6	18.8	12.9	6.5
Economic magazines	30.0	19.6	22.1	16.5	11.8
Economics section newspaper	87.5	6.7	2.4	1.0	2.4

(a) The question in the survey was formulated in the following fashion: "How often do you read the following type of article on average per year? With articles we also include unpublished manuscripts or discussion papers of the stated type journal." The type of journal associated with the journals stated above were illustrated by the following titles: pure theory (*Journal of Economic Theory* or *Econometrica*); theory combined with empirics (*American Economic Review* and *Journal of Political Economy*); Applied general economics (*Brookings Papers on Economic Activity* and *Economic Policy*); radical or heterodox economics (*Review of Radical Political Economics* or the Dutch equivalent *Tijdschrift voor Politieke Economie*); applied at a national level (the Dutch journal *Economisch Statistische Berichten*); an international economic weekly magazine (*The Economist*); and the economics section of your newspaper.
(b) The frequencies "Every quarter" were actually described as "Once or twice per quarter" in the questionnaire and the frequency "Irregular" denotes "Once or twice per year".

As one would expect articles which touch upon radical economics - as published in the *Review of Radical Political Economics* - and on pure theory - as one encounters in *Econometrica* - have the smallest population of readers. The newspapers and the journals with economic information of a very applied nature have the largest population of readers. In the survey a distinction was made between applied economics on a general, more advanced level and a national, pedestrian level. Journals which contain the latter type of knowledge appear more frequently and are probably read with more ease by those who have left academia completely. The applied literature as it appears in the *Brookings Papers on Economic Activity* and its European counterpart *Economic Policy* is probably read by those economists who work in the twilight zone between academia and consultancy.

An interesting question to explore at this juncture is the one relating to the interdependence of knowledge acquisition. The correlation matrix in Table 2 shows some clear patterns across the different types of economic literature. The positive correlation between pure theory and the more general academic journals,

which mix theory with empirical evidence is one of the highest, to be followed by the correlation between general academic and the general applied literature. The correlations between the advanced academic literature and the more applied literature, which conveys information on the state of the economy, is weak and in some cases negative. This pattern suggests that there exists a division amongst economists of those who only read the academic in crowd journals, whereas the economists working on a more down-to-earth level read primarily the journals and publications which contain knowledge directly applicable. Tempting as this division may seem to some, one has to dig deeper in order to claim that the economics profession is split up in two separate, non-communicating camps. Section 3 offers the reader such an attempt.

Table 2: Correlations between reading intensities

	Type of papers/journals						
	Pure Theory	Theory/ Empirical	Applied generally	Radical	Applied nationally	Economic Magazines	Economics section of newspapers
Pure theory	1.00	0.69	0.27	0.10	-0.08	-0.01	-0.13
Theory/Em.		1.00	0.48	0.15	0.05	0.07	-0.06
Applied gen.			1.00	0.39	0.37	0.28	0.14
Radical				1.00	0.25	0.12	0.07
Applied nat.					1.00	0.29	0.29
Econ. Mag.						1.00	0.22
Newspapers							1.00

3. Investing in Economic Literature: An Interpretation

Explaining the investment patterns in economic literature is to some extent difficult since the question capturing the reading intensity of economists merely registers *stated* time spent reading, which may differ markedly from the actual time spent for a variety of reasons. In the absence of perfect monitoring we will have to do with this type of measurement and hope that economists speak the truth. With this tacit assumption in mind the reading intensity of economists is estimated. As the dependent variable is an ordinal one, an ordered probit model was used (see Maddala, 1983, pp. 46-51). The probability that an economist *j* reads a paper of some type *s* (ranging from pure theory to newspaper articles) with the intensity *i* (*i* ranging from 'weekly' to 'never') corresponds to the probability that the estimated linear score function below, plus the normally distributed error term ϵ_j^s is within the range of cut points κ_i^s estimated for the outcome:

(1) $$Pr(paper_j^s = i) = Pr(\kappa_{i-1}^s < \sum_k \beta_k^s x_{kj}^s + \epsilon_j^s \leq \kappa_i^s)$$

In our case the parameters β_1^s, β_2^s ,.... β_k^s are estimated along with the four cut points κ_i^s.

