phd16_A5-final 2024/12/25 | QM筆記 | Chapter6] GoogleSheets計算表 |

Question: Japan and #4 Canada

6.31 Everaert and Pozzi20 develop a model to examine the predictability of consumption growth in 15 OECD countries. Their data is stored in the file oecd. The variables used are growth in real per capita private consumption (CSUMPTN), growth in real per capita government consumption (GOV), growth in per capita hours worked (HOURS), growth in per capita real disposable labor income (INC), and the real interest rate (R). Using only the data for Japan, answer the following questions:

a. Estimate the following model and report the results

$$CSUMPTN = \beta_1 + \beta_2 HOURS + \beta_3 GOV + \beta_4 R + \beta_5 INC + e$$

CSUMPTN = β_1 + β_2HOURS + β_3GOV + β_4R + β_5INC + e

Are there any coefficient estimates that are not significantly different from zero at a 5% level?

b. The coefficient β2 could be positive or negative depending on whether hours worked and private consumption are complements or substitutes. Similarly, β3 could be positive or negative depending on whether government consumption and private consumption are complements or substitutes. What have you discovered? What does a test of the hypothesis H0：β2 = 0, β3 = 0 reveal?

c. Re-estimate the equation with GOV omitted and, for the coefficients of the remaining variables, comment on any changes in the estimates and their significance.

d. Estimate the equation

$$GOV = \alpha_1 + \alpha_2 HOURS + \alpha_3 R + \alpha_4 INC + v$$

GOV = α_1 + α_2HOURS + α_3R + α_4INC + v

and use these estimates to reconcile the estimates in part (a) with those in part (c).

e. Re-estimate the models in parts (a) and (c) with the year 2007 omitted and use each of the estimated models to find point and 95% interval forecasts for consumption growth in 2007.

f. Which of the two models, (a) or (c), produced the more accurate forecast for 2007?

dataset是oecd.wkf (Sample: 1971 - 2007)

Backup Data:

1. Requirement: Report is confined to 10 pages no more than 10 pages. Include introduction, no literature review.

Introduction
Description of your data

Estimation result
Answerwer each qu
Compare result of 2 country
Conclusion
Write down professional results by yourself, don't just copy and paste from EViews.

2.**OECD**經濟合作暨發展組織（Organization for Economic Cooperation and Development）於1961年成立，目前擁有30個會員國，由於其中大部分為工業先進國家，國民總生產毛額占世界3分之2以上，因此又被稱為「富人俱樂部」。

3.請參考他的原來的報告 可以先唸過 可能不全懂 但可學習別人怎麼做。
0Everaert, G. and L. Ponzi (2014), "The Predictability of Aggregate Consumption Growth in OECD Countries: A Panel Data Analysis," Journal of Applied Econometrics, 29(3), 431–453.

在這一問題中，Everaert和Pozzi開發了一個模型來檢驗15個OECD國家的消費增長可預測性。具體來說，使用的數據包含日本的實際人均私人消費增長（CSUMPTN）、實際人均政府消費增長（GOV）、人均工作小時增長（HOURS）、人均實際可支配勞動收入增長（INC）以及實際利率（R）。問題要求對以下模型進行估計並報告結果：

- 問題分析
- **a.** 模型估計
- 模型設置：首先，需要使用日本的數據來估計上述迴歸模型。這涉及到收集數據並使用適當的統計軟件（如R、Stata或Python）進行迴歸分析。
- 結果報告：在模型估計後，將獲得每個係數的估計值及其標準誤差、t值和p值。這些結果將幫助判斷每個解釋變數對因變數的影響是否顯著。
- 顯著性檢驗
- 顯著性水平：通常使用5%的顯著性水平來判斷係數是否顯著。如果某個係數的p值小於0.05，則可以拒絕該係數等於零的虛無假設，認為該變數對因變數有顯著影響。
- 不顯著係數的識別：在報告結果時，特別注意哪些係數的**p**值大於**0.05**，這意味著這些係數在統計上不顯著，即它們與因變數之間的關係可能不強。
- 結論
  在完成模型估計後，應該能夠清楚地識別出哪些解釋變數的係數在5%的顯著性水平下不顯著。這一分析不僅有助於理解各個變數對消費增長的影響，也為後續的政策建議或經濟分析提供了依據。

$$\Delta \ln C_t = a_0 + a_1 \Delta \ln C_{t-1} + a_2 \Delta \ln H_t + a_3 \Delta \ln G_t + a_4 R_t + a_5 \Delta \ln Y_t + \mu_t$$

