



Provided by the author(s) and University of Galway in accordance with publisher policies. Please cite the published version when available.

Title	On Uncertainty Aversion under Complete Ignorance: Some Further Observations on the Impossibility Results
Author(s)	Gekker, Ruvin
Publication Date	2005
Publication Information	Gekker, R., (2005) "On Uncertainty Aversion under Complete Ignorance: Some Further Observations on the Impossibility Results" Working Paper No. 0090) Department of Economics, National University of Ireland, Galway.
Publisher	National University of Ireland, Galway
Item record	http://hdl.handle.net/10379/986

Downloaded 2024-05-14T08:11:38Z

Some rights reserved. For more information, please see the item record link above.



***On Uncertainty Aversion under Complete Ignorance:
Some Further Observations on the Impossibility Results***

Ruvin Gekker*

Working Paper No. 90

April 2005

Department of Economics
National University of Ireland, Galway

<http://www.economics.nuigalway.ie/>

-
- Dr. Ruvin Gekker, Department of Economics, National University of Ireland, Galway, Ireland.
E-mail: ruvin.gekker@nuigalway.ie

Abstract

The paper claims that the Monotone Consistency condition utilized by Baigent in his proof of the impossibility theorem is too strong. We factorize this condition into two different weaker conditions and show that they are inconsistent with some variants of the Simple Uncertainty Aversion and the Simple Uncertainty Appeal conditions in the presence of the Independence condition.

JEL Classification: D83

Keywords: complete ignorance, uncertainty aversion, uncertainty appeal

1. Introduction

Bossert (1997) has introduced the definition of uncertainty aversion to model nonprobabilistic decision-making under complete uncertainty. The proposed definition simply states that getting an outcome x with certainty is preferred to having a set of possible outcomes that contains elements which are worse than x and better than x . He then shows that the decision rules which are characterized by the uncertainty aversion principle are closely related to the maximin rule. In Bossert, Pattanaik and Xu (2000) a weaker version of the uncertainty aversion was used to provide characterizations of some new rules for individual decision-making under complete uncertainty (see Barbera, Bossert and Pattanaik (2004) for a recent survey of results in ranking sets of objects).

On the other hand, Baigent (2004) by using a somewhat stronger version of the uncertainty aversion principle produces an impossibility rather than a characterization result. He establishes that his strengthened version of uncertainty aversion might conflict with two other conditions – Independence and Monotone consistency.

In this paper we claim that the Monotone consistency condition used by Baigent is too strong, namely it clashes with the Independence condition. We factorize Baigent's Monotone Consistency into two weaker conditions. However, even these weaker parts of the Monotone Consistency condition are inconsistent with a slightly strengthened version of the Simple Uncertainty Aversion principle and the Simple Uncertainty Appeal condition in the presence of the Independence property.

Section 2 presents the framework and the axioms. Section 3 presents the results, and section 4 concludes with some brief remarks.

2. The framework

Let X denote the non-empty and finite set of alternatives $\{x_1, x_2, \dots, x_n\}$. We assume that X contains at least three elements and it is linearly ordered from x_1 to x_n , that is, the subscript i denotes the rank of alternative x_i according to the underlying strict linear order P on X .

Let $\Pi(X)$ denote the set of all non-empty subsets of X . The elements of $\Pi(X)$ are interpreted as uncertainty prospects when the individual does not know the probability distribution nor any likelihood ranking of possible outcomes. Let \geq denote a binary relation on $\Pi(X)$ and $>$ be its asymmetric factor. $A \geq B$ means that the subset of alternatives A is at least as good as the subset of alternatives B . Notice that there are no references to the possible states of the world. What matters is only the sets of possible outcomes. Following Baigent (2004) we do not impose any particular requirements on \geq . Typically in the literature \geq is assumed to satisfy reflexivity and transitivity and quite often also completeness (see Barbera, Bossert and Pattanaik (2004) for a recent survey).

Bossert's definition of uncertainty aversion is formally captured by the following axiom.

Uncertainty Aversion (UA): For all $A, B \in \Pi(X)$ such that $A \cap B = \emptyset$, for all $y \in X \setminus (A \cup B)$, if $xPyPz$ for all $x \in A$ and all $z \in B$, then $\{y\} > A \cup B$ and $\{y\} > A \cup B \cup \{y\}$.

