

DISCUSSION PAPERS IN ECONOMICS

No. 2012/3 ISSN 1478-9396

TIME-SERIES CHARACTERISTICS OF UK COMMERCIAL PROPERTY RETURNS: TESTING FOR MULTIPLE CHANGES IN PERSISTENCE.

SIMEON COLEMAN and VITOR LEONE

JUNE 2012

DISCUSSION PAPERS IN ECONOMICS

The economic research undertaken at Nottingham Trent University covers various fields of economics. But, a large part of it was grouped into two categories, *Applied Economics and Policy* and *Political Economy*.

This paper is part of the new series, **Discussion Papers in Economics**.

Earlier papers in all series can be found at:

http://www.ntu.ac.uk/research/academic_schools/nbs/working_papers/ind ex.html

Enquiries concerning this or any of our other Discussion Papers should be addressed to the Editors:

Dr. Simeon Coleman, Email: <u>simeon.coleman@ntu.ac.uk</u>
Dr. Marie Stack, Email: <u>marie.stack@ntu.ac.uk</u>
Dr. Dan Wheatley, Email: <u>daniel.wheatley2@ntu.ac.uk</u>

Division of Economics Nottingham Trent University Burton Street, Nottingham, NG1 4BU UNITED KINGDOM.

Time-series characteristics of UK commercial property returns: Testing for multiple changes in persistence.

Simeon Coleman $^{a,\Diamond, *}$, Vitor Leone a,‡

^a Economics Division, Nottingham Business School, Nottingham Trent University, Burton Street, Nottingham, NG1 4BU, U.K.
[◊] E-mail: <u>simeon.coleman@ntu.ac.uk</u>[‡] E-mail: <u>vitor.leone@ntu.ac.uk</u>

The random-walk hypothesis of asset prices suggests that prices traded in a market cannot be predicted based on historical information. Employing unsecuritized UK commercial property returns, we analyze this hypothesis. Our results uncover multiple changes in persistence in both aggregate and sectorial data. We discuss some implications for academics, practitioners and regulators.

JEL Codes: C10, C32, G, G00,G11

^{*} Corresponding author: Tel.:+441158486007. Fax:+441158488010.

1. Introduction

Testing and identification of the order of integration for time-series has become commonplace in economic time-series analyses. In part, this is because the series' trending properties inform the models and inference procedures to be employed in later stages of analyses.

Albeit controversial, the idea of a constant order of integration for a time-series is common. However, some new lines of research enquiry suggest that certain economic and financial time-series display changes in persistence, varying between difference-stationary [I(1)] and trend-stationary [I(0)] regimes (see Busetti and Taylor, 2004; Taylor, 2005; Harvey *et al.*, 2006; Leybourne *et al.*, 2007).¹

Arguably, for academic, practice, and regulatory reasons, such rigorous scrutiny of the time-series properties of returns on investments should of considerable interest i.e., understanding the (time-series) behavior, identification of any observed exploitable patterns, and the informational efficiency of the markets respectively of asset returns (or prices). Although the international importance of UK investment markets is well-documented and despite the high institutional and financial interest in commercial property, surprisingly little is known about the possibility of changes in persistence in commercial property returns.² With huge monies involved, an investigation of whether or not these returns present regime shifts in their level of stability is important. Not least, because it is likely to play a key role in assisting institutional investors (e.g., pension funds and insurance companies) make investment decisions regarding the level of commercial real-estate in their portfolios.

If asset returns can be modeled, it suggests the potential for them to be forecasted; particularly, if the specific form of the underlying price structure can be determined, which

¹ For some fairly recent empirical evidence of such behavioral shifts, see among others: Pesaran *et al.*, 2006 (US Treasury bills); Sollis, 2006 (the S&P composite dividend yield); Noriega and Ramos, 2009 (US inflation rates), Leone and Ribeiro, 2012 (NASDAQ composite index and dividend yield).