Dependent Variable: CSUMPTN
Method: Panel Least Squares
Date: 12/24/24 Time: 10:44
Sample: 1971 2007 IF COUNTRY="Japan"
Periods included: 37
Cross-sections included: 1
Total panel (balanced) observations: 37

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003980	0.003221	1.235388	0.2257
HOURS	0.424608	0.184279	2.304153	0.0279
GOV	0.164079	0.141829	1.156879	0.2559
R	0.243435	0.074703	3.258690	0.0027
INC	0.608275	0.138554	4.390149	0.0001

R-squared	0.822630	Mean dependent var	0.020929
Adjusted R-squared	0.800459	S.D. dependent var	0.023128
S.E. of regression	0.010331	Akaike info criterion	-6.182232
Sum squared resid	0.003415	Schwarz criterion	-5.964541
Log likelihood	119.3713	Hannan-Quinn criter.	-6.105486
F-statistic	37.10348	Durbin-Watson stat	2.182288
Prob(F-statistic)	0.000000		

Dependent Variable: CSUMPTN
Method: Panel Least Squares
Date: 01/04/25 Time: 18:50
Sample: 1971 2007 IF COUNTRY="Japan"
Periods included: 37
Cross-sections included: 1
Total panel (balanced) observations: 37

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C				
R-squared		Mean dependent var		
Adjusted		S.D. dependent		

R-squared		var		
S.E. of regression		Akaike info criterion		
Sum squared resid		Schwarz criterion		
Log likelihood		Hannan-Quinn criter.		
F-statistic		Durbin-Watson stat		
Prob(F-statistic)				

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Links

🎯 phd | 參考論文研讀 |

Quantitative Method Final Report

Question 6.31 requires the use of the Dataset of oecd.wkf to analyze and compare the figures of Japan and Canada.

Requirement: Report is confined to 10 pages no more than 10 pages. Include introduction, no literature review. Index as follows:

Introduction
Description of your data
Estimation result
Answer each question
Compare result of 2 country
Conclusion

With the help of ChatGPT, that's the basic answer. Waiting to be reorganized into report.

Final Report (Question 6.31 compare Japan and Canada)

Question 6.31 Everaert and Pozzi20 develop a model to examine the predictability of consumption growth in 15 OECD countries. Their data is stored in the file oecd. The variables used are growth in real per capita private consumption (CSUMPTN), growth in real per capita government consumption (GOV), growth in per capita HOURS worked (HOURS), growth in per capita real disposable labor income (INC), and the real interest rate (R). Using only the data for Japan, answer the following questions:

a. Estimate the following model and report the results
CSUMPTN = β1 + β2 HOURS + β3 GOV + β4 R + β5 INC + e
Are there any coefficient estimates that are not significantly different from zero at a 5% level?
b. The coefficient β2 could be positive or negative depending on whether HOURS worked and private consumption are complements or substitutes. Similarly, β3 could be positive or negative depending on whether government consumption and private consumption are complements or substitutes. What have you discovered? What does a test of the hypothesis H0：β2 = 0, β3 = 0 reveal?
c. Re-estimate the equation **with GOV omitted** and, for the coefficients of the remaining variables, comment on any changes in the estimates and their significance.
I will analyze the dataset in the provided file to estimate the required models for Japan and address the specified questions. Please hold on while I process the data.

Variables
CSUMPTN growth in real per capita private consumption.實際人均私人消費成長。
GOV growth in real per capita government consumption.實質人均政府消費成長。
HOURS growth in per capita HOURS worked.人均工作小時數成長。

INC growth in per capita real disposable labor income.人均實際可支配勞動所得的成長。
R the real interest rate.實際利率。

Analysis for Question (a) for Japan:

Analysis of Results for **Question (a):**
The model estimates the coefficients for Japan's data with the following findings:
HOURS: Coefficient = **0.4246**, p-value = 0.028 (significant at 5% level).
GOV: Coefficient = **0.1641**, p-value = 0.256 (not significant at 5% level).
R (Real interest rate): Coefficient = 0.2434, p-value = 0.003 (significant at 5% level).
INC (Disposable income): Coefficient = **0.6083**, p-value = 0.000 (significant at 5% level).

Conclusion: The coefficients for HOURS, R, and INC are significantly different from zero at the 5% level, while GOV is not.

Next, I will address **question (b),**
focusing on the hypotheses H0:β2=0 and β3=0.
Results for Question (b):
For **β2 (HOURS):**

- Test statistic: t=2.304
- p-value: 0.028 (significant at the 5% level).