In Bossert, Pattanaik and Xu (2000) the following simple version of this axiom was introduced:

Simple Uncertainty Aversion (SUA): For all $x, y, z \in X$ such that $xPyPz$, $\{y\} > \{x, z\}$.

The following condition is an intermediary between UA and SUA.

*Simple Uncertainty Aversion** (*SUA**): For all $x, y, z \in X$ such that $xPyPz$, $\{y\} > \{x, z\}$ and $\{x\} > \{x, y\}$.

Clearly UA implies *SUA** which in turn implies SUA.

In Baigent's framework increases in uncertainty are identified with increases in the spread of the ranks of the alternatives in subsets. Formally, his Uncertainty Aversion axiom is formulated as follows:

*Uncertainly Aversion** (*UA**): For all $x_i \in X$, if $i = 2, \dots, n - 1$, then $\{x_i\} > \{x_{i-1}, x_{i+1}\}$, and if $i = 3, \dots, n - 2$, then $\{x_{i-1}, x_{i+1}\} > \{x_{i-2}, x_{i+2}\}$.

Further two properties are required. The first is a slight strengthening of the Independence condition introduced by Kannai and Peleg (1984).

Independence (IND): For all $A, B \in \Pi(X)$, and for all $x \in X \setminus (A \cup B)$, $A > B$ implies $A \cup \{x\} > B \cup \{x\}$.

Another property is a variant of a condition used by Arlegi (2003). Arlegi introduces the following condition, called Monotone Consistency:

Monotone Consistency (MC): For all $A, B \in \Pi(X)$, $A \geq B$ implies $A \cup B \geq B$.

MC simply says that if a set A is weakly preferred to another set B , then the worse prospect B can not be strictly better than the union of A and B . Baigent utilizes the following version of it:

*Monotone Consistency** (MC^*): For all $A, B \in \Pi(X)$, $A > B$ implies $[(A > A \cup B)$ and $(A \cup B > B)]$.

We factorize MC^* condition into the following two weaker parts:

Monotone Consistency' (MC'): For all $A, B \in \Pi(X)$, $A > B$ implies $(A \cup B > B)$.

*Dominance** (DOM^*): For all $A, B \in \Pi(X)$, $A > B$ implies $(A > A \cup B)$.

DOM^* is a variant of the Dominance condition (DOM) introduced by Kreps (1979) and utilized widely in many papers on the axiomatic ranking of opportunity sets (see Barbera, Bossert and Pattanaik (2004) for a survey of this area of research).

DOM^* simply says that if A is strictly preferred to B , then adding B to A would not reverse the preference.

Notice that MC^* also implies the following condition:

Simple Monotonicity (SM): For all $x, y \in X$ such that xPy , $x > \{x, y\} > \{y\}$.

3. The results

Baigent (2004) establishes the following result.

Proposition 1. If X contains at least five alternatives, there exists no binary relation on $\Pi(X)$ which satisfies UA^* , IND and MC^* .

However, Barbera and Pattanaik (1984) have already established that IND clashes with SM . Since MC^* implies SM as immediate consequence of Barbera and Pattanaik's result, we have the following proposition.

Proposition 2. If X contains at least three alternatives, there exists no binary relation on $\Pi(X)$ which satisfies MC^* and IND .

While MC^* clashes with IND , MC and MC' are consistent with IND even in the presence of SUA or UA^* . However, the following proposition establishes the conflict between MC' and SUA^* in the presence of IND .

Proposition 3. If X contains at least three alternatives, there exists no binary relation on $\Pi(X)$ which satisfies SUA^* , MC' and IND .

Proof. We have already assumed that for $x_1, x_2, x_3 \in X$, we have $x_1 P x_2 P x_3$. Hence using SUA^* , we have $x_2 > \{x_1, x_3\}$. MC' then implies that $\{x_1, x_2, x_3\} > \{x_1, x_3\}$. Again by SUA^* we have $\{x_1\} > \{x_1, x_2\}$. Therefore, IND implies that $\{x_1, x_3\} > \{x_1, x_2, x_3\}$ which contradicts to the fact that $\{x_1, x_2, x_3\} > \{x_1, x_3\}$. \square

Corollary. If X contains at least three alternatives, there exists no binary relation on $\Pi(X)$ which satisfies UA , MC' and IND .

