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ECON3350 - Applied Econometrics for Macroeconomics and Finance

Tutorial 9: Research Report 2

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Adm · Tut 09 · Recap · Report 2

Univariate Time Series $y_t = a_0 + a_1 y_{t-1} + b_0 \varepsilon_t + b_1 \varepsilon_{t-1}$ - ARMA (1,1)

Until Week 3 – Forecasting

- Estimate a set of ARIMA (p, d, q) models,
- select the best models based on AIC & BIC,
- check for white noise residuals (Ljung-Box test),
- discard models that reject H_0,
- run forecasts with the models left.

Week 4 – ADF test (presence of unit root)

- Estimate a set of ADF (const, trend, p) models,
- select the best models based on AIC & BIC,
- check for white noise residuals (Ljung-Box test),
- discard models that reject H_0,
- run ADF test for the models left,
- I(0) if reject H_0, for all models left, otherwise repeat the test for differenced data {possibly I(1+)}.

Multivariate Time Series $y_t = a_0 + a_1 y_{t-1} + b_0 x_t + b_1 x_{t-1} + \varepsilon_{y,t}$ - ARDL (1,1)

Week 7 – Dynamic Relationships – ARDL and ECM

- Estimate a set of ARDL (p, l, s) models,
- select the best models based on AIC & BIC,
- check for autocorrelation in residuals,
- discard models with high autocorrelation in residuals,
- run IRFs for models left and analyse dynamic relationships.

Week 8 – Cointegration

- If it is the difference of two I(1) (e.g. spread) – ADF,
- If it is residuals of 2+ I(1) (e.g. regression) – Engle-Granger,
- Interpret the outcome and infer about cointegration.

Cointegration and ARDLs

Cointegration may also be tested with an ARDL. In general, an ARDL(p, l) may contain the following cases.

Case	$a(1) = 0$	$b(1) = 0$	x_t	y_t	SS Relationship	Cointegration
1	N	N	$I(0)$	$I(0)$	Y	N
2	N	N	$I(1)$	$I(1)$	N	Y
3	N	Y	$I(0)$	$I(0)$	N	N
4	N	Y	$I(1)$	$I(0)$	N	N
5	Y	N	$I(0)$	$I(1)$	N	N
6	Y	N	$I(1)$	$I(2)$	N	N
7	Y	Y	$I(0)$	$I(1)$	N	N
8	Y	Y	$I(1)$	$I(1)$	N	N

- Only cases 1-2 result in an equilibrium relationship.
- Only cases 1-4 admit an ECM representation.
- Case 8 is an ARDL in stationary Δy_t and Δx_t.

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Report 2 due 9 May

Research Report 2 - Data, Instructions, Rubric and Template

Attached Files: cay.xlsx (20.786 KB)
3350_Research_Report_2_2025.pdf (155.077 KB)
Rubric for Research Report (106.496 KB)

ECON3350 Research Report 2

ECON3350: Applied Econometrics for Macroeconomics and Finance

Research Report 2

Due date: 9th May 2025, 12:59 (12:59pm)

Please upload your report via the "Turnitin" submission link (in the "Assessment / Research Report 2" folder). Please note that hard copies *will not* be accepted. At the moment, the due date is 12:59 PM on 9th May 2025, but please check BlackBoard regularly for announcements regarding any changes to this. Your report should be a write-up of your answers (in PDF format, single-spaced, and in 12 font size).

As with the first research report, please *do not* include or attach any software specific material such as R source code or output. In particular, you should summarize the output in the report, but do not copy-paste the "dump" produced by the software. This "dump" is usually of poor quality in terms of presentation and contains much irrelevant or 'not relevant enough' material and so can cost you marks.

You are allowed to work on this assignment with others, that is, you can discuss how to answer the questions with your classmate(s) and even use AI as a research tool. However, this is not a group assignment, which means that the report must be written individually and by you: you must answer all the questions in your own words and submit your report separately. The marking system will check for similarities and AI content and UQ's student integrity and misconduct policies on plagiarism *strictly apply*.

Report 2 due 9 May - Question 1

[40 Marks] Your first task is to **characterize the relationship among consumption, asset wealth and human capital**. We wish to know if there exists an equilibrium relationship among these three variables. If such a relationship does exist, we wish to know if it is a steady state equilibrium or a cointegrating relationship. Interpret the implications of the estimated relationship.

Report 2 due 9 May - Question 2

[40 Marks] Your second task will be to **characterize the dynamic responses** of consumption to a shock to asset wealth. Assume that you have found an equilibrium relationship (choose carefully the model for this purpose). We wish to know about the short-term response of consumption to a shock to asset wealth over two years after the shock. Report the impulse responses of consumption for 8 quarters to a *negative* 10% shock at time t to asset wealth of the form $\delta = -0.1$ such that we assume $a_t = \mu_{a,t} - \delta = \mu_{a,t} - 0.1$. Report results under the assumption that the shock occurred only at time t, that is $a_{t+s} = \mu_{a,t+s}$ for all $s > 0$, and again but under the assumption that the shock was permanent and so present at all t, $t+1$, $t+2$, ..., that is $a_{t+s} = \mu_{a,t+s} - 0.1$ for all $s > 0$.

Report 2 due 9 May - Question 3

[20 Marks] Assume that we have the equilibrium relationship

$$c_t = \beta_a a_t + \beta_y y_t + \eta_t. \tag{1}$$

Your final task is to **investigate support for the hypothesis that the coefficients in the equilibrium relationship sum to one**. This restriction emerges from the model proposed by Lettau and Ludvigson (2001). They are interested in the relationship between aggregate consumption, C_t, and aggregate wealth, W_t. Aggregate wealth is composed of total asset holdings, A_t, and total human capital, H_t. That is, $W_t = A_t + H_t$. From this relationship, using $a_t = lg(A_t)$ and $y_t = log(H_t)$, log aggregate wealth ($w_t = log(W_t)$) may be approximated using

$$w_t \approx \omega a_t + (1 - \omega) y_t$$

where $0 < \omega < 1$. The above relation implies that the equilibrium relationship between log consumption and log wealth may be written as

$$c_t = \omega a_t + (1 - \omega) y_t + \eta_t.$$

That is, in the equilibrium relationship in (1), the coefficients on a_t and y_t will sum to one; or $\beta_a + \beta_y = 1$.

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Thank you

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Reference

Tsay, R. (2010). Analysis of Financial Time Series, 3rd Edition, John Wiley & Sons.