The most important explanatory variables (x_i^s) fall into three groups, viz. those related to:

(1) The profitability to read.

This motive is approximated by the question whether one is actively involved in research (denoted by *Researcher*[3]) or the type of employment (the private sector - *Business* - or the public sector, *Government;* the economist employed in the category employed in research/teaching serves as a benchmark). The researcher is not necessarily an academic economists as there are quite a number of economists inside government who are actively involved in research. These dummy variables are bound to differ as investment in a particular brand of literature is inspired by the profitability of that activity. Business economists earn a living by knowing the facts of the day, while academic economists will benefit more from reading *Econometrica* than from reading issues of the policy reports as their culture pushes them to produce and publish knowledge of a fundamental nature. This is not to say that academic economists do not read newspapers. They will invest on average more in pure theory and less in applied economics. At least, that is the theory and perhaps the practice of academic life. Furthermore, we expect an effect of learning-by-doing: in order to do research one has to invest in economic literature and if one carries out research one is bound to read more than the economist who only consumes economic literature.

(2) Reading as lifetime investment.

The variables *E* (years of experience) and *Math* (whether one starts a career with a mathematical or econometrics background) are the approximations of this reading motive. These variables are at the focus of our attention as they are the most relevant for the investment motives of today's economist. Experience is so, because one starts a career with a stock of knowledge which needs to be replenished if the knowledge becomes outdated. As the majority of fundamental papers are of a mathematical or advanced statistical nature, the inclusion of mathematical, c.q. econometric training background becomes important as it affects the ability to read advanced mathematics and statistics which are the dominant ingredient of an economics paper in one of today's top journals. If basic knowledge does not depreciate, or does so very slowly, we would expect a negative relationship between years of experience and reading.

An additional reason for including the mathematical background as a variable is to be traced to the Dutch economics curriculum which makes the distinction between a MA in economics and a MA in econometrics. In 1957 Henri Theil was the founder of the econometrics department at the Erasmus University Rotterdam (then called Nederlandsche Economische Hoogeschool), soon to be followed by other economics departments in the Netherlands. In line with the spirits of the day it was meant to stimulate research in quantitative economics but as time passed by specialisation set in and nowadays econometricians are more or less applied mathematicians with very little economic training. Unfortunately the reverse applies to economics

3. The exact question put to the economists was: "Do you carry out research on a regular basis (i.e. at least once a year)?". For the total sample (including the graduates and PhDs) 67 percent of the economists said 'yes' (Van Dalen and Klamer, 1996).

majors: they receive a few courses in mathematics during their undergraduate days and a lot of (basic) economics. It stands to reason that this type of background must have its implications for reading behaviour.

(3) The preference for a certain type of publications.
The preference for certain publications, ranging from pure theory to the economics appearing in newspapers, is captured by the dummy variables *Gender* and the political persuasion of the economist as measured by the party choice by the economists at the last national election (two dummy variables - *Left-wing* and a *Right-wing* - were created to capture for this purpose).

A number of elements about the reading behaviour of economists, as illustrated by Table 3, jump off the pages. First of all, experience on the job matters. The years of experience start to count once one has started a career in economics. Primarily the papers on pure theory or on advanced theory mixed with empirical findings are read less and less as time passes by. A mathematical training in that respect does not stop this process, although in case of pure theory the economist with a mathematical background reads on average more than his non-mathematically trained colleague.

Economists actively involved in research read mostly papers of an applied nature or the papers which conform to the style of the *American Economic Review*. Pure theory reaches a very specialised audience, which stands to reason as one has to invest a considerable amount of time in order to attain the ability to read, e.g. *Econometrica*. The pattern which emerges from the survey data is revealing in that mathematically oriented economic researchers spent more of their time reading what other mathematical economists write than their ordinary colleagues, who do not have a background in econometrics or mathematics. The mathematical economists also spent considerably less time on knowledge of an applied nature, judging from the *Math*-coefficients in the fourth row. They do, however, catch up on their arrears in practical knowledge, as one can deduce from the relatively large coefficients on the interaction tern between a mathematics background and years of experience. To quantify the catchup effect more precisely, mathematically-trained economists have caught up with their non-mathematical colleagues in 12.3 years in advanced applied papers (type *Brookings Papers*), 12.8 years in nationally applied papers and 15.3 years in the knowledge which can be dug up in magazines like *The Economist.*[4] Given the fact that once one starts working one cannot allocate the full time endowment reading the applied literature, these catchup lengths seem reasonable, especially if one compares this to the average formal university training time, 4-6 years.

