

Development Statistics

S13 Panel

Fujikawa, Kiyoshi
Nagoya University, GSID

Data used in the 8 largest
journals on labor economics

	65-69	70-74	75-79	80-83	94-97
Pure theory	14	19	23	29	21
Micro panel	1	6	21	18	31
Micro cross-section	10	21	21	26	25
Macro time-series	42	24	27	16	6
Macro cross-section	24	24	15	10	8

Source: Higuchi et al. (2005)

Structure of panel data

	1970	1971	1972		1980		1990
CA							
US							
UK							
FR							
IT							
JP							

Diagram annotations: A vertical line groups the years 1970, 1971, and 1972, labeled "Cross section". A horizontal line groups the countries CA, US, UK, FR, IT, and JP, labeled "Time Series". A larger box encompasses the entire grid, labeled "Pool (panel)".

Panel

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Example of panel data

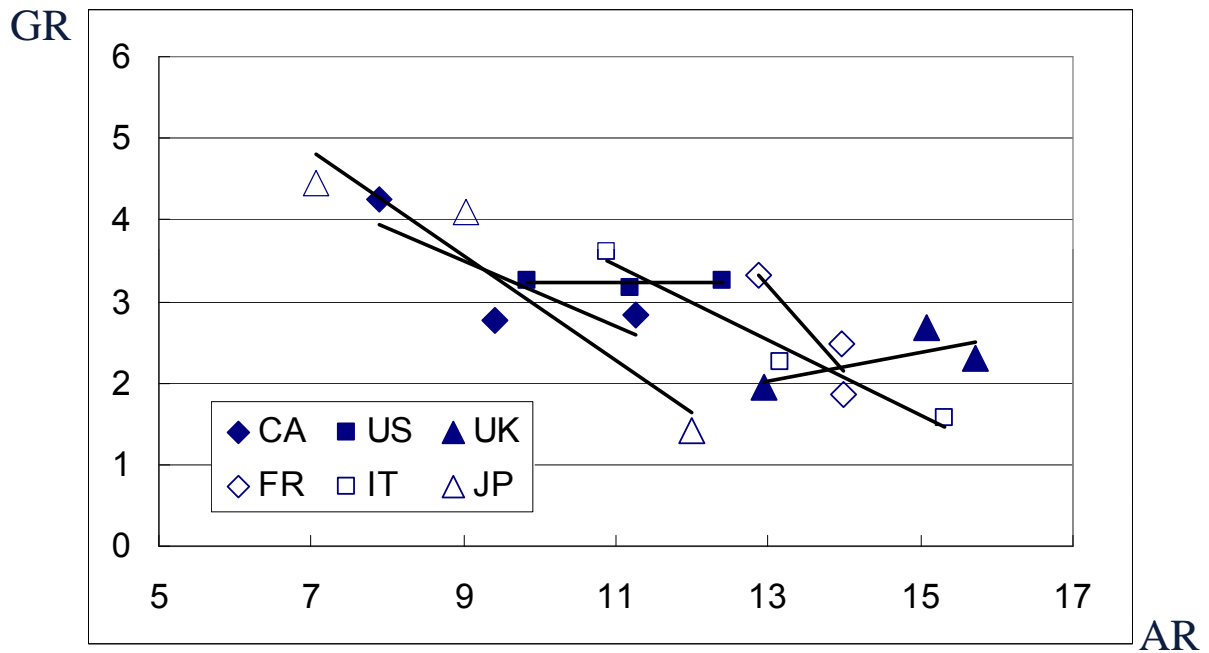
	Aged pop. rate			GDP growth rate		
	1970	1980	1990	1970s	1980s	1990s
CA	7.90	9.40	11.27	4.26	2.77	2.84
US	9.84	11.19	12.39	3.62	3.17	3.26
UK	12.94	15.07	15.72	1.94	2.67	2.30
FR	12.87	13.97	13.99	3.31	2.47	1.87
IT	10.89	13.15	15.32	3.61	2.26	1.57
JP	7.07	9.04	11.99	4.46	4.09	1.41