For **β3 (GOV):**

- Test statistic: t=1.157
- p-value: 0.256 (not significant at the 5% level).

Conclusion:

The hypothesis H0:β2=0 is rejected, indicating that **HOURS significantly affects consumption growth**. Whether HOURS and private consumption are complements or substitutes depends on the context; here, the positive coefficient suggests a **complementary relationship**. (htw: as β2 is positive)

The hypothesis H0:β3=0 is not rejected, indicating that GOV does not have a statistically significant impact on consumption growth.

Next, I will re-estimate the model without GOV and evaluate changes in the estimates and their significance for the remaining variables.
Results for Question (c):

Re-estimating the model without the variable GOV produced the following changes in the coefficients:

equation: CSUMPTN C HOURS R INC

Dependent Variable: CSUMPTN
Method: Panel Least Squares
Date: 12/24/24 Time: 14:01
Sample: 1971 2007 IF COUNTRY="Japan"
Periods included: 37
Cross-sections included: 1
Total panel (balanced) observations: 37

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006141	0.002638	2.327820	0.0262
HOURS	0.308006	0.155062	1.986338	0.0554
R	0.259905	0.073709	3.526097	0.0013
INC	0.746998	0.069770	10.70651	0.0000

R-squared	0.815212	Mean dependent var	0.020929
Adjusted R-squared	0.798413	S.D. dependent var	0.023128
S.E. of regression	0.010384	Akaike info criterion	-6.195313
Sum squared resid	0.003558	Schwarz criterion	-6.021160
Log likelihood	118.6133	Hannan-Quinn criter.	-6.133916
F-statistic	48.52759	Durbin-Watson stat	2.202635
Prob(F-statistic)	0.000000		

HOURS: Coefficiet = **0.3080**, p-value = 0.055 (*marginally insignificant* at the 5% level).

The coefficient decreased from 0.4246 to 0.3080, and its significance weakened slightly.

R (Real interest rate): Coefficient = **0.2599**, p-value = 0.001 (still significant at the 5% level).

The coefficient increased slightly from 0.2434 to 0.2599, with consistent significance.

INC (Disposable income): Coefficient = **0.7470**, p-value = 0.000 (still highly significant).

The coefficient increased from 0.6083 to 0.7470, and its significance remains robust.

Conclusion:

- ***Removing GOV slightly alters the magnitude and significance of the remaining coefficients.***

- ***The positive relationship between HOURS and consumption growth is weakened, while the impact of INC becomes more pronounced.***
- ***The robustness of R and INC underscores their critical role in explaining consumption growth in Japan.***

接下來，請再回答以下三個問題：(Next, please answer the following three questions:)

d. Estimate the equation

$$GOV = \alpha 1 + \alpha 2\ HOURS + \alpha 3\ R + \alpha 4\ INC + v$$

and use these estimates to **reconcile** the estimates in part (a) with those in part (c).

e. Re-estimate the models in parts (a) and (c) with the year 2007 omitted and use each of the estimated models to find point and 95% interval forecasts for consumption growth in 2007.

f. Which of the two models, (a) or (c), produced the more accurate forecast for 2007?

Results for Question (d):

LS GOV C HOURS R INC

Dependent Variable: GOV
Method: Panel Least Squares
Date: 12/24/24 Time: 14:52
Sample: 1971 2007 IF COUNTRY="Japan"
Periods included: 37
Cross-sections included: 1
Total panel (balanced) observations: 37

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.013171	0.003221	4.088575	0.0003
HOURS	-0.710646	0.189352	-3.753038	0.0007
R	0.100382	0.090009	1.115249	0.2728
INC	0.845469	0.085199	9.923439	0.0000

R-squared	0.764519	Mean dependent var	0.032551
Adjusted R-squared	0.743111	S.D. dependent var	0.025018
S.E. of regression	0.012680	Akaike info criterion	-5.795750
Sum squared resid	0.005306	Schwarz criterion	-5.621597
Log likelihood	111.2214	Hannan-Quinn criter.	-5.734353
F-statistic	35.71282	Durbin-Watson stat	2.083458
Prob(F-statistic)	0.000000		

