THE EMPIRICAL FOUNDATION OF THE GOLDEN RULE

Víctor J. Elías*

Abstract

This working paper analizes with cross-sectional data if the Golden Rule condition satisfies: where the saving index is equal to capital (β) or to the real interest rate, equal to the gross output growth of households.

Resumen

Este paper analiza con datos de corte transversal si se cumple la condición de la Regla de Oro: donde el índice de ahorro es igual al capital (β), o el tipo de interés real (i), igual al crecimiento bruto del producto de los hogares.
Se analizarán las implicancias que podría tener ésta, para la pérdida de eficacia o bienestar.

I. Introduction

The Golden Rule (GR) as developed by E. Phelps (1966) gives the condition under which a country will grow maximizing its consumption per capita. The condition is obtained when the country is growing in its long run path with stability fulfilled.

The objective of this paper is to check with cross-country data if this condition provided by the GR: rate of saving (s) equal to the capital share (β), or real interest rate (i) equal to gross domestics product growth (GDP), are actually fulfilled. Even though these are long-run conditions could be of interest to analyze how far are they from current conditions, and what are the implications for efficiency or welfare loss.

This very preliminar exercise will use the data provided by the World Development Indicators 2000 (World Bank) and other studies that provides estimates of β, capital growth and Total Factor Productivity (TFP). For some of the parameters there are information for almost 150 countries, but much less of 100 of them covers all the relevant parameters.

II. Data Behavior

In this section we present frequency distributions for real interest rate (i); annual GDP rate of growth for the period 1965-1998 (y); capital share (β_1); share of total income of the upper 10th decile group (β_2); annual capital stock rate of growth for the period 1950-1987 (k); annual Total Factor Productivity rate of growth for the period 1950-1987 (g); acceleration of the rate of change of the GDP (Δy) between the 90's with respect to the 80's.

FIGURE A
FREQUENCY OF DISTRIBUTION OF THE VARIABLES AND "PARAMETERS"

A.1. Frequency Distribution of Real Rate Interest 1998 (i)
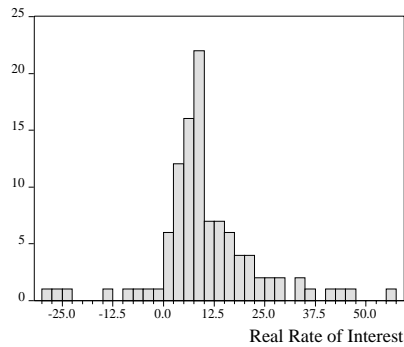
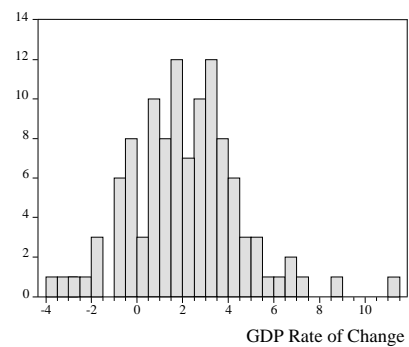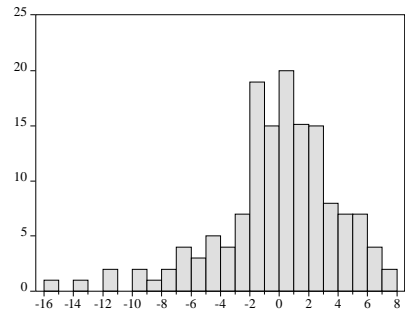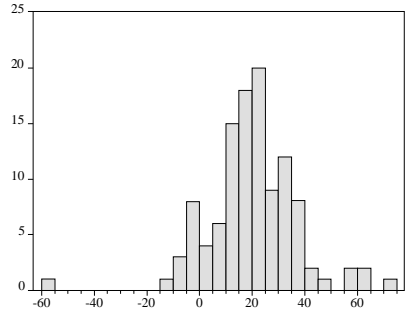A.2. Frequency Distribution of GDP Rate of Change 65-98 (y)

FIGURE A (cont.)

