

UNIVERSITY OF OSLO

DEPARTMENT OF ECONOMICS

Home exam: ECON5310/9310 – Topics in macroeconomics

Duration: May 21.-26. 2015

Guidelines:

Submit your exam answer electronically to: submissions@econ.uio.no. Last day for submission is **26 May 2015 at 4.00 p.m.**

Written text should be in pdf format. Please remember to also submit *Delcaration Form for Portfolio assessment/take home exam* which you will find on the course web page. This must be submitted as a separate document.

Use your candidate number, both as the name of the file you submit, and as the author name in the file. Do NOT use your name! You will find your candidate number on your StudentWeb. If you have problems, please contact Tone Enger.

Further instructions:

- The questions are in English, and you must give your answers in English.
- Students on master's level are awarded on a descending scale using alphabetic grades from **A** to **E** for passes and **F** for fail. Students who would like to have the course approved as a part of our phd-program, must obtain the grade B or better. Students on phd-level are awarded either a passing or failing grade. The pass/fail scale is applied as a separate scale with only two possible results.
- Your answer must fill the formal requirements, found at <http://www.sv.uio.no/studier/ressurser/kildebruk/> (Norwegian) or <http://www.sv.uio.no/english/studies/resources/sources-and-references/> (English).
- It is of importance that your paper is submitted by the deadline (see above). Papers submitted after the deadline, **will not be graded.***)
- All papers must be submitted electronically to the address given above. You must not submit your paper to the course teacher.

*) The rules for illness during exam also applies for the home exams. Please see <http://www.sv.uio.no/english/studies/admin/exams/postponed-exam/index.html> for further details.

Marcus Hagedorn
Kjetil Storesletten
May 21, 2015

Take-Home Exam

Topics in Macroeconomics ECON5310

Due: Tuesday May 26 at 16:00

Good Luck!

Storesletten's part (counts 70%)

Consider a static economy populated with a large number of individuals (agents) of measure one. Agents have preferences over an education effort s , private consumption c , and hours worked h . Preferences are given by

$$U_i = v(s; \kappa_i) + \mathbb{E}_0 u(c, h), \quad (1)$$

where the expectation is taken over the realization of idiosyncratic productivity shocks (see below). The disutility of education effort $s \geq 0$ takes the form

$$v(s; \kappa_i) = \frac{(\kappa_i)^{-1/\psi}}{1 + 1/\psi} (s)^{1+1/\psi}, \quad (2)$$

where $\kappa_i > 0$ is an individual preference parameter (interpreted as “learning ability”).

Preferences over consumption and labor supply are

$$u(c, h) = \ln(c) - \frac{h^{1+\sigma}}{1+\sigma}$$

where c is consumption and h is labor supply.

The agent can choose how many hours to work and the agent's hourly wage rate is w , so labor earnings are given by wh . The wage rate can be expressed as $w = p(s) \cdot \exp(\alpha + \varepsilon)$, where $p(s)$ is the price of skills and α and ε are idiosyncratic components of the wage (i.e., shocks to the agent's efficiency units of labor supply).

In the beginning of the period α is known but ε is revealed later in the period. Before the realization of ε the agent can purchase fair insurance against ε . Namely, the agent can purchase claims to $B(\varepsilon)$ units of consumption in case ε is realized, and this insurance costs $Q(\varepsilon)$ per unit. Agents enter the period with zero wealth and there are no possibilities to insure against the α shock. Thus, when insurance is purchased, the cost of insurance claims must sum to zero,

$$0 = \int Q(\varepsilon) B(\varepsilon) d\varepsilon,$$

and once ε is realized the agent's budget constraint is

$$c = wh + B(\varepsilon).$$

1. Suppose, as a start, that there is no ε shock so $\varepsilon = 0$ for all agents. Given an education s and a realization α , calculate the optimal labor supply and consumption for the agent.

2. Suppose now that ε is stochastic. Calculate optimal consumption and show that optimal labor supply is given by

$$\ln h = \frac{1}{\sigma} \varepsilon + X,$$

where X is a constant [hint: use the welfare theorems to simplify the problem].

3. Firms in the economy have a constant return to scale production function given by

$$Y = \int \exp(\varrho s) ds, \quad (3)$$

where $\varrho \geq 0$ is a constant reflecting the skill bias in production (so higher skilled people are inherently more productive).

- (a) Assuming that there is free entry of firms, show that the equilibrium skill price function $p(s)$ is linear in skills, i.e., on the form $\ln p(s) = \pi_0 + \pi_1 s$. Solve for $p(s)$.
- (b) Why is the price of skills independent of the distribution of s ?

4. Given the skill price function p and the subsequent (c, h) choices, compute the optimal skill choice s .
5. Suppose the government introduces a tax-and-transfer scheme such that the disposable (post-tax) earnings are \tilde{y}_i , given pre-tax earnings y_i :

$$\tilde{y}_i = \lambda y_i^{1-\tau}, \quad (4)$$

where λ and τ are constants. The budget constraint then changes to

$$c = \lambda (wh)^{1-\tau} + B(\varepsilon).$$

- (a) Explain why a larger parameter τ implies more progressive taxes.
- (b) Recalculate the optimal labor supply h , consumption c , and education choice s . Explain the intuition for how the progressivity parameter τ influences h , c , and s .
6. Assume that α , ε , and κ are independently distributed. Let α and ε be normally distributed,

$$\begin{aligned} \alpha &\sim N\left(-\frac{v_\alpha}{2}, v_\alpha\right) \\ \varepsilon &\sim N\left(-\frac{v_\varepsilon}{2}, v_\varepsilon\right), \end{aligned}$$

and let κ be exponentially distributed, $\kappa \sim \eta \exp(-\eta\kappa)$.