關於這個問題問說***: to reconcile (a) and (c)***是什麼意思呢？ 想探討什麼呢？

具體想探討什麼？

- 是否存在內生性或多重共線性：
  - 如果 GOV 與 HOURS, R, 或 INC 相關（即它們之間有顯著的關聯性），那麼在 (a) 中包含 GOV 作為解釋變數時，其他變數的影響可能會因 GOV 的控制而被削弱或放大。
  - 當 GOV 被排除時，這些變數可能會吸收一些原本由 GOV 解釋的變化，導致估計系數的變化。
- 探討 GOV\text{GOV}GOV 的替代解釋作用：
  - GOV 的排除可能揭示它在模型中的作用是否是重要的中介變數或是與其他變數具有交互效應。
  - GOV 的排除可能會揭示其對 CSUMPTN 的影響是否間接通過其他變數實現，例如 HOURS 或 INC。
- 結構性變數之間的關聯：
  - 問題要求估計 GOV 的方程式，目的是理解 GOV 與其他變數（HOURS, R, INC）之間的關係。
  - 如果 GOV 與其他變數密切相關（如顯著相關性或共線性），這會幫助解釋為何排除 GOV 對 (c) 模型的估計結果產生影響。

分析步驟

- 估計 GOV 方程式：
  - 方程式為：
  - $GOV = \alpha 1 + \alpha 2 \cdot HOURS + \alpha 3 \cdot R + \alpha 4 \cdot INC + v$
  - 使用 GOV 作為因變數，其他變數作為解釋變數進行回歸估計。
- 解釋估計結果：
  - 檢查 HOURS, R, 和 INC 是否對 GOV 有顯著影響。
  - 如果有，這些變數在 GOV 被排除的情況下，可能會因間接影響而改變其對 CSUMPTN 的影響力。
- 比較 (a) 和 (c) 的估計結果：
  - 檢查 HOURS, R, 和 INC 的估計係數是否在 (a) 和 (c) 中發生顯著變化。
  - 通過 GOV 的回歸結果來解釋這些變化是否由 GOV 的排除引起。

- 舉例
- 如果 HOURS 在 GOV 的回歸中具有顯著影響，那麼在 (c) 中排除 GOV 時，HOURS 的估計係數可能增加，因為它需要吸收一部分 GOV 的影響。
- 如果 INC 與 GOV 高度相關，則 (a) 中 INC 的影響可能被 GOV 的存在部分抵消，而在 (c) 中可能更強。

結論

問題 (d) 的核心是分析 GOV 在模型中作為控制變數的作用及其與其他變數的互動，並通過比較 (a) 和 (c) 的估計結果，揭示變數之間的潛在結構關係或模型特性。

The model estimates for GOV based on HOURS, R, and INC are as follows:
Constant: Coefficient = **0.0132**, p<0.001 (significant at 1% level).
HOURS: Coefficient = **-0.7106**, p=0.001 (significant at 1% level).
R (Real interest rate): Coefficient = **0.1004**, p=0.273 (not significant).
INC (Disposable income): Coefficient = **0.8455**, p<0.001 (significant at 1% level).

Reconciliation between (a) and (c):

The negative relationship between HOURS and GOV suggests that HOURS indirectly affects consumption growth through its influence on GOV. Removing GOV in part (c) reduces the direct impact of HOURS on CSUMPTN.
The strong relationship between INC and GOV supports the observed increase in the coefficient of INC when GOV is omitted in part (c).

Next, I will handle part (e) by re-estimating the models excluding 2007 and generating forecasts for that year.

The error indicates a mismatch in the number of predictors when attempting to forecast for 2007 using the re-estimated models. This is likely due to differences in the variables included in the models.

To address this, I will carefully adjust the inputs for each model and ensure compatibility with the variable sets used in their estimation. Let me fix this.

It appears there is a persistent issue with the variable alignment between the prediction inputs and the models. To resolve this, I will double-check the variable alignment in both the model estimation and the data for prediction, then recalculate.

The issue lies in ensuring the predictors match the number of parameters used during model estimation. For:
Model (a): Requires the predictors HOURS,GOV,R,INC along with a constant term (5 total).
Model (c): Requires HOURS,R,INC and a constant term (4 total).

The forecasts will now be recalculated with strict alignment to the predictors used during model estimation.

Results for Question (e):
Forecasts for consumption growth in 2007 based on the re-estimated models:

Model (a):
- Point forecast: 0.0088
- 95% Confidence Interval: [0.0013,0.0162]
- 95% Prediction Interval: [−0.0138,0.0314]

Model (c):

- Point forecast: 0.0066
- 95% Confidence Interval: [0.0001,0.0132]
- 95% Prediction Interval: [−0.0158,0.0291]

Next Steps:
For part (f), I will compare these forecasts to the actual 2007 consumption growth to determine which model is more accurate.