FREQUENCY OF DISTRIBUTION OF THE VARIABLES AND "PARAMETERS"

A.3. Frequency Distribution of "GDP Rate of Change 90-98 – GDP Rate of Change 80-90" (Δy)
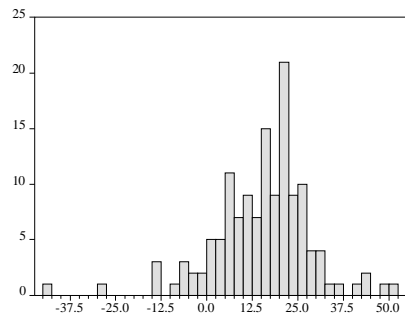
GDP Rate of Change 90-98 – GDP Rate of Change 80-90

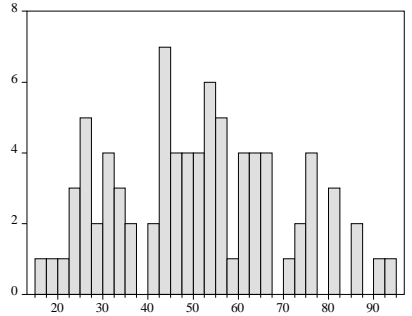A.4. Frequency Distribution of Gross Domestic Saving 1980 (s_{80})

Gross Domestic Saving

A.5. Frequency Distribution of Gross Domestic Saving 1980 (s_{98})
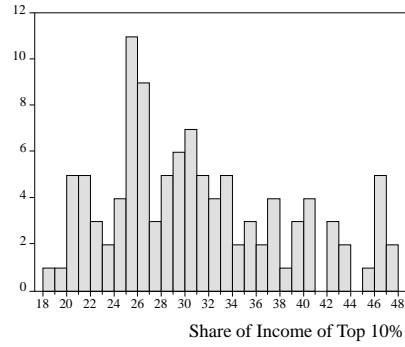
Gross Domestic Saving

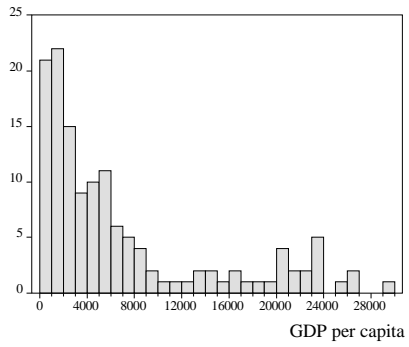A.6. Frequency Distribution of Capital Share (β_1)

Capital Share

FIGURE A (cont.)

FREQUENCY OF DISTRIBUTION OF THE VARIABLES AND "PARAMETERS"
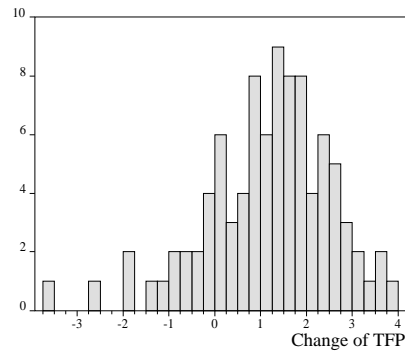
A.7. Frequency Distribution of Share of Income of Top 10% (β_1)

A.8. Frequency Distribution of GDP per capita 1998 (GDP/N)

A.9. Frequency Distribution of Change of TFP 1950-87 (g)

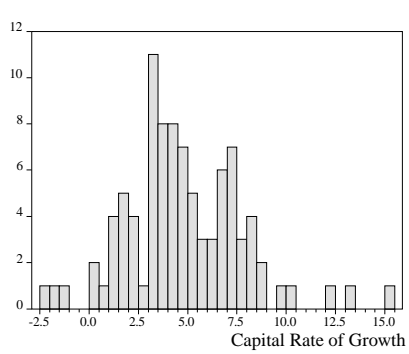A.10. Frequency Distribution of Capital Rate of Growth 1950-87 (k)

TABLE Nº 1

SUMMARY OF THE BEHAVIOR OF MAIN VARIABLES AND "PARAMETERS"

	Parameters	Mean	Standard Deviation	Number of Observations
i	Real rate of interest (1998)	10.5	12.7	105
y	GDP rate of change 65-98	2.1	2.4	110
Δy	GDP rate of change 90-98 – GDP rate of change 80-90	–0.2	4.1	144
s_{80}	Gross domestic saving 1980	19.7	17.1	113
S_{98}	Gross domestic saving 1998	15.1	13.3	136
β_1	Capital share (near 1998)	51.0	18.6	81
β_2	Share of income of top 10% (near 1998)	31.1	7.6	108
Y/N	GDP per capita 1998	6944.8	7533.8	135
g	Change of TFP (1950-1987)	1.1	1.4	92
k	Capita rate of growth (1950-1987)	4.8	3.0	92