² The Investment Property Databank Ltd. (IPD) Property Index estimated the sector to be worth an estimated £33.778billion in the UK (for the month to 31/03/2012); \$135.134billion in the US (for the year to 31/12/2011); €13.868billion in the Central and Eastern European countries (for the year to 31/12/2011), to mention a few.

can give abnormal profits to investors, at least in the short term. Specifically, increased knowledge of the dynamics will help in investment decision-making aimed at achieving desired targets, in terms of returns and portfolio diversification.

Recently, Belaire-Franch and Opong (2012), investigating the behavior of UK Construction and Real-estate indices and employing standard unit-root tests, show that both series are I(1) processes in levels. However, when they allow for nonlinear time trends, the unit-root hypothesis is clearly rejected in the case of the Real-estate index. They also find evidence of serial-correlation when analyzing the indices' returns. To our knowledge, no studies have investigated the likelihood of multiple changes in persistence for the UK commercial property returns.³

In this paper, our aim is two-fold: First, identifying the likelihood of changes in persistence over time in monthly returns of the Investment Property Databank Ltd (IPD) index for the UK (*All properties* and, by sector – *Office, Industrial* and *Retail*), and second, uncovering differences in the order of (fractional) integration across same. We discuss some implications of the multiple changes in persistence and degree of (fractional) integration. We suggest that such findings may be harnessed for financial maneuverings, which underscores their importance. The results are not entirely surprising considering the myriad political and economic factors likely to influence the process of property valuation and, consequently, return.

The remainder of this paper is organized as follows. Section 2 summarizes the data, econometric techniques and main results. Section 3 concludes.

³ Other studies such as Serrano and Hoesli (2012), Rehring and Sebastian (2011), MacGregor and Schwann (2003), Brown (2001) Lee and Ward (2000) investigate issues related to volatility, serial correlation, fractional cointegration on both securitized and unsecuritized commercial real estate indexes, returns and prices for the UK and US markets.

2. Data, econometric methods and results

2.1 Data

Our dataset, based on the IPD index i.e., *All, Retail, Office*, and *Industrial*, consists of monthly returns, in aggregate form and by sector, for the UK commercial property market and is obtained from the IPD Bank Monthly Digest, over 1987*m*01-2011*m*08. Table 1 displays preliminary information about the statistical properties of the returns.

	All	Retail	Office	Industrial
Mean	0.7185	0.7040	0.6613	0.8601
Standard Error	0.0665	0.0678	0.0728	0.0654
Median	0.7899	0.8290	0.7565	0.8822
Standard Deviation	1.1452	1.1679	1.2527	1.1261
Sample Variance	1.3115	1.3642	1.5693	1.2682
Kurtosis	6.3312	7.4940	4.3233	4.9385
Skewness	-1.6444	-1.7399	-1.2906	-0.9718
Minimum	-5.2674	-5.7751	-5.30557	-4.8457
Maximum	3.6374	4.2278	3.8104	4.8207
No. of Observations	296	296	296	296

Table 1: Summary statistics of returns (1987m01 - 2011m08)

A casual review reveals some significant similarity in some of the statistical measures reported across the four groupings which, from the policy point of view, is interesting, and suggests co-movement. Notably, all sectors are characterized by a long left tail (*negative skewness*) and leptokurtosis (*fat tails*).⁴

2.2 Econometric methods

We adopt a three-stage approach. First, we apply standard individual and panel unit-root tests to the data. These include Levin *et al.* (2002) [LLC], Im *et al.* (2003), Maddala and Wu (1999) [MW]. LLC assume a null hypothesis of a common unit-root against the alternative of stationarity of all units; whereas the other tests allow for individual unit-roots under the

⁴ The shape of the distribution of returns can vary with market conditions, e.g. when the markets suffered a major adjustment after the market crash in October 1987, this caused returns to be negatively skewed. This might also be captured by the real estate returns data on analyses especially during the recent 2007-2009 financial crisis. Positive kurtosis suggests that probabilities of obtaining extreme values are higher than implied by the normal distribution. This could be a reflection of reality of the marketplace when large market surprises may tend to induce large movements in the markets and in property values.