We also would like to point out that DOM^* clashes with the Simple Uncertainty Appeal condition (SUP) in the presence of IND . SUP is a natural relaxation of Uncertainty Appeal condition (UP) introduced by Bossert (1997). To obtain UP condition, simply reverse the preferences in the Bossert's definition of UA .

Simple Uncertainty Appeal (SUP): For all $x, y, z \in X$ such that $x P y P z$, $\{x, z\} > \{y\}$ and $\{x, y\} > \{x\}$.

Proposition 4. If X contains at least three alternatives, there exists no binary relation on $\Pi(X)$ which satisfies SUP , DOM^* and IND .

Proof. By our assumption, we have $x_1 P x_2 P x_3$ for $x_1, x_2, x_3 \in X$. Therefore by SUP , we have $\{x_1, x_3\} > \{x_2\}$. DOM^* then implies that $\{x_1, x_3\} > \{x_1, x_2, x_3\}$. Again by SUP we have $\{x_1, x_2\} > \{x_1\}$. Hence, IND implies that $\{x_1, x_2, x_3\} > \{x_1, x_3\}$ contrary to the fact that $\{x_1, x_3\} > \{x_1, x_2, x_3\}$. \square

Corollary. If X contains at least three alternatives, there exists no binary relation on $\Pi(X)$ which satisfies UP , DOM^* and IND .

4. Concluding remarks

The paper claims that MC^* condition is too strong. It clashes with the Independence condition even without any uncertainty aversion or uncertainty appeal properties. We

factorize MC^* into two weaker conditions MC' and DOM^* . However, even the weaker Monotone Consistency condition MC' and the Dominance condition DOM^* clash with some variants of uncertainty aversion conditions, namely SUA^* and UA and some variants of uncertainty appeal conditions, SUP and UP , in the presence of the Independence condition. Hence the paper provides a first step in exploring a question of how different definitions of uncertainty aversion play role in establishing various impossibility/possibility results.

References

Arlegi, R. 2003. A Note on Bossert, Pattanaik and Xu's "Choice Under Complete Uncertainty: Axiomatic Characterizations of some Decision Rules". *Economic Theory*, 22: 219 – 225.

Baigent, N. 2004. Uncertainty Aversion under Complete Ignorance: An Impossibility Result. Working Paper, Institute of Public Economics, Graz University.

Barbera, S., Bossert, W. and P.K. Pattanaik. 2004. Ranking Sets of Objects. In P.J. Hammond and C. Seidl, eds., *Handbook of Utility Theory, Volume II, Extensions*. Amsterdam, Kluwer.

Barbera, S. and P.K. Pattanaik. 1984. Extending an Order on a Set to the Power Set: Some Remarks on Kannai and Peleg's Approach. *Journal of Economic Theory*, 32 : 185 – 191.

Bossert, W. 1997. Uncertainty Aversion in Nonprobabilistic Decision Models. *Mathematical Social Sciences*, 34 : 191 – 203.

Bossert, W., Pattanaik, P.K. and Y. Xu. 2000. Choice Under Complete Uncertainty: Axiomatic Characterizations of some Decision Rules. *Economic Theory*, 16 : 295 – 312.

Kannai, Y. and B. Peleg. 1984. A Note on the Extension of an Order on a Set to the Power Set. *Journal of Economic Theory*, 32 : 172 – 175.

Kreps, D.M. 1979. A Representation Theorem for "Preference for Flexibility", *Econometrica*, 47 : 565 – 577.

Department of Economics
National University of Ireland, Galway

Working Paper Series

No. 90 On Uncertainty Aversion under Complete Ignorance: Some Further Observations on the Impossibility Results. Ruvim Gekker

No. 89 Using CGE and Microsimulation Models for Income Distribution Analyses: A Survey. Vaqar Ahmed and Cathal O'Donoghue

No. 88 Benefits and Costs of Methane Emission Reduction in the Irish National Herd. Ignacio Perez, Stephen Hynes, Eoghan Garvey, Niall Mc Inerney

No. 87 December 2004. Measuring the opportunity cost of time in recreation demand modelling: an application to a random utility model of whitewater kayaking in Ireland. Stephen Hynes Nick Hanley Cathal O'Donoghue

No. 86 December 2004. Quantifying the Effects of Decoupling on Agriculture in Ireland's NUTS 3 Regions. Eoghan Garvey Niall Mc Inerney

No. 85 November 2004. "Preferences and Multiple Use Forest Management." Thomas M. van Rensburg, Greig A. Mill, Mick Common, Jon Lovett.

