

UNIVERSITAT POMPEU FABRA

APPLIED MACROECONOMICS

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Problem Set 3

Due: 1/11/04

1. The file *hall_jones.xls* contains the data used in the paper by Hall and Jones (1999) that we discuss in class. In most of the cases the identification of each variable is clear from the name in the first row. Other cases could be more difficult:

- SocInf: social infrastructure
- YrsOpen: openness index of Sachs and Wagner.
- GADP: government antidiversion policies.
- log_Fr_Rom: log of predicted trade by the gravity model. Instrument used originally by Frankel and Romer (1999).
- EngFrac: fraction of English speakers as a first language.
- EurFrac: fraction of speakers of European languages.

a. Discuss the ranking of countries in function of social infrastructure. Is that ranking reasonable?

b. Replicate the results in table II of Hall and Jones (1999).

c. Discuss the sensibility of the results to different sets of instrument. Comment the overidentification test in each case.

2. Usually taxes do not disturb the revenue based calculation of TPF. Suppose that firms buy capital through equity finance and wages and depreciation (τ) are tax deductible for firms and that r is the required (gross of personal tax) rate of return on equity.

a. What is the after tax net marginal product of capital? Assume CRS and competitive markets.

b. How does the existence of this taxes affect the calculation of TFP? Is there any condition that guarantees that the usual formula for the revenue based TPF remains valid?

c. Imagine a tax on output or sales (τ). How does TFP calculation change? Is there any condition that guarantees that the usual formula for the revenue based TFP remains valid? Assume CRS and competitive markets.

d. Calculate the revenue-based Solow residual when there are increasing returns to scale and market power.

e. Assume CRS and competitive markets. Suppose that only a fraction ρ of variation of the labor input is in the form of changes in hours. The rest are variations in work effort. Derive the Solow residual based on hours. Would it be correlated with the exogenous instrument?

3. Write down the simplest OLG (Diamond model) and explain why it is possible in this kind of models to find dynamic inefficiency. You can use the basic set-up in the textbook (pages 75-88).

a. Discuss what is the essential difference with respect to the Ramsey model we discuss in class that makes dynamic inefficiency a possible outcome in the OLG model.

b. Look at the data in table 1 (next page). Notice that V is the total value of the market portfolio ex-dividend and D is the total dividend. Consider that in the OLG model each young person consumes some of the return to his labor and invest the rest by buying shares in the new and existing firms that compose the market portfolio. In the old age she receives dividends from his shares, sells then ex dividend to the young cohort and consumes the total proceeds. Therefore notice that the total return to aggregate capital stock is rK and the net investment is nK . Would you say that this economy is dynamically efficient? Why?

TABLE 1
Gross profit and investment: the United States economy (percent)

Year	Gross profit	Gross investment	$\frac{D}{V}$	$\frac{D}{V}$
	GNP	GNP	GNP	
1929	32.6	16.1	16.5	—
1930	31.7	11.6	20.1	—
1931	28.6	7.7	20.9	—
1932	26.4	1.9	24.5	—
1933	24.6	2.9	21.8	—
1934	26.1	5.3	20.8	—
1935	27.1	9.1	18.0	—
1936	26.4	10.5	15.9	—
1937	26.9	13.3	13.6	—
1938	26.5	7.8	18.6	—
1939	26.7	10.4	16.3	—
1940	28.2	13.3	14.9	—
1941	29.4	14.6	14.8	—
1942	29.0	6.5	22.6	—
1943	27.2	3.2	24.0	—
1944	25.2	3.6	21.5	—
1945	23.2	5.3	17.9	—
1946	24.0	14.8	9.2	—
1947	25.6	14.9	10.8	—
1948	27.8	18.0	9.8	—
1949	27.3	14.0	13.3	—
1950	28.4	19.1	9.3	—
1951	28.0	18.1	9.9	—
1952	26.9	15.2	11.7	3.9
1953	26.4	14.8	11.6	4.0
1954	26.9	14.5	12.4	4.1
1955	28.2	17.2	11.0	3.7
1956	27.6	17.0	10.6	3.4
1957	27.4	15.8	11.6	3.8
1958	27.0	13.9	13.1	4.1
1959	27.8	16.2	11.6	3.8
1960	27.1	15.2	11.9	3.9
1961	27.1	14.4	12.7	4.2
1962	27.4	15.2	12.1	4.1
1963	27.6	15.3	12.3	4.2
1964	27.7	15.3	12.4	4.3
1965	28.2	16.5	11.8	4.2
1966	27.8	16.7	11.1	4.0
1967	27.2	15.4	11.8	4.2
1968	26.6	15.3	11.3	4.0
1969	25.7	15.9	9.8	3.5
1970	24.6	14.7	9.9	3.5
1971	25.2	15.6	9.6	3.4
1972	25.6	16.7	8.9	3.1
1973	25.6	17.6	8.1	2.8
1974	25.1	16.3	8.8	2.8
1975	26.2	13.7	12.4	3.9
1976	26.4	15.6	10.8	3.4
1977	27.1	17.3	9.9	3.1
1978	27.6	18.5	9.1	2.7
1979	27.6	18.1	9.5	2.8
1980	27.4	16.0	11.4	3.2
1981	28.1	16.9	11.2	3.2
1982	27.7	14.1	13.6	3.9
1983	28.4	14.7	13.7	4.0
1984	28.5	17.6	10.9	3.3
1985	28.0	16.5	11.5	3.6

Source. NIPA. Capital Cash Flow is calculated as national income plus capital consumption allowances less employee compensation and 67% of proprietors' income which is imputed to labour. This imputation is discussed in Christensen (1971).