Economics preparatory readings and exercises for the summer[1]

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Dear PPE and HEco students,

Welcome to Oxford! I am Francesca Arduini, the Economics Fellow at Somerville.

A quick intro to me: I am a microeconomist with a focus on applying game theory to a variety of policy-relevant questions. As an undergraduate, I was a PPE student at Magdalen. I then did my masters at Oxford and my PhD at UCL. Prior to becoming an academic, I worked as an economic consultant, so I have experience both of economics research and of deploying economic models in real-life settings, particularly antitrust cases. As well as teaching you economics, I am also available to you as a mentor. I hope to help you thrive during your time at Oxford, and to help you prepare for whatever path you choose to take next.

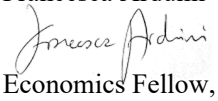
The first term is often a challenging one for new undergraduates (freshers). Therefore, I would encourage you to enjoy this summer and arrive to Oxford with your batteries fully charged. At the same time, I would recommend that you put aside some time to make sure that you are well prepared, so that you won't have to play catch-up while also getting used to the new environment and substantial workload.

My main advice is to revise key maths concepts, and fill in any gaps by self-teaching. Maths is the foundation on which we will build to study economic models, so it's important that you have that foundation in place before you start. I have provided below a list of questions for you to go through independently, to help you check whether you need to strengthen your understanding of any areas before October. Some of these questions are from the Maths Workbook (attached), which was developed specifically for Oxford undergraduates, and will continue to be a useful reference for the next three years.

Additionally, I recommend reading the first two units of the online free textbook CORE The Economy 1.0 (1-The capitalist revolution, and 2-Technology, population, and growth). This is one of the main textbooks we will use for the first year economics course. Below, I also included other textbooks which will be helpful during term-time (I do not suggest you start reading them now). Unless you prefer to have your own copy, there is no need for you to purchase these books as they are widely available in University libraries.

Finally, I have prepared a list of academic articles, books, podcasts and blogs that may be of interest to you. I suggest you have a look, pick out the ones that seem more appealing to you, and try them. It would be particularly valuable for you to skim a few academic papers, to start familiarising yourselves with what academic economics articles look like. The list of papers below is somewhat random, but the papers have in common that (i) they can be understood without specialist knowledge, and (ii) they are all available for free from the links provided. During term, we will start looking at more complex articles. You may notice that the suggested resources (articles but also blogs etc) cover very diverse topics. Many people think Economics is just about money, inflation, interest rates… That could not be less true! It is also about understanding the decision-making of individuals, groups of people, and institutions. Often, it is about quantifying cause and effect relationships and rigorously evaluating and advising policy. I hope these resources help you start connecting the dots between the economics foundations we will cover this year, and the extraordinary variety of interesting and important work that is produced using extensions of these simple models and concepts.

I look forward to meeting you in person,
Francesca Arduini



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[1] I would like to thank Juliette Caucheteux for contributing to the reading suggestions and maths questions

Maths

Using online tools

I encourage you to use online tools while reviewing the questions below. For instance, WolframAlpha and Geogebra are helpful for plotting graphs, differentiating equations etc. Make sure that you use these tools as an aid, especially to check your answers, but that you don't become reliant on them: you should aim to answer the questions below yourself. If these basics become second nature to you, rather than needing to always look them up, that will free up more time and mental energy for other tasks. Much more than at school, in the coming years you will find that you cannot complete all tasks you are set to a perfect standard… but the more time and energy you have, the easier it will be to progress further. Also, on a very practical note, you will often not have access to these online tools in exams!

Revision list – please go through all of these carefully:

- Pythagoras' theorem
- Laws of inequalities (especially what happens if you multiply by a negative number)
- Basic interval and set notation
    - E.g. how do you formally write down the interval between 0 and 10 (inclusive vs exclusive)?
- Simplification and factorization, e.g.
    - How to factorise $10x^2 + 2x$
    - How to simplify $\frac{10x^2+2x}{2}$
- Binomial expansion, including the standard formulas:

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a - b)^2 = a^2 - 2ab + b^2$$

$$(a + b)(a - b) = a^2 - b^2$$

- Laws of exponents (e.g. product of powers)
- Exponents and logarithms. Special focus on the natural logarithm and Euler's constant, as these are heavily used in economics
- Solve a linear equation of the type $ax + b = 0$. How do you usually check your answer?
- Solve a quadratic equation of the type $ax^2 + bx + c = 0$, either by factorising or by computing the discriminant. When should we use one relative to the other?
- What is a function?
    - For example, consider a linear function takes the form $f(x) = ax + b$
    - Understand that a and b represent coefficients.
        - Unlike variables, coefficients have a constant value.
        - Note: sometimes we refer to the *constant term* as a coefficient that is not accompanied by a variable, e.g. b in the example above. However, any coefficient is itself constant, though it may be part of a non-constant *term*, e.g. a.
        - We may know that the coefficients take specific values, in which case we may substitute those in those values, e.g. $f(x) = 10x + 5$.
        - Otherwise, we may work with a and b to represent general coefficients.
        - If we observe both x and f(x) then we can estimate the constants a and b using statistics / econometric techniques (no need to understand this point in detail).
    - Understand that we can replace x in the formula $f(x) = ax + b$ with any other variable,

