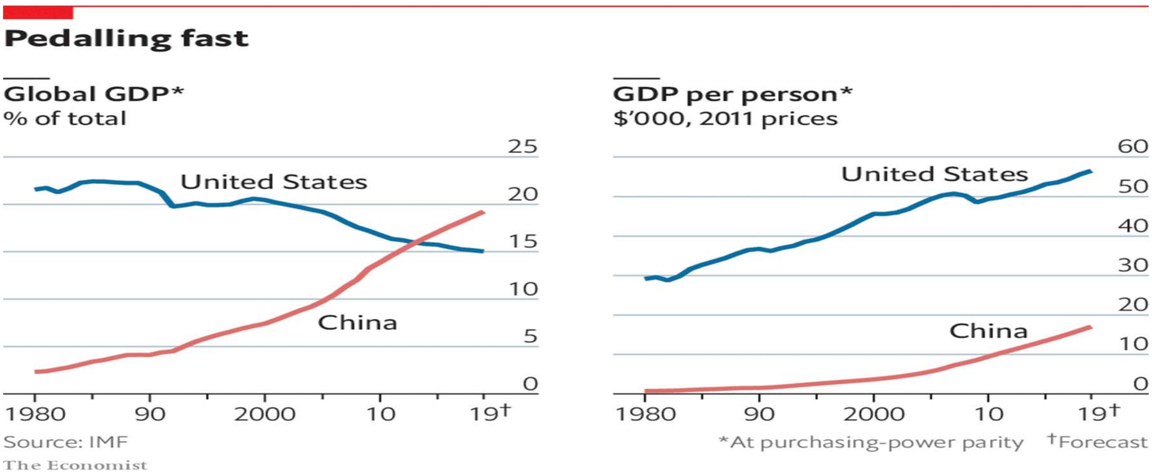
Macroeconomics II, academic year 2022-2023

Mid-term test

28-03-2023

Read each question carefully and organize your thoughts in a logic and concise manner before answering. The duration of the test is 40 minutes only. Answer all the questions. Each question is worth 5 points. Please do not talk to your colleagues during the test. Do not forget to write your name and student number in each of your exam sheets. Please, write as intelligibly as possible, as examiners need to be able to read and understand what you have written in order to grade your test. Be cool. Good luck!

1. Carefully analyze the following Figure and indicate the main conclusions that can be drawn from it.



These two graphs show different types of convergence – there is convergence because the People's Republic of China starts with a lower level of income (share of global income in the graph on the left, and level of income per capita, in the graph on the right), but its rate of growth is significantly faster than that of the USA. Over the 40 years covered by the graphs, China's share of global GDP increased almost ten times, while the USA's fell by about 32% [(22 - 7)/22 ≈ 0.32] (check the data in the graphs). Over the same period, China's GDP/capita increased 19 times, while the USA's did not even double (check the data in the graphs). Given that the size of the Chinese population is five times that of the USA, and that China's GDP/capita is only three times smaller than that of the USA, then the GDP of the PR of China has to be larger than that of the USA, hence China's larger share of global GDP (and became so around 2012). Also, given that China's total GDP exceeds that of the USA by a much smaller margin than its population, then China's GDP per capita is smaller of the USA's, but is catching up.

2. Explain how, in the context of growth accounting, Total Factor Productivity can be considered a "measure of ignorance".

Total factor productivity measures residual growth in total output of a firm, industry or national economy that cannot be explained by the accumulation of traditional inputs such as labour and capital. Since this cannot be measured directly the process of calculating derives TFP as the residual which accounts for effects on total output not caused by inputs. As a residual, TFP is dependent on estimates of the other components.

Estimates by different studies show that for an average country the TFP accounts for 60 percent of growth of output per worker. Studies on human capital attempted to correct for weaknesses in estimations of the labour component of the equation, by refining estimates of the quality of labour - using these re-estimations, the contribution of TFP was substantially lower. Other studies have found that the model can be improved by using the efficiency of energy conversion, which roughly tracks *technological progress*.

The word "total" suggests all inputs have been measured. Official statisticians tend to use the term "multifactor productivity" (MFP) instead of TFP because some inputs such as energy are usually not included. External costs including attributes of the workforce, public infrastructure such as highways and environmental sustainability costs such as mineral depletion and pollution are not traditionally included. TFP has been criticized as lacking meaningful units of measurement, being not more than a balancing quantity. Some economists believe that the method and its results are invalid or need to be carefully interpreted and used along with other alternative approaches. In this construction the units of *A* would not have a simple economic interpretation, and the concept of TFP appears to be a modelling artifact. In other words, it is not possible to know what accounts as residual, such that some economists call TFP the coefficient of ignorance (a ratio of something we don't know what is).

3. Indicate, briefly explaining, two aspects considered unsatisfactory in the Harrod-Domar model that led to the development of the Solow model.

Solow developed several critiques of the Harrod-Domar model, namely that labour is not made explicit, factors of production are only complementary, not substitutable, the capital/output ratio is constant (therefore, does now account for technical change), that equilibrium in the model is unstable and the model does not contain a mechanism of adjustment (the answer could refer to any combinations of two of these factors, as long as it can demonstrate how Solow address them in his models). For example, Solow included a variable of technical change in his models (A = TFP), which removed the limitation of capital efficiency being constant; assumed the substitutability of the factors of production, such that the same level of output can be achieved by different combinations of capital and labour; and, in addition to making labour explicit in the growth equation, also made explicit the importance of labour productivity, which changes with changes in the capital/labour ratio.

4. Within the framework of the Solow model, assume the existence of two economies, A and B, with identical current levels of labour productivity. Economy A has a higher saving rate than economy B,

while economy B has a higher rate of growth of labour than economy A. Since the economies are identical in everything else, what is to be their expected comparative growth performance? Justify.

Economy A is expected to grow faster because: (i) its savings rate is higher than B's; (ii) the model assumes that S = I; (iii) so, other things being equal, provided that $sy - (n + \delta)k > 0$, there is capital accumulation in economy A; (iv) such that its k (= K/L) is higher than in B, and so will be its labour productivity. With a lower savings rate and higher rate of growth of the labour force, k in economy B may be constant [if $sy = (n + \delta)k$], so, no capital accumulation takes places; or, if labour grows faster than savings, $sy < (n + \delta)k$, in which case k falls over time, and so does labour productivity.