Source: WB, World development indicators 2003

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Time series (by country)



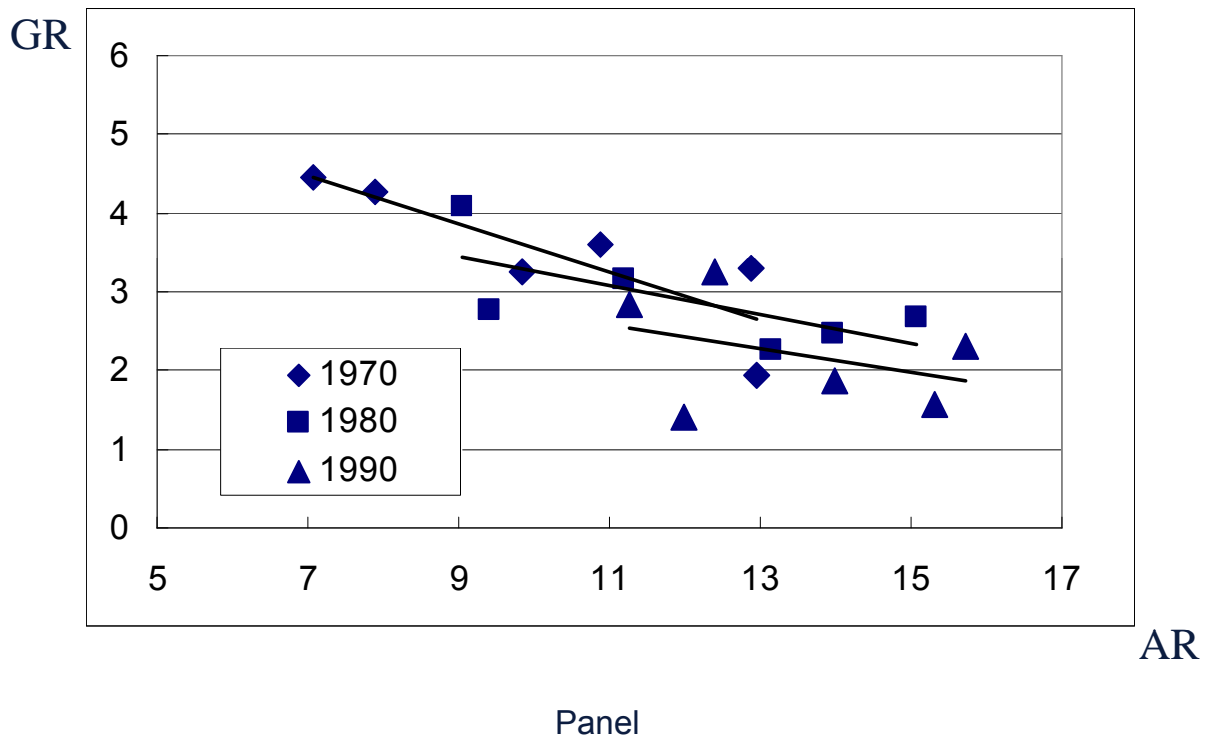
Panel

Time series estimation (OLS)

	Constant	Slope
Canada	7.08	-0.40
USA	3.29	0.00
UK	-0.65	0.20
France	16.20	-1.00
Italy	8.45	-0.45
Japan	9.48	-0.66

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Cross section (by period)