e.g. $f(z) = az + b$ or $f(\text{applies}) = a*apples + b$

- Linear function
    - How do you plot it?
    - In the graph with x labelling the horizontal axis and y labelling the vertical axis, how do you find the y-intercept and the x-intercept?
    - How do you determine the equation for a linear function knowing that it goes through two points?
    - How do you know whether it is increasing or decreasing?
    - What is the gradient of a vertical line? How about a horizontal line?
    - Think of examples of x and y that can be plausibly linked with a linear relationship (it's ok if it's approximate). Practice explaining what it means that they are linearly related, and how to interpret the intercept and slope.
    - What are the domain and range?
- Quadratic function
    - Write down a general formula using a, b, c as the coefficients
    - Consider examples with different values of a, b and c. How do these different coefficients affect the shape of the graph?
    - How do you plot it?
    - How do you find the roots?
    - What are the domain and range (as a function of a, b and c)?
    - What is the slope of this function for different values of x?
- Intersection between functions
    - How many intersections can there be between two linear functions? (depending on the values of a and b for the two functions)
    - How to find the intersection between two functions, e.g. between a linear and quadratic
    - How can this method be applied to determine over what interval a quadratic function is greater than a specific constant?
- What are derivatives?
- Laws of derivatives (e.g. product rule)
- Practice differentiating functions, including
    - Linear
    - Quadratic
    - bx^a
    - x^{-a}
    - $\ln(x)$
    - a^x
    - e^x
- What are integrals? Remind yourself of the difference between an indefinite integral, and an integral over a specific interval, with a lower and upper bound.
- Practice integrating these functions. (Try computing both the indefinite integral and the integral over a specific interval)
    - Linear
    - Quadratic
    - bx^a
    - x^{-a}
    - $\ln(x)$
    - a^x
    - e^x

Please attempt the following exercises from the Maths Workbook:

Chapter: Review of Algebra
Exercises 1.7; Exercises 1.11 and Exercises 1.13
Chapter: Lines and Graphs
Exercises 2.1 and Exercises 2.4.
Chapter: Sequences, Series and Limits; the Economics of Finance
Exercises 3.1, Exercises 3.5 and Exercises 3.6
Chapter: Functions
Exercises 4.2 and Exercises 4.5.
Chapter: Differentiation
Exercises 5.1, Exercises 5.2 and Exercises 5.4
Chapter: More Differentiation, and Optimisation
Exercises 6.1 and Exercises 6.2
Chapter: Integration
Exercises 10.1, Exercises 10.2 and Exercises 10.5

Suggested Readings

Journal Articles
Please select at least a few that interest you and skim them

- Prendergast, Canice. 2017. "How Food Banks Use Markets to Feed the Poor." *Journal of Economic Perspectives* 31 (4): 145–62. https://www.aeaweb.org/articles?id=10.1257/jep.31.4.145
- Oates, Wallace E., and Robert M. Schwab. 2015. "The Window Tax: A Case Study in Excess Burden." *Journal of Economic Perspectives* 29 (1): 163–80. https://www.aeaweb.org/articles?id=10.1257/jep.29.1.163
- Dragusanu, Raluca, Daniele Giovannucci, and Nathan Nunn. 2014. "The Economics of Fair Trade." *Journal of Economic Perspectives* 28 (3): 217–36. https://www.aeaweb.org/articles?id=10.1257/jep.28.3.217
- Slonim, Robert, Carmen Wang, and Ellen Garbarino. 2014. "The Market for Blood." *Journal of Economic Perspectives* 28 (2): 177–96. https://www.aeaweb.org/articles?id=10.1257/jep.28.2.177
- Bernanke, Ben S. 2013. "A Century of US Central Banking: Goals, Frameworks, Accountability." *Journal of Economic Perspectives* 27 (4): 3–16. https://www.aeaweb.org/articles?id=10.1257/jep.27.4.3
- Sandel, Michael J. 2013. "Market Reasoning as Moral Reasoning: Why Economists Should Re-engage with Political Philosophy." *Journal of Economic Perspectives* 27 (4): 121–40. https://www.aeaweb.org/articles?id=10.1257/jep.27.4.121
- Mankiw, N. Gregory. 2013. "Defending the One Percent." *Journal of Economic Perspectives* 27 (3): 21–34. https://www.aeaweb.org/articles?id=10.1257/jep.27.3.21
  Auerbach, Alan J., William G. Gale, and Benjamin H. Harris. 2010. "Activist Fiscal Policy." *Journal of Economic Perspectives* 24 (4): 141–64. https://www.aeaweb.org/articles?id=10.1257/jep.24.4.141
- Moore, Tyler, Richard Clayton, and Ross Anderson. 2009. "The Economics of Online Crime." *Journal of Economic Perspectives* 23 (3): 3–20.
- https://www.aeaweb.org/articles?id=10.1257/jep.23.3.3
- Backhouse, Roger E., and Steven G. Medema. 2009. "Retrospectives: On the Definition of Economics." *Journal of Economic Perspectives* 23 (1): 221–33.