A second, but plain, result is that the necessity to read a particular brand of economic literature depends on one's line of work. Economists actively involved in research read with more zest the columns of the high brow economic literature than their colleagues who only read economics just to be kept informed about the state of the economy and not with the intention to use papers as an input in their own research. Besides the pure academic literature researchers also seem to read the low brow literature (columns five and six).

4. Because of non-linearity in the effect of experience on reading intensity, the average mathematically trained economist reaches his maximum after 17.6 years of experience in general applied papers, 17.3 years in nationally applied papers, and 19.3 years for economic magazines.

Table 3: Ordered probit estimates of the economist's reading intensities

	Dependent variable: Reading intensity of papers of the following type:						
Explanatory variables	Pure theory	Theory/ Empirical	Applied generally	Radical economics	Applied nationally	Economic Magazines	Economics newspapers
	1	2	3	4	5	6	7
Researcher	0.71***	1.22***	0.87***	0.46***	0.38***	0.27**	-0.38**
	(0.12)	(0.13)	(0.12)	(0.13)	(0.12)	(0.11)	(0.19)
Business	-0.41***	-0.54***	-0.35***	-0.51***	0.31**	0.31**	0.02
	(0.14)	(0.13)	(0.12)	(0.14)	(0.13)	(0.12)	(0.20)
Government	-0.29*	-0.23	-0.25*	-0.26*	0.61***	0.18	0.12
	(0.15)	(0.15)	(0.14)	(0.15)	(0.15)	(0.14)	(0.25)
Math	0.60**	0.16	-1.41***	-1.28***	-1.11***	-0.71***	-0.50*
	(0.22)	(0.22)	(0.23)	(0.27)	(0.22)	(0.22)	(0.29)
E	-0.042***	-0.042***	-0.011	0.031**	0.004	0.008	0.027
	(0.015)	(0.014)	(0.013)	(0.014)	(0.013)	(0.013)	(0.021)
E^2	0.0006*	0.0004	0.0002	-0.0007**	0.0001	-0.0003	-0.0003
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0004)
Math . E	-0.020	0.027	0.176***	0.062	0.138***	0.077**	0.056
	(0.034)	(0.034)	(0.037)	(0.041)	(0.034)	(0.034)	(0.053)
Math . E^2	0.001	-0.000	-0.005***	-0.001	-0.004***	-0.002**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Gender	-0.26	-0.18	-0.21	0.31	-0.42**	-0.33*	-0.52**
(female =1)	(0.19)	(0.19)	(0.18)	(0.20)	(0.18)	(0.18)	(0.22)
Left-wing	0.01	0.13	0.23**	0.51***	-0.02	-0.09	-0.01
	(0.11)	(0.11)	(0.11)	(0.12)	(0.11)	(0.11)	(0.17)
Right-wing	-0.04	0.06	-0.08	-0.21*	-0.34***	0.08	-0.17
	(0.12)	(0.12)	(0.12)	(0.13)	(0.12)	(0.12)	(0.18)
Log Likelihood	-716.5	-748.0	-821.8	-638.4	-824.3	-895.6	-285.6
$\chi^2(11)$	195.0	302.4	148.4	133.7	83.8	35.1	41.1
N	579	580	583	579	586	584	588

(a) Standard errors are stated between parentheses; a * denotes significance at 10% level or smaller, ** at 5% level and *** at 1% level. The variable *Researcher* denotes whether the economist is actively involved in research; *Business* denotes employment in the private sector; *Government* denotes employed in the public sector; *Math* denotes a MA degree in mathematics or econometrics, and *E* denotes the number of years experience calculated as the difference between the year of the interview (1995) and the year of graduation, respectively; *Left-wing* is dummy variable reflecting a progressive political persuasions: Green Left and Labour Party = 1 otherwise 0; Right-wing refers to conservative party choice: conservatives and Conservative Christian parties = 1, otherwise 0; the Christian Democrats (CDA) and the Democratic party (D66) are the benchmark.