- (a) Calculate aggregate labor supply and aggregate output.
 - (b) Explain how aggregate labor supply and output depend on τ and inequality in α and ε (i.e., v_α and v_ε).
 - (c) Calculate the cross-sectional inequality in consumption and labor supply, $var(\ln c)$ and $var(\ln h)$. Explain the intuition for these results.
 - (d) Calculate the cross-sectional covariances $cov(\ln h, \ln w)$, $cov(\ln h, \ln w)$, and $cov(\ln c, \ln w)$. Explain the intuition for these results.
 - (e) Suppose you knew the value for τ and had access to a cross-sectional data set with data on consumption, labor supply, and hourly wage rates. How could you identify (in order to estimate) the parameters σ and the quantities v_α and v_ε ?
7. Suppose taxes were zero (so $\tau = 0$ and $\lambda = 1$) and let $\xi = v_\varepsilon / (v_\alpha + v_\varepsilon)$ denote the share of insurable risk.
- (a) Plot the second moments $var(\ln c)$, $var(\ln h)$, and $cov(\ln h, \ln w)$ as a function of ξ .
 - (b) Plot aggregate labor supply H , aggregate output Y , and aggregate labor productivity Y/H as a function of ξ .
 - (c) Based on your answers, how would you expect aggregate labor supply and aggregate TFP to respond to an increase in wage inequality?

Hagedorn's part: A referee report (counts 30%)

The take-home exam is simple: Pick one paper from each of the lists below (i.e., one paper in macro/labor and one on sovereign debt). Imagine that each of them have been submitted to a journal at about the level of the *Journal of Political Economy*.

Please prepare a recommendation about whether or not the paper should be published in the journal. Draft a brief letter, no more than one paragraph, to the editor explaining your recommendation regarding the paper. Recommendations usually fall into three categories: "publish as is," "revise and resubmit," or "reject." Your cover letter should explain the reasons for your recommendation, but it does not need to provide great detail. Please attach a referee's report for each paper, explaining the arguments underlying your recommendation. Does the paper break new ground? Are the findings important enough to warrant publication, assuming that they are correct? Is the empirical work convincing and is the econometric methodology correct? If there are proofs, are they right? Are there other issues that the author should address if the paper is going to be revised?

1. All reports start with a brief overview of what the authors do and a brief summary of the paper's new contribution. The purpose of this is twofold: (a) to give the editor a brief summary of what the paper does, and (2) to show the editor and the authors of the paper that you have understood the paper (recall that the report is always forwarded to the authors). Note that you have to extract the key message of the paper and the key element of the model (i.e., what makes the model tick), or – for an empirical paper – what is the key empirical strategy.

In a normal report this summary takes a couple of paragraphs and no more than a page. In your case, you should do a better job, and write about two pages (single spaced). When grading the exam, we will use this to gauge if you have understood the paper sufficiently well.

2. Provide your thoughts about strengths or weaknesses of the paper. Strengths might include: interesting question not answered before, interesting methodological contribution / new techniques that help to deepen understanding of the issue, new results on an old question, or similar items. Examples of weaknesses might include algebraic or modeling mistakes, demonstrating results that are well known or just a simple reinterpretation of the existing results, excessively strong or

unrealistic assumptions needed to obtain the results, an inappropriate theoretical model for answering the question at hand, perhaps because it misses some important dimensions of the real world, or an uninteresting question (you need to find good arguments why it is the case).

For an empirical paper, there are further issues. You need to decide if the empirical work is convincing. Is the model identified in a reasonable way? Are the results statistically significant at conventional levels? Are the results substantively significant, or has the author found statistically significant but small coefficients? Sometimes small coefficients have important consequences, so you need to decide whether the estimates, of whatever magnitude, are of some intrinsic interest. Beware of results that are statistically indistinguishable from zero only because the standard errors are very large. You should also consider whether the data are well suited to the problem at hand, and whether the data set has been used appropriately. Are there concerns about sample choice? Are there problems with measurement error or other aspects of data quality? Sometimes, there are econometric issues with the estimation in a paper, and you should raise them for the editor. If the paper uses panel data but does not present robust and heteroskedasticity-consistent standard errors, you might ask for the revision to do so.

If a paper has several parts, for example a model, numerical simulations, and an estimation section, one can often comment on each part separately. Examples of questions you may raise about a numerical section are: Do the numerical results appear reasonable or robust? Do the parameters the authors choose appear to be reasonable? Do the results illustrate the theoretical points the authors make? Do you agree with the author's interpretation of their results?

Choose one among the following list of papers:

- 1 Mortensen & Pissarides (1994)
- 2 Burdett & Mortensen (1998)
- 3 Abowd, Kramarz & Margolis (1999)
- 4 Shimer & Smith (2000)
- 5 Postel-Vinay & Robin (2002)
- 6 Cahuc, Postel-Vinay & Robin (2006)
- 7 Gautier & Teulings (2006)
- 8 Atakan (2006), Eeckhout & Kircher (2011)
- 9 Hornstein, Krusell & Violante (2011)
- 10 Hagedorn, M., & Manovskii, I. (2013).
- 11 Hagedorn, Law & Manovskii (2014)