III. GOLDEN RULE'S "VERIFICATION"

In this section we "verify" how close is satisfied the GR. We make the following graphical analysis:
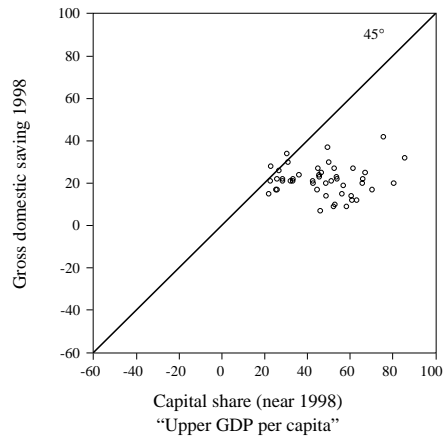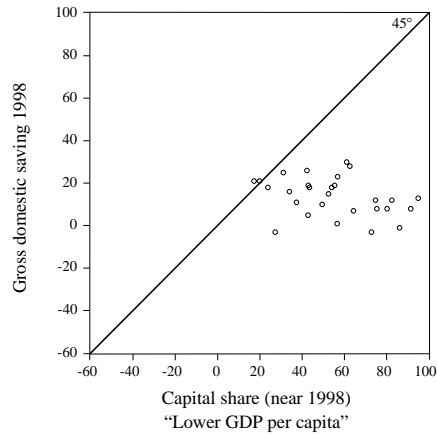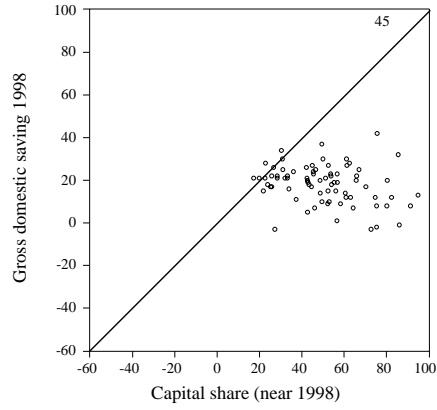
1. How far are the countries from their long run conditions: we compare GDP Growth (y) with the Capital Growth (k):
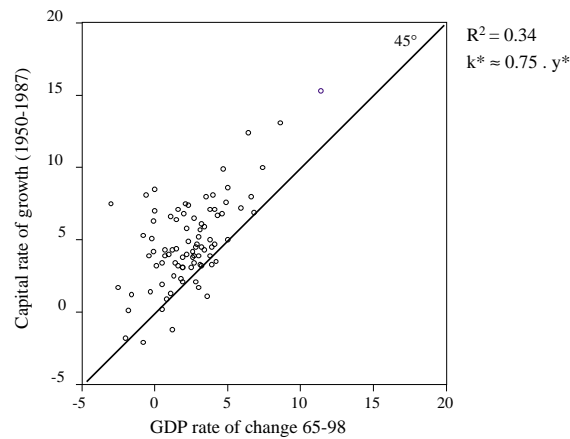
2. How far are the countries from the GR's condition i = y (*):
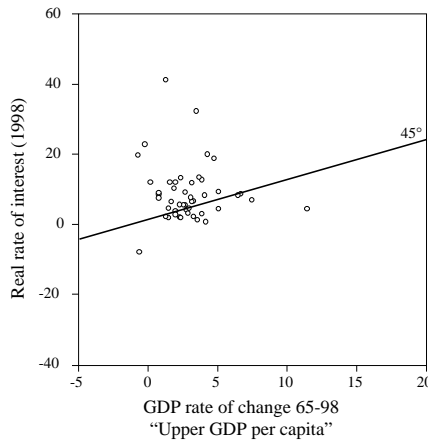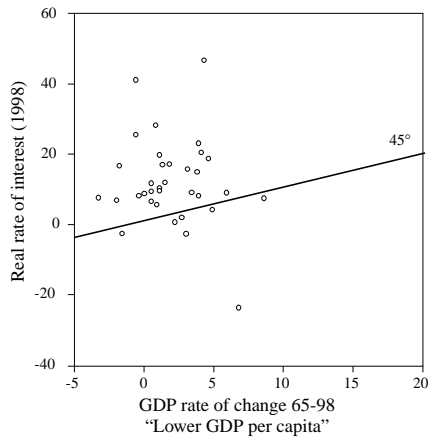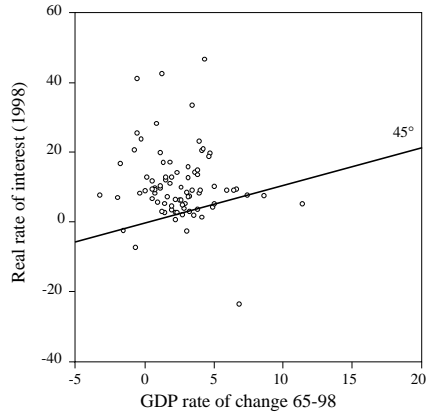
(*) Milton Friedman (1971) in some of his estimates of demand function for money used "y"
    as a proxy for "i", based on this GR.