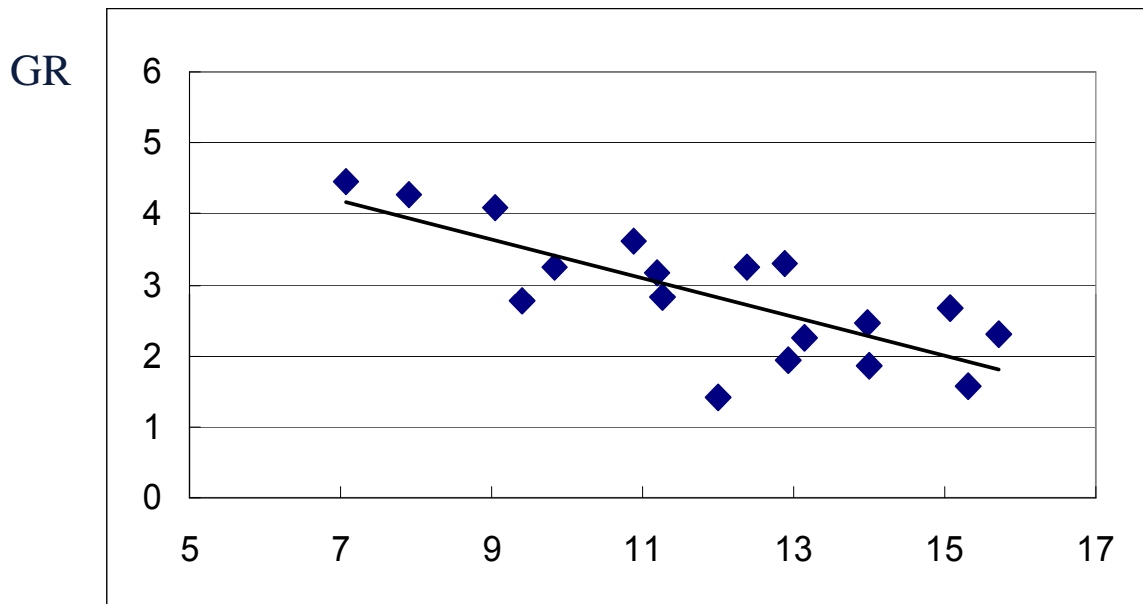


Cross section estimation (OLS)

	Constant	Slope
1970	6.73	-0.32
1980	5.07	-0.18
1990	4.18	-0.15

- Waste of time series data information
- Common effect of population aging by period?

Pool data (OLS)



Estimation: $Y_t = 6.11 - 0.27 X_t + e_t$ AR

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No difference by country ?

- Fixed effect model
 - Correlation between X_i and α_i
 - Practically the same as “dummy variable” model
- Random effect model
 - No correlation between X_i and α_i
 - (Block diagonal) GLS estimation

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Dummy variable

$$\text{CA dummy} = \begin{pmatrix} 1 \\ \vdots \\ 1 \\ 0 \\ \vdots \\ 0 \\ 0 \\ \vdots \\ 0 \end{pmatrix} \left. \begin{array}{l} \text{Canada} \\ \\ \text{The USA} \\ \\ \text{The UK} \end{array} \right\}$$

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Fixed effect model

$$Y_{it} = b X_{it} + c + \alpha_i + e_{it}$$

Slope	-0.40	Constant	7.73
CA dummy	0.54	FR dummy	0.39
US dummy	0.06	IT dummy	0.12
UK dummy	0.54	JP dummy	-0.57

- α_i is not a random variable (but a fixed term)
- GDP growth depends on each unique factor

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Random effect model

$$Y_{it} = a + b X_{it} + e_{it}$$
$$e_{it} = \alpha_i + \eta_{it} \text{ (country error + random error)}$$

- α_i is a random variable
- The average of α_i is zero

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Image of two models

- Fixed effect model
 - Country based data
 - Prefecture based data
 - Industry based data
- Random effect model
 - General Social Survey data
 - Customer survey
 - Public survey

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Fixed effect or random effect?

- Houseman's test
- Hypothesis
 - H0: No correlation between X_i and α_i
 - H1: correlation between X_i and α_i
- Test statistic
 - Quadratic form of $(b_f - b_r)$
- Distribution of the test statistic
 - Chi-square with degree of freedom K
 - K : the number of the parameters