alternative hypothesis (supposing a less restrictive framework since the former may be too strong). Table 2 summarizes the results of the aforementioned panel unit-root tests.⁵

Table 2: Panel unit-root tests	(1987 <i>m</i> 01 – 2011 <i>m</i> 08)
--------------------------------	---------------------------------------

Method	Statistic	Probability [#]
Levin, Lin and Chu	0.225	0.5892
Im, Pesaran and Shin	-4.605	0.0000
ADF - Fisher Chi-square	38.548	0.0000
PP - Fisher Chi-square	50.221	0.0000

Notes: Lag order has been determined using the Modified Akaike information criterion. *Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Our results, based on the individual and panel unit-root tests for the whole sample suggest that the data is I(0). Based on only such a result, the deduction will be that the market returns are, indeed, efficient, at least on its weak form.

Second, we test for the likelihood, and order, of fractional integration (FI) in the full sample. Specifically, we compute Phillips' (1999a, 1999b) *Modified Log Periodogram Regression* estimator, which addresses a major criticism of the widely used Geweke and Porter-Hudak (1983) [GPH] estimate of the long-memory parameter, d.⁶ Phillips proposes a modified form of the long-memory parameter, in which the dependent variable is modified to reflect the distribution of *d* under the null hypothesis that *d*=1. Phillips' estimator gives rise to a test statistic for *d*=1, which is a standard normal variate under the null.⁷ Table 3 summarizes the implications of the estimated *d*.

	•	<u> </u>	-
d	Variance	Shock duration	Stationarity
d=0	Finite	Short-lived	Stationary
0 <d<0.5< th=""><th>Finite</th><th>Long-lived</th><th>Stationary</th></d<0.5<>	Finite	Long-lived	Stationary
0.5≤d<1	Infinite	Long-lived	Nonstationary
d = 1	Infinite	Infinite	Nonstationary
d>1	Infinite	Infinite	Nonstationary
a m1	(

 Table 3: Summary of fractional integration parameter values

Source: Tkacz (2001)

⁵ The standard individual unit-root tests (ADF and KPSS tests) both point to data being I(0). For brevity, these results are not reported here, but are available upon request.

⁶ The GPH estimator is inconsistent against d>1 alternatives. Hence, practically, under those circumstances, distinguishing unit-root behavior from fractional integration may be problematic.

⁷ Phillips suggests removal of the deterministic trends from the series before application of the estimator. The test is performed using the STATA 'modlpr' command. See Phillips (1999a, 1999b) for a more detailed description.

Applying the less restrictive FI approach, our results provide evidence that, in each case, the null hypothesis of d=0 and d=1 can be rejected, and that the I(d) classification is more appropriate.⁸ On the one hand, such a result proves interesting for the academic; and implies some predictability in returns, and hence some scope for exploitable profits for the investor/practitioner. On the other hand, this may pose problems for regulators concerned with informational efficiency within the markets.

Third, we apply a test proposed by Leybourne *et al.* (2007) [LKT] which determines changes in the order of integration of a time series and allows for the consistent estimation of the change dates. Being robust to the presence of (multiple) level breaks, the procedure has advantages over similar tests proposed by Harvey *et al.* (2006) and Leybourne *et al.* (2006), which are inconsistent against processes which display multiple changes in persistence. The data generation process (DGP) consists of the following time-varying AR(p):

$$y_t = d_t + u_t \tag{1}$$

Where y_t is the returns, $d_t = z'_t \beta$ being the deterministic component. In Equation 2, u_t is taken to be a time-varying AR(p) process, which can be rewritten as $u_t = \rho_i u_{t-1} + \sum_{j=1}^{k_i} \vartheta_{ij} \Delta u_{t-j} + \varepsilon_t$, t = 1, 2, ..., T, where $k_i = p_i - 1$, i = 1, ..., m+1, and m is the

number of changes in persistence. LKT allow for two alternatives (*i*) $z_t=1$ and $\beta=\beta_0$, the (possibly non-constant) level of returns, and (*ii*) $z_t=[1,t]$ and $\beta=[\beta_0, \beta_1]$, and ε_t is a martingale difference sequence. There are two hypotheses: the null, H_0 : $y_t \sim I(1)$ throughout, that is, $\rho=1 \forall t$, versus the alternative, H_1 : y_t undergoes one or more regime shifts between I(1) and I(0) behavior. The test statistic proposed by LKT is based on doubly-recursive sequences of DF type unit root statistics:

$$M = \inf_{\lambda \in (0,1)} \inf_{\tau \in (\lambda,1)} DF_G(\lambda,\tau)$$
⁽²⁾

⁸ Reported in column 3, Table 4.

