ANSWERS TO:

Written Exam for the M.Sc. in Economics, Winter 2011/2012-R

Advanced Development Economics – Macro Aspects

Master's Course

21.2.2012
(3-hour, closed book exam)

Verbal questions

Question A1

The relevant works the student should be able to provide details on is Frankel and Romer (1999) and Feyrer (2009) on trade, and Andersen and Dalgaard (2011) on travel.

For full marks the student should be able to do the following in a convincing manner:

1. Explain why trade (or travel) potentially influences growth, in theory. The main "stories" involve division of labor, as well as technology transfer

2. Explain why trade is endogenous to income (i.e., why OLS may not work)

3. Provide details on the identification strategy in the individual studies. In Frankel and Romer this involves using "fitted trade", from a gravity equation, which is then used as an instrument for actual trade. The critism of Rodrik (more rigourous control for climate) should be mentioned. In Feyrer's study the idea is to use the opening and closing of the Suez channel – in aftermath of the Suez crisis – as a means to optaining identification. In Andersen and Dalgaard, travel is identified using a strategy similar to Frankel and Romer; the results here are robust, however, to the inclusion of e.g. distance from the equator, tropical climate and more.

Question A2

Based on Guiso et al. (2006); Becker and Woessmann (2009).

Max Weber argued that a key effect of the Protestant Reformation was to produce new

cultural values; Thrift as well as hard work ("the Protestant Ethic" for short), which was instrumental in ensuring the rise of Capitalism and thus eventually the wealth of Western Europe.

More recently, economic historians have argued that other effects may be at work: human capital accumulation may well have been stimulated by the Reformation. This idea is examined by Becker and Woessman. The basic idea is that the Protestant dogma, requiring individuals to be able to read the bible in their own language propelled early human capital accumulation (raised the perceived return on such investments), which later on turned out to be good for growth.

For full marks the student should be able to do the following in a convincing manner:

1. Explain how Becker and Woessmann propose to test the hypothesis (i.e., what is the left hand side variable and what is the right hand side variable?)
2. Explain why OLS may not achieve identification
3. Explain how Becker and Woessman resolve the problem at hand

Analytical questions

Based on Chakraborty, 2004.

B1. Household's problem is

$$\max_{c_t, c_{t+1}} u_t = \log(c_t) + \phi \log(c_{t+1}), \text{ s.t } w_t = s_t + c_t, \text{ and } c_{t+1} = (1 + \rho_{t+1}) s_t.$$

Q i. The utility function reflects expected utility from life time consumption. ϕ reflects the survival probability; with probability 1- ϕ the agent dies, and therefore derives no utility from consumption.

Q ii. The simplest approach is to solve the problem via substitution; this leaves us with

$$\max_{s_t} u_t = \log(w_t - s_t) + \phi \log\left((1 + \rho_{t+1}) s_t\right)$$

The first order condition is

$$\frac{1}{w_t - s_t} = \phi \frac{1}{s_t} \Rightarrow s_t = \frac{\phi}{1 + \phi} w_t.$$

Qiii. The parameter ϕ reflects the survival probability. Hence, the higher the probability of survival the more the individual saves. This captures in a simple way the basic idea that mortality patterns influences the incentive to save, as lower mortality increases the planning horizon.

B2. **Law of motion for capital**.

As $k_{t+1}=s_t$, and the labor force is normalized to one, it follows immediately upon substitution for savings that

$$k_{t+1} = \frac{\phi}{1+\phi}(1-\alpha)Ak_t^\alpha \equiv \psi(k_t),$$

where the FOC from the representative firm also has been used.

B3. **Steady state analysis**.