Results for Question (f):
The actual consumption growth in 2007 was 0.0036.

- Model (a):Forecast: 0.0088
- Absolute error: 0.0052
- Model (c):Forecast: 0.0066
- Absolute error: 0.0030

Conclusion:

Model (c) produced a more accurate forecast for 2007, with a smaller absolute error compared to Model (a). This suggests that the simplified model without GOV may better capture the dynamics of consumption growth for this specific year.

接下來同樣問題，但分析對象是Canada (The next question is the same, but the analysis object is Canada.)

Analysis for Question (a) for Canada:

The regression results for the model

CSUMPTN=β1 + β2 HOURS + β3 GOV + β4 R + β5 INC + e

are as follows:

Constant: β1=**0.0082**, p=0.045 (significant at 5% level).
HOURS: β2=**0.4125**, p=0.001 (significant at 5% level).
GOV: β3=**−0.0827**, p=0.472 (not significant at 5% level).
R (Real interest rate): β4=**−0.0091**, p=0.916 (**not significant** at 5% level).
INC (Disposable income): β5=**0.5459**, p=0.001 (significant at 5% level).

Conclusion:
Coefficients for **HOURS** and **INC** are significantly different from zero at the 5% level.

Coefficients for **GOV** and **R** are not significantly different from zero.

Next, I will test the hypotheses H0:β2=0 and H0:β3=0.

Results for Question (b) for Canada:

For β2 (HOURS):

- Test statistic: t=3.663
- p-value: 0.001 (significant at the 5% level).
- Conclusion: H0 is rejected, indicating that HOURS significantly affects CSUMPTN . The positive coefficient suggests that HOURS and private consumption are complements.

For β3 (GOV):

- Test statistic: t=−0.728
- p-value: 0.472 (not significant at the 5% level).
- Conclusion: H0 is not rejected, indicating that GOV does not significantly affect CSUMPTN . Its relationship with consumption growth is unclear based on this model.

Next, I will re-estimate the model omitting GOV and analyze the changes in the remaining coefficients.

Results for Question (c) for Canada:

After omitting **GOV** , the coefficients are as follows:
Constant: **0.0078**, p=0.052 (marginally significant).
HOURS: Coefficient increased from 0.4125 to 0.4525, p=0.000 (highly significant).
R (Real interest rate): Coefficient slightly changed from −0.0091 to −0.0025, p=0.976 (not significant).
INC (Disposable income): Coefficient decreased from 0.5459 to 0.4637, p=0.000 (highly significant).

Conclusions:

Excluding **GOV** increases the importance of **HOURS** and reduces the influence of **INC** slightly.
R remains insignificant and has minimal impact on the model.

Next, I will estimate GOV based on HOURS, R, and INC for Question (d).

Results for Question (d) for Canada:

The model **GOV = α1 + α2 HOURS + α3 R + α4 INC + v** yielded the following estimates:

Constant: α1=0.0050, p=0.405 (not significant).
HOURS: α2=**−0.4838**, p=0.003 (significant at the 1% level, negative relationship).
R (Real interest rate): α3=**−0.0790**, p=0.547 (not significant).
INC (Disposable income): α4=**0.9953**, p=0.000 (highly significant).

Reconciliation of (a) and (c):
The significant negative relationship between **HOURS** and **GOV** indicates **that** omitting GOV in part (c) amplifies the direct impact of HOURS on CSUMPTN .
The strong positive relationship between INC and GOV accounts for the reduced coefficient of INC when GOV is omitted in part (c).

Next, I will re-estimate the models from parts (a) and (c) without the year 2007 and forecast consumption growth for that year for Question (e).

The error suggests a mismatch in the input dimensions for the 2007 forecasts. Let me adjust the predictors for each model to ensure they align with the parameter structures used during estimation.

Results for Question (e) for Canada:
Forecasts for consumption growth in 2007 based on the re-estimated models:

Model (a):
- Point forecast: 0.0212
- 95% Confidence Interval: [0.0162,0.0262]
- 95% Prediction Interval: [−0.0014,0.0438]

Model (c):
- Point forecast: 0.0225
- 95% Confidence Interval: [0.0187,0.0263]
- 95% Prediction Interval: [0.0002,0.0447]

Next, I will compare these forecasts with the actual consumption growth in 2007 to determine which model is more accurate for Question (f).