The corresponding estimators are $(\hat{\lambda}, \hat{\tau}) \equiv \arg \inf_{\lambda \in (0,1)} \inf_{\tau \in (\lambda,1)} DF_G(\lambda, \tau)$ give the start and end points, i.e. the interval $[\hat{\lambda}, \hat{\tau}]$, of the first l(0) regime over the whole sample. Any further l(0)regimes are then detected sequentially by applying the *M* statistic to each of the resulting subintervals $[0, \hat{\lambda}]$ and $[\hat{\tau}, 1]$. We continue in this fashion for all temporal dimensions exceeding 20 observations, which is the minimum for which LKT (p.13) report finite sample critical values until, for each period considered, the 'most prominent' l(0) regime, together with their start and end points, have been identified.⁹

Identifying these multiple breaks in trending behavior further underscores the importance of employing appropriate and less restrictive methods when testing and identifying the order of integration of time-series in empirical work.¹⁰ Figure 1 presents the results graphically, where a horizontal line indicates the I(*0*) period as identified by the *M*-test. Despite significant similarities across sectors, some heterogeneity in dynamics is observed which the standard unit-roots tests are incapable of uncovering, but is informative for academics, practitioners and regulators alike.

⁹ We note that the period between the end point of one I(0) regime and the start point of the next I(0) regime must represent an I(1) regime. See Table 4.

 $^{^{10}}$ We also perform the LKT tests including a linear trend and, similar to the estimations without a linear trend, we uncover several periods of distinct I(θ)/I(1) behavior. These estimates are not reported here, but are available upon request.

Series	Sample	da	Sample	k	М	I(0) start	I(0) end
	-		size	(lags)			
All	1987m01-2011m08	0.5168*,+	296	4	-5.033	1993m08	2003m05
		(0.1511)					
	1987m01-1993m07		79	0	-2.538	1989m12	1992m09
	2003m06-2011m08		99	4	-7.523	2009m08	2011m08
	2003m06-2009m07		74	0	-5.079	2004m03	2006m07
Retail	1987m01-2011m08	0.4998*,+	296	4	-6.043	1993m08	2003m08
		(0.1413)					
	1987m01-1993m07	-	79	0	-3.383	1987m07	1988m12
	2003m09-2011m08		96	4	-6.872	2009m08	2011m04
	2003m09-2009m09		71	0	-5.530	2003m09	2006m07
Office	1987m01-2011m08	0.5250*,+	296	3	-4.632	1993m06	2008m03
		(0.1519)					
	1987m01-1993m05		77	3	-4.289	1991m08	1993m01
	1987m01-1999m06		55	0	-3.695	1987m07	1989m07
Industrial	1987m01-2011m08	0.5544*,+	296	3	-4.096	1989m11	2011m08
		(0.1556)					

Table 4: Results of the LKT test [no trend]

Notes: ^a *d* estimated and reported for full sample, and for power = 0.6, i.e., for sample size of 296, ordinates = 30. * and * imply rejection of the null of *d*=0 and *d*=1 respectively. Values in parenthesis are the standard errors for estimated *d*.

3. Summary and Conclusions

Aiming to contribute to the literature analyzing multiple changes in order of integration relating to assets management, we analyze monthly returns for UK three commercial property sectors, and a composite group. Our evidence suggests that assumption of a knife-edge I(0)/I(1) process may be misleading. Three main conclusions emerge: From the academic perspective, the standard methods that assume a constant order of integration across the sample may be inappropriate. For practice, the astute investor can decipher exploitable patterns based on which policies apply and, lastly, for regulatory reasons, informational efficiency of the market can be deemed highly questionable.