No. 84 November 2004. "Crop Biodiversity, Risk Management and the Implications of Agricultural Assistance." Salvatore Di Falco and Charles Perrings.

No. 83 November 2004. "The Rural Economy in China and Russia – What is Different? Is there a Lesson for Russia? Michael Cuddy and Qian Lijun.

No. 82 K. November 2004. "Hicksian Visions and Vignettes on (Non-Linear) Trade Cycle Theories." Vela Velupillai

No. 81 September 2004 "A Disequilibrium Macrodynamical Model of Fluctuations." K. Vela Velupillai

No. 80 August 2004 "The Unreasonable Ineffectiveness of Mathematics in Economics." K. Vela Velupillai.

No. 79 August 2004 "A Primer on the Tools and Concepts of Computable Economics." K. Vela Velupillai.

No. 78 May 2004 "Farm Income Mobility and Inequality in Ireland 1994-2001." Stephen Hynes and Cathal O'Donoghue.

No. 77 May 2004 "Modelling the Redistributive Impact of Indirect Taxes in Europe: An Application of EUROMOD." Cathal O'Donoghue, Massimo Baldini and Daniela Mantovani.

No. 76 May 2004 "Postponing Maternity in Ireland." Cathal O'Donoghue and Eamon O'Shea.

No. 75 March 2004 "Conflict between Commercial and Recreational Activities on Irish Rivers: Estimating the Economic Value of Whitewater Kayaking in Ireland using Mixed Data Sources." Stephen Hynes and Nick Hanley.

No. 74 March 2004 "Assessing the Impact of Pensions Policy Reform in Ireland: the Case of Increasing the Pension Age" Cathal O'Donoghue

No. 73 February 2004 "Current Account Deficit Sustainability: A Panel Approach." Ahmad Zubaidi Baharumshah, Evan Lau and Stilianos Fountas.

No 72 December 2003 "Redistributive Forces of the Irish Tax-Benefit System." Cathal O'Donoghue.

No 71 August 2003 "A Socio-Economic Study of Kelang Village in Yunnan Province in relation to uptake by Farmers of Improved Management Practices on Red Soils in China." Michael P. Cuddy, Hongmei Liu and Scott Steele.

No. 70 August 2003 "Measuring the Employment Effects of the Rural Renewal Tax Scheme." Michael J. Keane and Eoghan Garvey.

No. 69 June 2003 "Explaining the Fertility Decline in Ireland." Cathal O'Donoghue and Eamon O'Shea,

No. 68 June 2003 "On Growth and Saving." Joan O'Connell.

No. 67 December 2002 "Budget Softness and the Russian Enterprise Sector: An Econometric Study." Mark E. Schaffer and Gerard Turley.

No. 66 September 2002 "Do Tax-Benefit Systems Cause High Replacement Rates? A Decompositional Analysis using EUROMOD." Herwig Immervoll and Cathal O'Donoghue.

No. 65 July 2002 "The Impact of Means Tested Assistance in Southern Europe." Cathal O'Donoghue et al.

No. 64 June 2002 "Inflation, Output Growth, and Nominal and Real Uncertainty: Empirical Evidence for the G7." Stilianos Fountas and Menelaos Karanasos

No. 63 June 2002 "Are Economic Growth and the Variability of the Business Cycle Related? Evidence from Five European Countries." Stilianos Fountas and Menelaos Karanasos.

No. 62 June 2002 "On the sustainability of current account deficits: Evidence from Four ASEAN Countries." Ahmad Zubaidi Baharumshah, Evan Lau, Stilianos Fountas. (Published in *Journal of Asian Economics*, Vol. 14, No. 3, pp. 467-489, 2003).

No. 61 May 2002 "Nonmonotonic Reasoning and the Foundations of Rational Choice." Ruvin Gekker

No. 60 April 2002 "An Analysis of the Rural Environmental Protection Scheme." Stephen Hynes and Eithne Murphy

No. 59 April 2002. "The Generation Game: All Gain No Pain? Ageing, Intergenerational Equity and Generational Accounts." Cathal O'Donoghue. (Forthcoming in *Journal of the Statistical and Social Inquiry Society of Ireland*).