Researchers are only slightly less interested in the economic news which appears in newspapers. Business economists do not consult intensively the pages of the *American Economic Review* or *Economic Policy*. Judging from columns five and six they are only interested in the literature which is profitable: applied national literature and the information in economic magazines. Newspapers are well read by business economists, but not more or less than the intensity with which such papers are read by government economists. The category of government economists is particularly interested in nationally applied papers, which stands to reason as those papers contain information which serves as an input in their advisory role.

A surprising result is that the gender of an economist seems to matter when it comes to investing in economic literature. Female economists are more likely than their male colleagues to read unorthodox or radical economics. All journal/paper types, save the radical economics journals, are negatively associated with female economists. The female preference also seems to indicate a clear dislike for nationally oriented economic knowledge. Of course, I am not sure whether this applies to all economists of the female gender, but from an earlier study (Van Dalen and Klamer, 1997b) this finding fits the general picture of (Dutch) female economists being more interested in unorthodox voices in economics and an aversion for mainstream (or as feminist economists call it 'malestream') economics.

A second surprising result is the element of political ideology in reading behaviour. Especially the papers on radical economics and applied economics are vulnerable to the political colour of the economist. Left-wing economists are far more likely candidates reading the unorthodox prose published in journals as the *Review of Radical Economics* than their right-wing colleagues. This does, of course, not signify that 'radical economics' is not read by economists. First of all, radical or heterodox economists do get their work published in mainstream journals and those journals are more widely read. Furthermore, dissenting economists like Piore, Boulding, Sweezy and Heilbroner are recognised as outstanding economists who have published their most important work in the form of books and as we asked the economists about the type of papers they have read, books were obviously not included. In short, it suggests that unorthodox papers or journals primarily seem to be read by a likewise oriented public. The average reader is likely to be a left-wing, non-mathematical, academic researcher. Right-wing economists show a clear dislike for unorthodox economics and turn away from radical prose (but then again, that is what makes them conservative).

The survey allows us also to explore another question which might affect the outcome of Table 3, viz. the degree (or culture) of graduate training. Starting in 1986 the six economics faculties in the Netherlands started to train their graduates in economics in an American mode. Graduate schools were established and advanced workshops were organised to train the new generation in modern economics. In the design of Dutch graduate training the American model of graduate training was implicitly and sometimes explicitly used. has raised some mixed feelings among European economists (see Frey and Eichenberger, 1993, 1997). In the survey opinions were polled of PhDs of two vintages - an American style and a European style PhD - we can examine whether the experiment of a new graduate training style has affected the economic literature orientation of the top-level economists in the Netherlands. Table 4 reports the results for reading intensities across PhDs - American style (denoted as 'PhDs new') and European style (denoted as 'PhDs old') - and the current generation of graduates who did not finish their doctorate in 1995.

Table 4: The economist's reading intensities: does graduate training matter?[a]