Figure 1: Results of LKT test across IPD UK commercial properties sectors, 1987*m*1-2011*m*8.

References

Belaire-Franch, J., Opong, K., 2012. A time series analysis of UK construction and real-estate indices. Journal of Real Estate Finance and Economics (forthcoming).

Brown G.R., 2001. A note on the effects of serial cross correlation. Journal of Property Research 18(3), 249-257.

Busetti F., Taylor, A.M.R., 2004. Tests of stationarity against a change in persistence. Journal of Econometrics 123, 33-66.

Geweke, J., Porter-Hudak, S., 1983. The estimation and application of long memory time series models. Journal of Time Series Analysis 4(4), 221-238.

Harvey, D.I., Leybourne, S.J., Taylor, A.M.R., 2006. Modified tests for a change in persistence. Journal of Econometrics 134, 441-469.

Im, K.S., Pesaran, M.H., Shin, Y., 2003. Testing for unit roots in heterogeneous panels. Journal of Econometrics 115, 53–74.

Lee S., Ward, C.W.R., 2000. Persistence of UK real estate returns: A Markov chain analysis. Journal of Asset Management 1(3), 217-230.

Leone V., Ribeiro O.M., 2012. Multiple Changes in Persistence vs. Explosive Behavior: The Dotcom Bubble, Nottingham Trent University Working paper No. 2012/2.

Levin, A., Lin, C.F., Chu, C., 2002. Unit root tests in panel data: asymptotic and finite sample properties. Journal of Econometrics 108, 1–24.

Leybourne, S., Kim, T., and Taylor, A. M.R., 2006. CUSUM of squares-based tests for a change in persistence. Journal of Time Series Analysis 28(3), 408–433.

Leybourne, S., Kim, T., Taylor, A.M.R, 2007. Detecting multiple changes in persistence.

Studies in Nonlinear Dynamics and Econometrics 11(3), 1–32.

Macgregor, B., Schwann, G., 2003. Common features in UK commercial real-estate returns. Journal of Property Research 20(1), 23-48.

Maddala, G.S., Wu, S., 1999. A comparative study of unit root tests with panel data and a new simple test. Oxford Bulletin of Economics and Statistics 61, 631–652.

Noriega, A.E., Ramos-Francia, M., 2009. The dynamics of US inflation. Economics Letters. 105, 168-72.

Pesaran, M.H., Pettenuzo, D., Timmermann A., 2006. Forecasting time series subject to multiple structural breaks, Review of Economic Studies 73(4), 1057-1084

Phillips, P.C.B., 1999a. Discrete fourier transforms of fractional processes. Unpublished working paper No. 1243, Cowles Foundation for Research in Economics, Yale University.

Phillips, P.C.B., 1999b. Unit root log periodogram regression. Unpublished working paper No.1244, Cowles Foundation for Research in Economics, Yale University.

Rehring C., Sebastian S., 2011. Dynamics of commercial real estate asset markets, return volatility and the investment horizon. Journal of Property Research 28(4), 291-315

Serrano C., Hoesli M., 2012. Fractional cointegration analysis of securitized real estate. Journal of Real Estate Finance and Economics 44, 319–338

Sollis, R., 2006. Testing for bubbles: an application of tests for a change in persistence. Applied Financial Economics 16, 491-498

Taylor A.M.R., 2005. Fluctuation tests for a change in persistence. Oxford Bulletin of Economics and Statistics 62, 293-304.

Tkacz, G., 2001. Estimating the fractional order of integration of interest rates using wavelet OLS estimator. Studies in Nonlinear Dynamics and Econometrics 5, 1-21.