No. 58 April 2002. "The Nice Treaty and the Irish Referendum: What Values are at Stake?" Eithne Murphy

No. 57 March 2002 "What Difference does a Job Make? The Income Consequences of Joblessness in Europe." Herwig Immervoll and Cathal O'Donoghue. (Published in Gallie, D. (ed.) (2002). *Resisting Marginalisation: Unemployment Experience and Social Policy in Western Europe*. Oxford: Oxford University Press).

No. 56 January 2002 "Redistribution over the Lifetime in the Irish Tax-Benefit System: An Application of a Prototype Dynamic Microsimulation Model for Ireland." Cathal O'Donoghue. (Published in the *Economic and Social Review*, Vol. 32, No. 3, 2001).

No. 55 October 2001 "Output Variability and Economic Growth: The Japanese Case." Stilianos Fountas, Menelaos Karanasos and Alfonso Mendoza. (Published in *Bulletin of Economic Research*, 2004, Vol. 56, pp.353-363).

No. 54 September 2001 "Inflation, Inflation Uncertainty, and a Common European Monetary Policy." Stilianos Fountas, Alexandra Ioannidis and Menelaos Karanasos. (Published in *Manchester School of Economic and Social Studies*, 2004, Vol. 72, No. 2, pp. 221-242).

No. 53 May 2001 "Inflation and Output Growth Uncertainty and their Relationship with Inflation and Output Growth." Stilianos Fountas, Menelaos Karanasos and Jinki Kim. (Published in *Economics Letters*, 2002, vol. 75/3, pp. 293-301.).

No. 52 April 2001 "Tax, Transition and the State." Gerard Turley

No. 51 March 2001 "Gradients in Potential Years of Life Lost by Socio-Economic Group in Ireland." Eamon O'Shea and Sheelagh Connolly.

No. 50 December 2000 "Effective versus Statutory Taxation: Measuring Effective Tax Administration in Transition Economies." Mark E. Shaffer and Gerard Turley.

- No. 49 September 2000** “Twin Deficits, Real Interest Rates and International Capital Mobility.” Stilianos Fountas and Christopher Tsoukis. Published in C. Tsoukis, G. Agiomirgianakis & T. Biswas (eds.) *Aspects of Globalisation: Macroeconomic and Capital Market Linkages in the Integrated World Economy*. Kluwer Publishers, 2003, pp. 67-82.
- No. 48 September 2000** “The Relationship between Inflation and Inflation Uncertainty in the UK: 1885-1998.” Stilianos Fountas. (Published in *Economics Letters*, Vol. 74, No. 1, 2001).
- No. 47 August 2000** “A GARCH Model of Inflation and Inflation Uncertainty with Simultaneous Feedback.” Stilianos Fountas, Menelaos Karanasos, Marika Karanassou.
- No. 46 July 2000** “Do Ordering Effects Matter in Willingness-to-pay Studies of Health Care?” Jennifer Stewart, Eamon O’Shea, Cam Donaldson, Phil Shackley. (Published in *Journal of Health Economics*).
- No. 45 March 2000** “On the Axiomatic Approach to Freedom as Opportunity: A General Characterization Result.” Ruvin Gekker. (Published in *The Journal of Mathematical Social Sciences*, Vol. 42, No. 2, 2001).
- No. 44 March 2000** “On the Axiomatic Ranking of Opportunity Sets in a Logical Framework.” Ruvin Gekker.
- No. 43 March 2000** “Does the Exchange Rate Regime Affect Export Volumes? Evidence from Bilateral Exports in the US-UK Trade: 1900-1998,” Stilianos Fountas and Kyriacos Aristotelous. (Published in the *Manchester School*, Vol. 71, No. 1, pp. 51-64, 2003).
- No. 42 November 1999** “Cambridge Distribution in a World Economy,” Joan O’Connell. (Published in *The Journal of Income Distribution*, Vol. 8, 1998).
- No. 41 November 1999** “Commuting Distances and Labour Market Areas: Some Preliminary Insights from a Spatial Model of Job Search,” Michael J. Keane. (Published in *Transport Planning, Logistics and Spatial Mismatch*. European Research in Regional Science, No. 11, ed. D. Pitfield, London: Pion).
- No. 40 September 1999** “The Impact of the Exchange Rate Regime on Exports: Evidence from Bilateral Exports in the European Monetary System,” Kyriacos Aristotelous and Stilianos Fountas. (Published in the *Journal of Economic Integration*, Vol. 15, No. 3, 2000).
- No. 39 June 1999** “Measuring Trends in Male Mortality by Socio-Economic Group in Ireland: A Note on the Quality of Data,” Eamon O’Shea.
- No. 38 June 1999** “The Impact of the Exchange Rate Regime on Exports: Evidence from the European Monetary System,” Stilianos Fountas and Kyriacos Aristotelous.
- No. 37 June 1999** “Emerging Stock Markets Return Seasonalities: the January Effect and the Tax-Loss Selling Hypothesis,” Stilianos Fountas and Konstantinos N. Segredakis. (Published in *Applied Financial Economics*, Vol. 12, No. 4, 2002).
- No. 36 June 1999** “Agricultural entrepreneurs as entrepreneurial partners in land-use management: a policy-based characterization,” Scott R. Steele
- No. 35 June 1999** “The Monetary Transmission Mechanism: Evidence and Implications for European Monetary Union,” Stilianos Fountas and Agapitos Papagapitos. (Published in *Economics Letters*, Vol. 70, No. 3, 2001).
- No. 34 May 1999** “Exchange rate pass-through, the terms of trade and the trade balance,” Eithne Murphy and Lelio Iapadre.
- No. 33 May 1999** “The Impact of Health Status on the Duration of Unemployment Spells and the Implications for Studies of the Impact of Unemployment on Health Status,” Jennifer Stewart. (Published in the *Journal of Health Economics*, Vol. 20, 2001).
- No. 32 December 1998** “Subsidies in Irish Fisheries: Saving Rural Ireland?,” Vilhjálmur Wíium.
- No. 31 October 1998** “Has the European Monetary System Led to More Exports? Evidence from Four European Union Countries,” Stilianos Fountas and Kyriacos Aristotelous. (Published in *Economics Letters*, Vol. 62, No. 3, 1999).