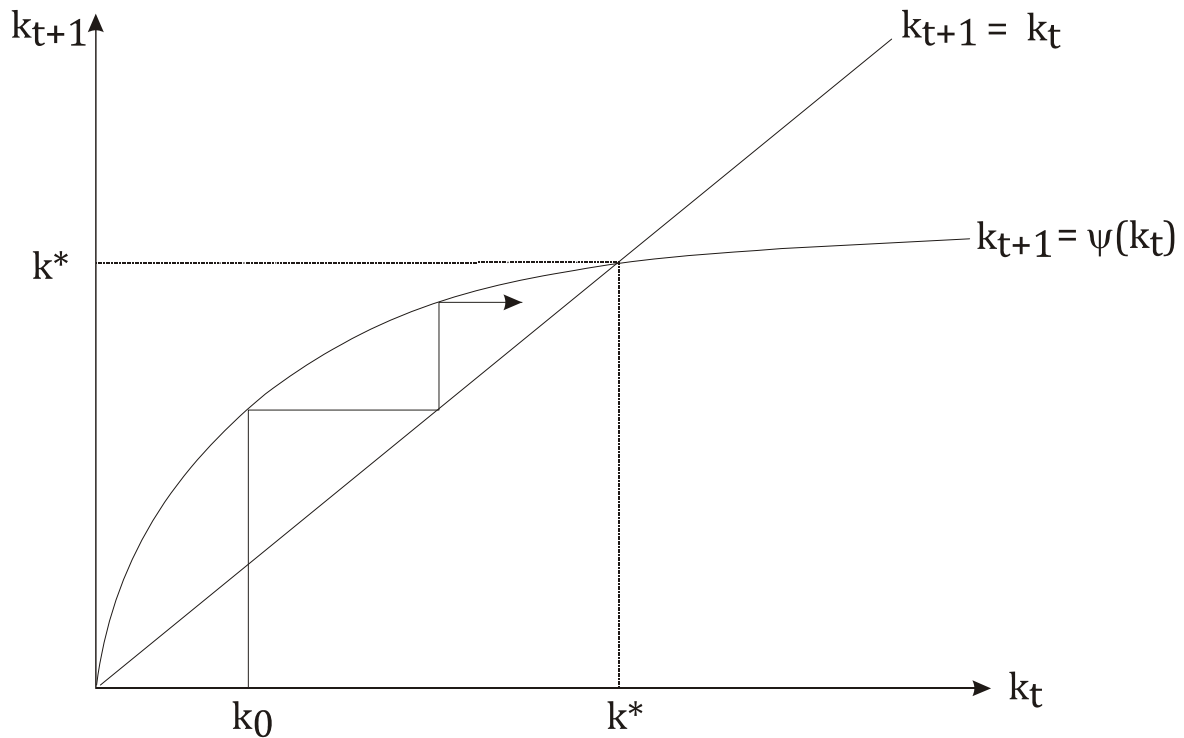The student should establish that the following properties of $\Psi(k)$ are fulfilled:

$$\psi(0)=0, \psi'(k)>0, \psi''(k)<0,$$
$$\lim_{k\to 0}\psi'=\infty$$
$$\lim_{k\to\infty}\psi'=0$$

These properties ensures that the law of motion only crosses the 45 degree line once. Hence, a unique steady state exist.

The phase diagram of the model is illustrated in the figure below

It is plain to see from the figure that no matter where the economy starts out (as long as k0 is positive), the economy will converge toward k*. The steady state is globally stable.

B4. (i) Employing the steady state definition, $k_{t+1} = k_t = k^*$, in the law of motion and rearranging gives the steady state level of k.

$$k^* = \left[\frac{\phi(1-\alpha)A}{1+\phi} \right]^{\frac{1}{1-\alpha}}$$

Using the production function , $y = Ak^\alpha$ leads to

$$y^* = A\left[\frac{\phi(1-\alpha)A}{1+\phi} \right]^{\frac{\alpha}{1-\alpha}}$$

Increased mortality is captured by a decrease in ϕ (lowered survival rate to period 2). It is clear from the steady state expression that this will work to lower k* and thereby y*. The intuition is simple: as mortality goes up consumers attach less weight on future consumption, effectively speaking. Consequently, savings are reduced, and thus capital accumulation leading to a lower k in the long run.

(ii) The two most relevant studies on the reading list is Acemoglu and Johnson (AJ), and Aghion et al. Both studies are regression based. The student needs to explain how AJ tries to identify the impact of changes in mortality on changes in income per capita by exploiting the *international epidemiological transition* to construct an instrument for changes in longevity. Similarly, the student should explain the critique voiced by Aghion et al (i.e., the level as well as changes in life expectancy matters to growth), it's significance (i.e., if so the exclusion restriction is violated in AJ), and potential critiques of Aghion et al (e.g., overinstrumentation).