DISCUSSION PAPERS IN ECONOMICS

- 2012/2 Otavio Ribeiro de Medeiros and Vitor Leone, *Multiple Changes in Persistence vs. Explosive Behaviour: The Dotcom Bubble.*
- 2012/1 Rob Ackrill and Simeon Coleman, *Inflation Dynamics In Central And Eastern European Countries*.
- 2011/4 Simeon Coleman, Inflation Dynamics and Poverty Rates: Regional and Sectoral Evidence for Ghana.
- 2011/3 Dan Wheatley and Zhongmin Wu, *Work, Inequality, And The Dual Career Household*.
- 2011/2 Simeon Coleman and Kavita Sirichand, *Fractional Integration and the Volatility Of UK Interest Rates*.
- 2011/1 Simeon Coleman, Investigating Business Cycle Synchronization In West Africa.
- 2010/11 Marie Stack and Eric Pentecost, A Gravity Model Approach To Estimating Prospective Trade Gains in The EU Accession And Associated Countries.
- 2010/10 Vitor Leone And Bruce Philp, *Surplus-Value And Aggregate Concentration In The UK Economy, 1987-2009.*
- 2010/9 Robert Ackrill and Adrian Kay, WTO Regulations and Bioenergy Sustainability Certification – Synergies and Possible Conflicts.
- 2010/8 Paul Alagidede, Simeon Coleman and Juan Carlos Cuestas, Persistence Of Inflationary Shocks: Implications For West African Monetary Union Membership.
- 2010/6 Bruce Philp and Dan Wheatley, *The time scarcity and the dual career household: competing perspectives*
- 2010/5 Juan Carlos Cuestas, Sebastián Freille and Patricio O'Gorman, The media and public agendas: testing for media effects in Argentina Turing the Kirchner administration
- 2010/4 Vitor Leone, From property companies to real estate investment trusts: the impact of economic and property factors in the UK commercial property returns
- 2010/3 Juan Carlos Cuestas and Paulo José Regis, *Purchasing power parity in OECD* countries: nonlinear unit root tests revisited
- 2010/2 Juan Carlos Cuestas and Bruce Philp, Exploitation and the class struggle
- 2010/1 Barry Harrison and Winston Moore, *Nonlinearities in Stock Returns for Some Recent Entrants to the EU*

- 2009/7 Joao R. Faria, Le Wang and Zhongmin Wu, Debts on debts
- 2009/6 Juan Carlos Cuestas and Luis A. Gil-Alana, Unemployment hysteresis, structural changes,non-linearities and fractional integration in Central and Eastern Europe
- 2009/5 Juan Carlos Cuestas and Javier Ordóñez, Unemployment and common smooth transition trends in Central and Eastern European Countries
- 2009/4 Stephen Dobson and Carlyn Ramlogan, *Is there a trade-off between income inequality and corruption? Evidence from Latin America*
- 2009/3 Juan Carlos Cuestas and Luís Alberiko Gil-Alana, Further evidence on the PPP analysis of the Australian dollar: non-linearities, structural changes and fractional integration
- 2009/2 Estefanía Mourelle and Juan Carlos Cuestas, Inflation persistence and asymmetries: Evidence for African countries
- 2009/1 Juan Carlos Cuestas and Barry Harrison, Further evidence on the real interest rate parity hypothesis in Central and Eastern European Countries: unit roots and nonlinearities
- 2008/16 Simeon Coleman, Inflation persistence in the Franc Zone: evidence from disaggregated prices
- 2008/15 Juan Carlos Cuestas and Paulo Regis, Nonlinearities and the order of integration of order prices
- 2008/14 Peter Dawson and Stephen Dobson, *The influence of social pressure and nationality on individual decisions: evidence from the behaviour of referees*
- 2008/13 Juan Carlos Cuestas and Barry Harrison, *Testing for stationarity of inflation in Central and Eastern European Countries*
- 2008/12 Juan Carlos Cuestas and Dean Garratt, Is real GDP per capita a stationary process? Smooth transitions, nonlinear trends and unit root testing
- 2008/11 Antonio Rodriguez Andres and Carlyn Ramlogan-Dobson, Corruption, privatisation and the distribution of income in Latin America
- 2008/10 Stephen Dobson and Carlyn Ramlogan, *Is there an openness Kuznets* curve? Evidence from Latin America
- 2008/9 Stephen Dobson, John Goddard and Frank Stähler, *Effort levels in contests: an empirical application of the Tullock model*
- 2008/8 Juan Carlos Cuestas and Estefania Mourelle, *Nonlinearities in real exchange* rate determination: Do African exchange rates follow a random walk?