Explanatory variables	Dependent variable: Reading intensity of papers of the following type:						
	Pure Theory	Theory/ Empirical	Applied generally	Radical economics	Applied nationally	Economic Magazines	Economics newspapers
	1	2	3	4	5	6	7
PhDs old	0.76***	1.16***	0. 84***	0.26*	0.41***	0.08	-0.39
	(0.14)	(0.14)	(0.13)	(0.14)	(0.14)	(0.13)	(0.23)
PhDs new	0.68***	1.21***	0.80***	0.21	-0.11	0.33*	-0.52*
	(0.18)	(0.17)	(0.17)	(0.18)	(0.17)	(0.17)	(0.27)
Graduates	0.75***	1.00***	0.57***	-0.04	-0.36**	0.10	-0.69**
	(0.20)	(0.19)	(0.18)	(0.20)	(0.19)	(0.19)	(0.30)
Business	-0.31**	-0.46***	-0.33***	-0.62***	0.18	0.25**	-0.13
	(0.14)	(0.14)	(0.13)	(0.15)	(0.13)	(0.13)	(0.22)
Government	-0.22	-0.22	-0.27**	-0.39**	0.44***	0.12	0.01
	(0.16)	(0.15)	(0.15)	(0.16)	(0.15)	(0.15)	(0.26)
Math	0.59**	0.19	-1.30***	-1.18***	-0.93***	-0.68***	-0.45
	(0.22)	(0.22)	(0.23)	(0.27)	(0.22)	(0.23)	(0.30)
E	-0.031**	-0.033**	-0.010	0.018	-0.027*	0.010	0.003
	(0.018)	(0.017)	(0.016)	(0.018)	(0.016)	(0.016)	(0.027)
E^2	0.0002	0.0001	0.0000	-0.001	0.0004	-0.0004	0.0001
	(0.0004)	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0005)
Math.E	-0.021	0.017	0.156***	0.051	0.110***	0.076**	0.052
	(0.035)	(0.034)	(0.037)	(0.041)	(0.035)	(0.036)	(0.055)
Math.E^2	0.001	-0.0001	-0.004***	-0.001	-0.003***	-0.002**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Gender (female =1)	-0.31*	-0.21	-0.21	0.35*	-0.31*	-0.31*	-0.45**
	(0.20)	(0.19)	(0.19)	(0.20)	(0.19)	(0.19)	(0.23)
Left-wing	-0.04	0.05	0.17	0.47***	-0.07	-0.10	0.00
	(0.11)	(0.11)	(0.11)	(0.12)	(0.11)	(0.11)	(0.17)
Right-wing	-0.07	0.00	-0.12	-0.23*	-0.39	0.07	-0.16
	(0.12)	(0.12)	(0.12)	(0.13)	(0.12)	(0.12)	(0.18)
Log Likelihood	-715.6	-753.2	-826.9	-642.9	-820.3	-896.6	-284.4
$\chi^2(13)$	196.8	291.9	138.2	124.8	91.8	33.0	43.6
N	579	580	583	579	586	584	588

(a) Ordered probit estimation, standard errors are stated between parentheses; a * denotes significance at 10% level or smaller, ** at 5% level, *** at 1% level. The variables '*PhD old*' and '*PhD new*' denote the generation of PhDs trained in the old European style and trained in an American style respectively, *Graduates* denotes the current generation who in 1995 had not finished their American style PhD training.

In estimating the effects of graduate training we control for the same variables as in Table 3, save the dummy variable 'Researcher', as the graduate training, c.q. PhD variables and the variable 'researcher' are correlated thereby giving rise to multicollinearity problems.

The estimation results are to a certain extent remarkable as they suggest that the acquisition of knowledge is more or less constant across different vintages of PhDs. Of course, today's graduates invest far more in the pure theory literature than their experienced peers who obtained a PhD years ago. However, once one controls for experience, the differences are no longer that spectacular. The biggest difference in economic reading behaviour remains the fact whether one has enjoyed a mathematical training or not. The old PhDs even surpass the young bright men of today in their reading habits with respect to pure theory and the general and applied academic literature, but then again this finding may be affected to a large extent by the fact that a large number of the old PhDs have attained the status of professor, whereas a considerable number of new PhDs have not (yet) followed this career track.

What appears to be an odd outcome is the negative relationship between the probability of reading national newspaper articles on economics and the appearance of a new generation of economists.[5] Both the new PhDs and the graduate students turn away from the economics sections in the national newspapers. This fact may perhaps not be as odd as it appears. Klamer and Colander (1990) found out that a mere 3 percent of the US graduates perceived "having thorough knowledge of the economy" as very important for an academic economist succeeding in academia. Van Dalen and Klamer (1997a) reported that Dutch PhDs who have been trained in an 'American style' stated a similar percentage: 12 percent. Of course, if the incentives for economists are not directed at investing in knowledge about the economy then one should not be surprised that they are averse to knowledge of an applied nature. Perhaps it is somewhat comforting to know that the new generation of PhDs consults the pages of magazines such as *The Economist* more frequently than the average economist. Still, to turn away from the economics sections of the newspaper is something which remains odd, no matter how much time a graduate has to invest in acquiring 'high brow' literacy.

In order to better understand how graduate training affects reading at a certain time one can calculate the predicted probabilities from the model of Table 4. For matters of illustration, Table 5 presents the predicted probabilities for economists reading an advanced academic paper. As one can see the graduates are the heavy investors in pure theory. The more experienced PhDs invest significantly less than the young and eager 'grads', but still their investment exceeds that of the average economist. The most noteworthy element of the AER-type of papers is that the new style graduates and PhDs are more or less identical in their reading behaviour. The decrease in the acquisition of knowledge implied by the number of years of experience is counteracted by the relatively high interest in this type of papers by the new PhDs.