Results for Question (f) for Canada:

The actual consumption growth in 2007 was 0.0295.
Model (a):
- Forecast: 0.0212
- Absolute error: 0.0083

Model (c):

- Forecast: 0.0225
- Absolute error: 0.0070

Conclusion:

Model (c) produced a more accurate forecast for 2007, with a smaller absolute error compared to Model (a). This indicates that omitting GOV in this context improves the forecast accuracy for consumption growth in Canada.

You analyzed the data of Japan and Canada and got the answers to these 6 questions. Next, please compare these two countries in your major and tell me what you found? What conclusion was reached?

Comparative Analysis and Conclusions for Japan and Canada

Based on the analyses of Japan and Canada regarding the six questions, the results reveal both similarities and differences in the determinants of private consumption growth between these two OECD countries. Here's a comparative summary:

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1. Determinants of Consumption Growth:

Japan:

- Significant variables in Model (a): HOURS, R, INC.
- Insignificant: GOV .

Canada:

- Significant variables in Model (a): HOURS, INC.
- Insignificant: GOV , R.

Observation:

In both countries, **INC** (real disposable income) is a key driver of consumption growth, highlighting the critical role of income in sustaining private consumption.
GOV (government consumption) has limited direct influence in both contexts, indicating that public spending does not significantly complement or substitute private consumption.
Japan's sensitivity to **R** (real interest rate) suggests that monetary policy has a more noticeable impact compared to Canada.

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2. The Relationship Between Consumption and HOURS Worked (β2):

Japan:

- Positive and significant (p=0.028), indicating a complementary relationship between HOURS worked and private consumption.

Canada:

- Also positive and significant (p=0.001), indicating a similar complementary relationship.

Observation:

The complementary relationship between HOURS worked and consumption implies that increased labor activity supports higher consumption levels in both economies. This reflects shared dynamics where employment and disposable income are tightly linked.

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3. The Role of Government Consumption (β3):

Japan:

- GOV is insignificant, suggesting limited direct interaction between public and private consumption.

Canada:

- Similarly, GOV is insignificant, reinforcing the idea that public consumption does not crowd out or strongly complement private consumption.

Observation:

In both countries, public sector activities appear to have an indirect rather than direct effect on private consumption.

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4. Model Re-Estimation Without GOV:

Japan:

- Omitting GOV increases the significance of INC and slightly reduces the influence of HOURS.

Canada:

- Omitting GOV amplifies the coefficient of HOURS, suggesting that its influence was partially mediated through GOV .

Observation:

Removing GOV clarifies the direct relationships of other variables, particularly HOURS and INC, with private consumption.

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5. The Determinants of Government Consumption:

Japan:

- HOURS has a significant negative relationship with GOV , while INC is significantly positive.

Canada:

- Similar patterns: HOURS negatively affects GOV , while INC is a strong positive determinant.

Observation:

In both countries, higher disposable income supports increased government consumption, likely through taxation and spending policies. Conversely, increased labor activity may reduce reliance on government-provided services.

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6. Forecasting Accuracy for 2007:

Japan:

- Model (c) (excluding GOV) provided a more accurate forecast.

Canada:

- Similarly, Model (c) was more accurate.

Observation:

In both countries, simpler models excluding GOV outperform more complex models, suggesting that government consumption's indirect role introduces noise rather than predictive power.

Key Takeaways and Conclusions:

Income as the Dominant Factor:

- **INC** is consistently the most significant predictor of private consumption growth in both countries, emphasizing the universal importance of disposable income.

Government Consumption's Limited Role:

- **GOV** does not significantly drive private consumption growth directly, indicating a shared trend where public consumption has indirect effects on private sector dynamics.

Monetary Sensitivity Differences:

- **Japan** is more responsive to real interest rate changes (**R**), highlighting monetary policy as a critical tool for influencing consumption.

Work-Consumption Dynamics:

- Both countries exhibit a complementary relationship between **HOURS** worked and private consumption, reflecting their shared economic structure where employment is a key consumption enabler.

Model Simplicity for Forecasting:

- Simpler models excluding GOV offer better predictive accuracy, likely because government consumption's indirect impact complicates modeling.

Policy Implications:
Japan: Focus on monetary policy adjustments to influence consumption, and maintain stable income growth to support consumption.
Canada: Prioritize policies that enhance disposable income to drive private consumption, as monetary policy seems less effective than in Japan.

This comparison highlights shared economic dynamics while identifying unique country-specific characteristics that can guide tailored policy-making.

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