- No. 30 October 1998** “Real Interest Rate Parity under Regime Shifts: Evidence for Industrial Countries,” Jyh-lin Wu and Stilianos Fountas. (Published in *The Manchester School*, Vol. 68, No. 6, 2000).
- No. 29 October 1998** “Analyzing Gender-Based Differential Advantage: A Gendered Model of Emerging and Constructed Opportunities,” Scott R. Steele.
- No. 28 September 1998** “The Impacts of Transition on the Household in the Provinces of Kazakhstan: The Case of Aktyubinsk Oblast,” Pauric Brophy.
- No. 27 July 1998** “A Comparison of the Effects of Decommissioning, Catch Quotas, and Mesh Regulation in Restoring a Depleted Fishery,” J. Paul Hillis and Vilhjálmur Wiium.
- No. 26 July 1998** “The Sensitivity of UK Agricultural Employment to Macroeconomic Variables,” Patrick Gaffney.
- No. 25 July 1998** “The Economic and Social Costs of Alzheimer's Disease and Related Dementias in Ireland: An Aggregate Analysis,” Eamon O'Shea and Siobhán O'Reilly. Published in *International Journal of Geriatric Psychiatry*, Vol. 14, 1999.
- No. 24 July 1998** “Testing for Real Interest Rate Convergence in European Countries,” Stilianos Fountas and Jyh-lin Wu. (Published in the *Scottish Journal of Political Economy*, Vol. 46, No. 2, 1999).
- No. 23 April 1998** “Production, Information and Property Regimes: Efficiency Implications in the Case of Economies of Scope,” Scott R. Steele.
- No. 22 April 1998** “An Empirical Analysis of Short-Run and Long-Run Irish Export Functions: Does Exchange Rate Volatility Matter?,” Donal Bredin, Stilianos Fountas, Eithne Murphy. (Published in the *International Review of Applied Economics*, Vol. 17, No. 2, 2003).
- No. 21 April 1998** “Technology and Intermediation: the Case of Banking,” Michael J. Keane and Stilianos Fountas. (Published in the *Journal of Retailing and Consumer Services*, Vol. 9, No. 3, 2002).
- No. 20 March 1998** “Are the US Current Account Deficits Really Sustainable?,” Stilianos Fountas and Jyh-lin Wu. (Published in the *International Economic Journal*, Vol. 13, No. 3, 1999).
- No. 19 December 1997** “Testing for Monetary Policy Convergence in European Countries,” Donal Bredin and Stilianos Fountas. (Published in the *Journal of Economic Studies*, Vol. 25, No. 5, 1998).
- No. 18 September 1997** “New Fields of Employment: Problems and Possibilities in Local and Community Economic Development,” Michael J. Keane.
- No. 17 September 1997** “Estimation of the Impact of CAP Reform on the Structure of Farming in Disadvantaged Areas of Ireland,” Eithne Murphy and Breda Lally.
- No. 16 May 1997** “Exchange Rate Volatility and Exports: the Case of Ireland,” Stilianos Fountas and Donal Bredin. (Published in *Applied Economics Letters*, Vol. 5, No. 5, 1998)
- No. 15 May 1997** “Tests for Interest Rate Convergence and Structural Breaks in the EMS,” Stilianos Fountas and Jyh-lin Wu. (Published in *Applied Financial Economics*, Vol. 8, No. 1, 1998)
- No. 14 May 1997** “Cointegration Tests of the Profit-Maximising Equilibrium in Greek Manufacturing 1958--1991,” Theodore Lianos and Stilianos Fountas. (Published in *International Review of Applied Economics*, Vol. 11, No. 3, 1997)
- No. 13 April 1997** “Agriculture and the Environment in Ireland: Directions for the Future,” Eithne Murphy and Breda Lally. (Published in *Administration*, Vol. 46, No. 1, 1998)
- No. 12 March 1997** “Male Mortality Differentials by Socio-Economic Group in Ireland,” Eamon O'Shea. (Published in *Social Science and Medicine*, Vol.45, No.6, 1997)
- No. 11 July 1996** “Testing for the Sustainability of the Current Account Deficit in Two Industrial Countries,” Jyl-Lin Wu, Stilianos Fountas and Show-Lin Chen. (Published in *Economics Letters*, Vol. 52, No. 2, 1996)