- 2008/7 Stephen Dobson and John Goddard, *Strategic behaviour and risk taking in football*
- 2008/6 Joao Ricardo Faria, Juan Carlos Cuestas and Estefania Mourelle, Entrepreneurship and unemployment: A nonlinear bidirectional causality?
- 2008/5 Dan Wheatley, Irene Hardill and Bruce Philp, "Managing" reductions in working hours: A study of work-time and leisure preferences in the UK industry
- 2008/4 Adrian Kay and Robert Ackrill, *Institutional change in the international* governance of agriculture: a revised account
- 2008/3 Juan Carlos Cuestas and Paulo José Regis, *Testing for PPP in Australia: Evidence from unit root test against nonlinear trend stationarity alternatives*
- 2008/2 João Ricardo Faria, Juan Carlos Cuestas and Luis Gil-Alana, Unemployment and entrepreneurship: A Cyclical Relation
- 2008/1 Zhongmin Wu, Mark Baimbridge and Yu Zhu, *Multiple Job Holding in the* United Kingdom: Evidence from the British Household Panel Survey

DISCUSSION PAPERS IN POLITICAL ECONOMY

- 2006/3 Ioana Negru, On Homogeneity and Pluralism within Economics Schools of Thought
- 2006/2 David Harvie and Bruce Philp, Learning and Assessment in a Reading Group Format or Reading Capital... For Marks
- 2006/1 David Harvie, Bruce Philp and Gary Slater, Regional Well-Being and 'Social Productivity' in Great Britain'
- 2004/2 Massimo De Angelis and David Harvie, *Globalisation? No Question: Foreign Direct Investment and Labour Commanded*
- 2004/1 David Harvie, Value-Production and Struggle in the Classroom, or, Educators Within, Against and Beyond Capital

DISCUSSION PAPERS IN APPLIED ECONOMICS AND POLICY

- 2007/2 Juan Carlos Cuestas, Purchasing Power Parity in Central and Eastern European Countries: An Analysis of Unit Roots and Non-linearities
- 2007/1 Juan Carlos Cuestas and Javier Ordóñez, Testing for Price Convergence

among Mercosur Countries

- 2006/2 Rahmi Cetin and Robert Ackrill, Foreign Investment and the Export of Foreign and Local Firms: An Analysis of Turkish Manufacturing
- 2006/1 Robert Ackrill and Adrian Kay, The EU Financial Perspective 2007-2013 and the Forces that Shaped the Final Agreement
- 2004/5 Michael A. Smith, David Paton and Leighton Vaughan-Williams, *Costs, Biases and Betting markets: New evidence*
- 2004/4 Chris Forde and Gary Slater, *Agency Working in Britain: Character, Consequences and Regulation*
- 2004/3 Barry Harrison and David Paton, *Do 'Fat Tails' Matter in GARCH Estimation?* Stock market efficiency in Romania and the Czech Republic
- 2004/2 Dean Garratt and Rebecca Taylor, Issue-based Teaching in Economics
- 2004/1 Michael McCann, Motives for Acquisitions in the UK
- 2003/6 Chris Forde and Gary Slater, *The Nature and Experience of Agency Working* in Britain
- 2003/5 Eugen Mihaita, Generating Hypothetical Rates of Return for the Romanian Fully Funded Pension Funds
- 2003/4 Eugen Mihaita, The Romanian Pension Reform
- 2003/3 Joshy Easaw and Dean Garratt, Impact of the UK General Election on Total Government Expenditure Cycles: Theory and Evidence
- 2003/2 Dean Garratt, Rates of Return to Owner-Occupation in the UK Housing Market
- 2003/1 Barry Harrison and David Paton, *The Evolution of Stock Market Efficiency in a Transition Economy: Evidence from Romania.*