https://www.aeaweb.org/articles?id=10.1257/jep.23.1.221
- Leape, Jonathan. 2006. "The London Congestion Charge." *Journal of Economic Perspectives* 20 (4): 157–76. https://www.aeaweb.org/articles?id=10.1257/jep.20.4.157
- Einav, Liran, and Leeat Yariv. 2006. "What's in a Surname? The Effects of Surname Initials on Academic Success." *Journal of Economic Perspectives* 20 (1): 175–87. https://www.aeaweb.org/articles?id=10.1257/089533006776526085
- Siegel, Jeremy J., and Richard H. Thaler. 1997. "Anomalies: The Equity Premium Puzzle." *Journal of Economic Perspectives* 11 (1): 191–200. https://www.aeaweb.org/articles?id=10.1257/jep.11.1.191
- Sloane, Carolyn M., Erik G. Hurst, and Dan A. Black. 2021. "College Majors, Occupations, and the Gender Wage Gap." *Journal of Economic Perspectives* 35 (4): 223–48**.** https://www.aeaweb.org/articles?id=10.1257/jep.35.4.223
- Easterly, William, and Tobias Pfutze. 2008. "Where Does the Money Go? Best and Worst Practices in Foreign Aid." *Journal of Economic Perspectives* 22 (2): 29–52. https://www.aeaweb.org/articles?id=10.1257/jep.22.2.29
- Stefano DellaVigna, John A. List, Ulrike Malmendier, "Testing for Altruism and Social Pressure in Charitable Giving", The Quarterly Journal of Economics, Volume 127, Issue 1, February 2012, Pages 1–56, https://doi.org/10.1093/qje/qjr050
    - Freely available version here: https://www.nber.org/system/files/working_papers/w15629/w15629.pdf
- Aksoy, Ozan; Szekely, Aron; (2025) Making Sense of Honor Killings? American Sociological Review, 90 (3) pp. 427-454. 10.1177/00031224251324504.
    - Freely available here: https://discovery.ucl.ac.uk/10203638/7/Aksoy_szekely-2025-making-sense-of-honor-killings.pdf
    - Note that this was published in a sociology journal, but it draws on game theory and is closely related to the work economists do

Other

I suggest you have a look at these and pick out one or two to read / listen to semi-regularly. You might also want to browse and pick out some older articles / episodes on topics you are particularly interested in.

- The Economics Department has put together a list of blogs, podcasts and books that may be interesting to you.
    - You can find it here: https://www.economics.ox.ac.uk/undergraduate-reading-suggestions
- I would add to that list:
    - A fantastic website which summarises academic economics articles in a way that is easy to digest. This is published by the IFS, a very influential UK-based economics think-tank:
        - https://microeconomicinsights.org/
    - An interesting book on parenting styles written by a really good academic economist:
        - Doepke, M. and Zilibotti, F. *Love, Money and Parenting*. Princeton University Press.
    - A really good resource for learning about some forms of gender inequality:
        - https://ourworldindata.org/economic-inequality-by-gender
    - An interesting source of articles written by economic consultants, often about competition economics and regulation (less academic, more practical):
        - https://www.oxera.com/insights/agenda/
    - The American Economic Association's podcast. They discuss recent academic papers with their authors in a way that is easy to digest
        - https://www.aeaweb.org/research/podcasts

List of textbooks

For summer reading and also for term-time

- CORE Economics, *The Economy 1.0*, Oxford University Press, and freely available online at

https://books.core-econ.org/the-economy/v1/index.html

- **Summer reading: first two units (1-The capitalist revolution, and 2-Technology, population, and growth)**

For term-time

Microeconomics

- Frank, R., *Microeconomics and Behavior,* McGraw-Hill
- Varian, H. R., *Intermediate Microeconomics: A Modern Approach,* Norton
- Morgan, W., Katz, M. L. and Rosen, H. S., *Microeconomics*, McGraw-Hill

Macroeconomics

- Jones, C.I., *Macroeconomics*, 5th International Student Edition, Norton

Maths

- The Maths Workbook, attached
- Ian Jacques, *Mathematics for Economics and Business,* Pearson (introductory)
- Malcolm Pemberton and Nicholas Rao, *Mathematics for Economists: An Introductory Textbook,* Manchester University Press (more advanced)