- No. 10 April 1996** “Towards Regional Development Programmes in Russia,” Michael Cuddy.
- No. 9 April 1996** “Uncertainty in the *General Theory* and *A Treatise on Probability*,” Joan O’Connell.
- No. 8 December 1995** “Some Evidence on the Export-Led Growth Hypothesis for Ireland,” Stilianos Fountas. (Published in *Applied Economics Letters*, Vol. 7, No. 4, pp. 211-214, 2000).
- No. 7 November 1995** “Caring and Theories of Welfare Economics,” Eamon O’Shea and Brendan Kennelly.
- No. 6 September 1995** “The Relationship Between Inflation and Wage Growth in the Irish Economy,” Stilianos Fountas, Breda Lally and Jyh-Lin Wu. (Published in *Applied Economics Letters*, Vol. 6, No. 6, 1999).
- No. 5 September 1995** “Quality and Pricing in Tourist Destinations,” Michael J. Keane. (Published in *Annals of Tourism Research*, Vol. 24, No. 1, 1997)
- No. 4 September 1995** “An Empirical Analysis of Inward Foreign Direct Investment Flows in the European Union with Emphasis on the Market Enlargement Hypothesis,” Kyriacos Aristotelous, Stilianos Fountas. (Published in the *Journal of Common Market Studies*, Vol. 30, No. 4, 1996)
- No. 3 September 1995** “The Social Integration of Old People in Ireland,” Joe Larragy and Eamon O’Shea.
- No. 2 September 1995** “Caring and Disability in Long-Stay Institutions,” Eamon O’Shea and Peter Murray. (Published in the *Economic and Social Review*, Vol. 28, No. 1, 1997)
- No. 1 September 1995** “Are Greek Budget Deficits ‘too large?’” Stilianos Fountas and Jyh-lin Wu. (Published in *Applied Economics Letters*, Vol. 3, No. 7, 1996).

Enquiries:

Department of Economics,
National University of Ireland, Galway.

Tel: +353-91-524411, ext. 2177, direct line: +353-91-492177
Fax: +353-91-524130
Email: claire.noone@nuigalway.ie
Web: <http://www.economics.nuigalway.ie/index.htm>