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5. An additional finding is that the negative effect of a mathematical training on reading newspapers is not as strong as it appeared in Table 3. Substituting the 'researcher' by the PhDs and graduates gives rise to a strong and negative effect among the new style PhDs and graduates, at the same time weakening the mathematics training effect. Given the high number of mathematics

Table 5: Predicted probabilities in reading papers/journals: graduates versus PhDs

	Reading intensity of pure theory papers (type *Econometrica*)				
	weekly	monthly	quarterly	irregular	never
PhDs old	5.22	16.42	17.22	32.15	28.98
PhDs new	5.20	17.54	18.48	33.10	25.68
Graduates	9.40	23.41	20.25	29.79	17.16
Total sample	4.33	13.05	13.85	28.42	40.46
	Reading intensity of theory mixed with empirics papers (type *Amer. Econ. Rev.*)				
PhDs old	10.52	26.38	26.62	21.55	14.93
PhDs new	15.85	32.52	26.69	17.06	7.89
Graduates	16.39	33.66	26.91	16.34	6.69
Total sample	8.56	20.21	20.98	20.50	29.75
	Reading intensity of generally applied papers (type *Brookings Papers*)				
PhDs old	12.17	31.78	28.98	18.83	8.24
PhDs new	12.50	31.91	28.81	18.76	8.02
Graduates	7.19	23.94	27.96	24.38	16.52
Total sample	6.93	22.09	26.52	24.90	19.56

If we turn to the applied papers then both type of PhDs beat the graduates with their investment rate. The reading intensity of the graduates barely exceeds the total sample average. The most plausible explanation for this pattern was provided already. A large number of graduates have a background in mathematics or econometrics and during their graduate years they neglect the applied literature, which they only start to read once they have finished their training.

4. Discussion

Academic life is nowadays dominated by the idea of *producing* economic literature. Whether this literature is read at all and by whom seems to be of less importance. Reading is an activity which increases one's stock of knowledge and indirectly one's value as an economist. But reading economic literature is also affected by one's ability to read, one's love for reading and the necessity to read. In this paper it was assumed that the profitability to read fundamental economic publications declines by four to five percent per year of experience. The reason why profitability declines is because the marginal productivity of reading an additional number of advanced theory papers also declines. Applied economic literature is not read with increasing or decreasing intensity as one gains experience, save the mathematically trained economists who have to catch up with their colleagues who followed the standard economics curriculum. As it turns out, experience is an important

explanatory variable, together with the ability to read mathematical prose (approximated by a mathematical training) and the necessity to read, as measured by the fact whether one actually performs economic research and the line of employment.

The most important implication of the findings of this paper is perhaps the implication that economics is not only a young man's game on account of the *production* of new fundamental knowledge (see Oster and Hamermesh, 1998), it is also a game for the young because it is primarily *consumed* or read by the young and eager economists. As the economist ages he will take note of the latest developments in science only through journals and papers which try to apply new ideas to the problems of the day. Reading less as time passes by poses no problem for areas of research, which are not characterised by revolutionary developments. Holub *et al.* (1991) already showed that a regular reader can keep track of his subject as the newly published articles contain a small share of important articles. The probability of hitting on an important article for a research subject, with an average appearance of 50 articles per year, decreases from 16 percent at the beginning of the 'life' of a field to less than 2 percent at the end. These percentages make clear why experienced readers do not have to read as much as the 'rookies'. Still, the fact that quite a number of them keeps on reading with relatively high frequency reveals that experienced academic economists know that reading is necessary in order not to fall behind. Economic science is clearly not a constant body of knowledge. Innovations do happen and these innovations, whether fashionable or not, are like learning a new language: if one does not adopt the new language rules one will soon start to feel helpless and estranged. Academia, in short, is no place for Rip Van Winkle, the imaginary figure produced by Washington Irving (1819) who fell asleep before the American Revolution and awoke twenty years later to discover an alien world. For the experienced and ambitious academic economist reading is a necessity.

References:

Dalen, Hendrik P. van, and Arjo Klamer, 1996, *Telgen van Tinbergen, Het verhaal van de Nederlandse economen*, Balans, Amsterdam.