3. How far are the countries from GR's s = β:

Gross domestic saving 1998 vs. Capital share (near 1998)

Gross domestic saving 1998 vs. Capital share (near 1998)
"Lower GDP per capita"

Gross domestic saving 1998 vs. Capital share (near 1998)
"Upper GDP per capita"

Share of income of top 10% (near 1998)

Share of income of top 10% (near 1998)
"Lower GDP per capita"

Share of income of top 10% (near 1998)
"Upper GDP per capita"
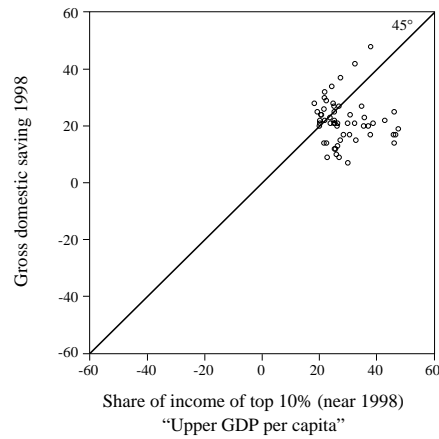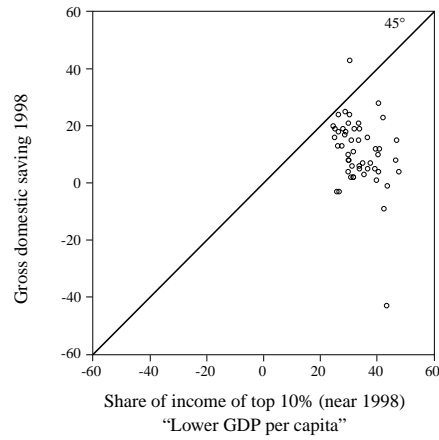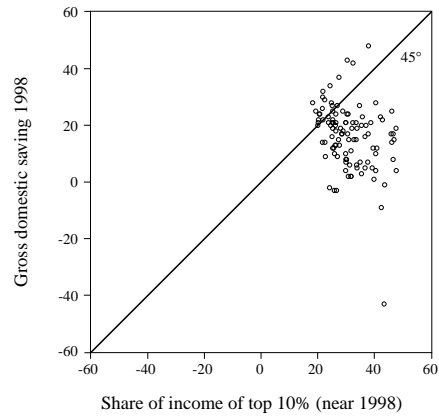
IV. SOME IMPLICATIONS

As we do no get a "verification" of the GR's we try to see if the departure from it could be explained by:

1. If the two GR's are consistent:
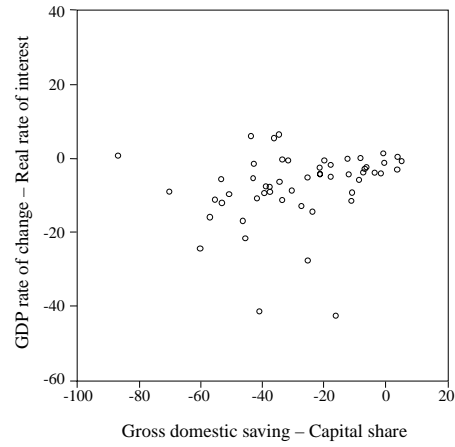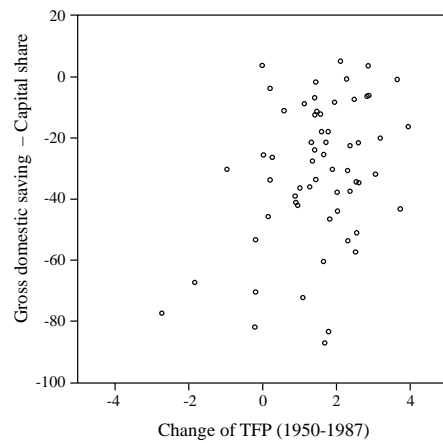
(Plot: y-axis "GDP rate of change – Real rate of interest" ranging from -60 to 40; x-axis "Gross domestic saving – Capital share" ranging from -100 to 20.)

2. If the departure of s from b are related to efficiency problems. We relate s – β with TFP growth:

(Plot: y-axis "Gross domestic saving – Capital share" ranging from -100 to 20; x-axis "Change of TFP (1950-1987)" ranging from -4 to 4.)

Change of TFP (1950-1987)
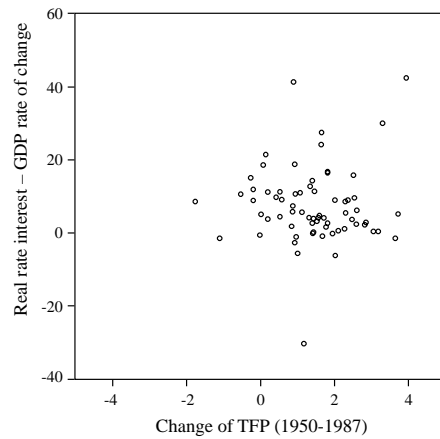
V. REFERENCES

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