Dalen, Hendrik P. van, and Arjo Klamer, 1997a, Blood is Thicker than Water - Economists and the Tinbergen Legacy, in: P.A.G. van Bergeijk et al., *Economic Science and Practice, The Roles of Academic Economists and Policy Makers*, Edward Elgar, Cheltenham.

Dalen, Hendrik P. van, and Arjo Klamer, 1997b, Vrouwelijke economen in Nederland: een klasse apart?, *Tijdschrift voor Politieke Economie*, 20, forthcoming.

Diamond, Arthur M., Jr., 1986, The Life-Cyle Research Productivity of Mathematicians and Scientists, *Journal of Gerontology*, 41, 520-525.

Frey, Bruno S., and Reiner Eichenberger, 1993, American and European Economics and Economists, *Journal of Economic Perspectives*, 7, 185-193.

Frey, Bruno S., and Reiner Eichenberger, 1997, Economists: First Semester, High Flyers and UFO's, in: P.A.G. van Bergeijk et al., *Economic Science and Practice, The Roles of Academic Economists and Policy Makers*, Edward Elgar, Cheltenham.

Goodwin, Thomas H., and Raymond D. Sauer, 1995, Life Cyle Productivity in Academic Research: Evidence from Cumulative Publication Histories of Academic Economists, *Southern Economic Journal*, 62, 728-743.

Holub, Hans W., Gottfried Tappeiner, and Veronika Eberharter, 1991, The Iron Law of Important Articles, *Southern Economic Journal*, 58, 317-328.

Klamer, Arjo, and David Colander, 1990, *The Making of An Economist*, Westview Press, Boulder.

Lovell, Michael C., 1973, The Production of Economic Literature: An Interpretation, *Journal of Economic Literature*, 27-55.

Maddala, G.S., 1983, *Limited-dependent and Qualitative Variables*, Cambridge University Press, Cambridge.

Magnus, Jan R., and Mary S. Morgan, 1987, The ET Interview: Professor J. Tinbergen, *Econometric Theory*, 3, 117-142.

Oster, Sharon, and Daniel S. Hamermesh, 1998, Aging and Productivity, *Review of Economics and Statistics*, 80, forthcoming.

Stigler, George J., Stephen M. Stigler, and Claire Friedland, 1995, The Journals of Economics, *Journal of Political Economy*, 103, 331-359.

Stigler, Stephen M., 1994, Citation Patterns in the Journals of Statistics and Probability, *Statistical Science*, 9, 94-108.

Zuckerman, Harriet, and Robert K. Merton, 1972, Age, Aging and Age Structure in Science, in: Robert K. Merton, 1973, *The Sociology of Science*, University of Chicago Press, Chicago.

Appendix: Summary statistics of the economist's reading intensity

To make the reading intensity interpretable, a data transformation on this ordinal variable has been applied for this appendix so one can interpret the variable as the chances that one will read a paper or an article per week. As one can see the chances that the average economist will read a paper on radical economics during a week is 5.1 percent and his or her chances or reading the economics section of a newspaper during the week is 89.4 percent.

Table A1: Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
Dependent variables					
Pure theory	613	0.089	0.212	0	1
Theory/Empirics	614	0.155	0.273	0	1
Applied general	617	0.149	0.247	0	1
Radical Economics	613	0.051	0.150	0	1
Applied national	620	0.433	0.422	0	1
Economic Magazines	618	0.376	0.422	0	1
Economic Newspapers	623	0.894	0.284	0	1
Explanatory variables					
Age	632	41.2	13.9	22	87
E	597	15.32	12.49	0	59
E^2	597	390.50	575.77	0	3481
Math E*	629	2.63	6.54	0	41
*Math** E^2	629	49.63	167.34	0	1681
Gender	632	0.06	0.24	0	1
Left-wing	632	0.39	0.48	0	1
Right-wing	632	0.30	0.46	0	1
Math	632	0.24	0.43	0	1
Researcher	632	0.65	0.48	0	1
Business	632	0.24	0.43	0	1
Government	632	0.14	0.35	0	1
PhDs old	632	0.25	0.44	0	1
PhDs new	632	0.10	0.30	0	1
Graduates	632	0.24	0.43	0	1