

Discussion of
**Business Cycle Accounting for the
Japanese Economy**

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Japan Project Meetings

Tokyo September, 15-16, 2006

Summary of Paper

■ Question

What are the main sources of output fluctuation behind

- Lost Decade,
- 1920s recession in Japan?

Do results change if using capital wedge instead of investment wedge?

- Lost Decade in Japan.
- Great Depression in the U.S.

■ Methodology

They apply business cycle accounting (BCA) techniques developed by Chari, Kehoe and McGrattan (2002).

BCA Methodology

- **Goal of BCA:** decompose aggregate fluctuations in movements of wedges and use this information to help the researcher know where to add the frictions to the models.

- **Procedure:**

Step 1

- Set-up and solve of a standard neoclassical growth model with time varying wedges.

- 4 wedges:
 - Efficiency
 - Labor
 - Investment (or capital)
 - Government consumption

Step 2

- Parametrize the model and calculate the wedges using data and the equilibrium conditions.

Step 3

- Feed back the measured wedges into model to assess the fraction of output movements attributable to each or to combinations of these wedges.

BCA Methodology

- Other papers use BCA to study the same and different episodes.
 - [Chari, Kehoe and McGrattan \(2002 and 2004\)](#) (CKM) study the U.S. Great Depression and find that efficiency and labor wedges account for most of the movement in output.
 - [Chakraborty \(2005\)](#) studies Japan's Lost Decade and finds that efficiency and investment wedges are the most important to explain output movements.
 - [Ahearne, Kydland and Wynne \(2005\)](#) study Ireland's 1980s recession and find that efficiency and labor wedges are the most important.

Main Results

Lost Decade in Japan

- The combined effect of efficiency, government and labor wedges reproduces output data the best.

1920s recession in Japan

- Efficiency and investment wedges had a very negative impact during the recession and labor wedges affected at the end of the 20s.

Capital wedge instead of investment wedge

- Japan's Lost Decade: Efficiency, government and labor wedges have the same effects, but the results for capital wedges are not robust.
- U.S. Great Depression: Capital wedges had a negative effect on output during the Great Depression.

Main Points of Discussion

- Government wedge
 - Is it really that important?

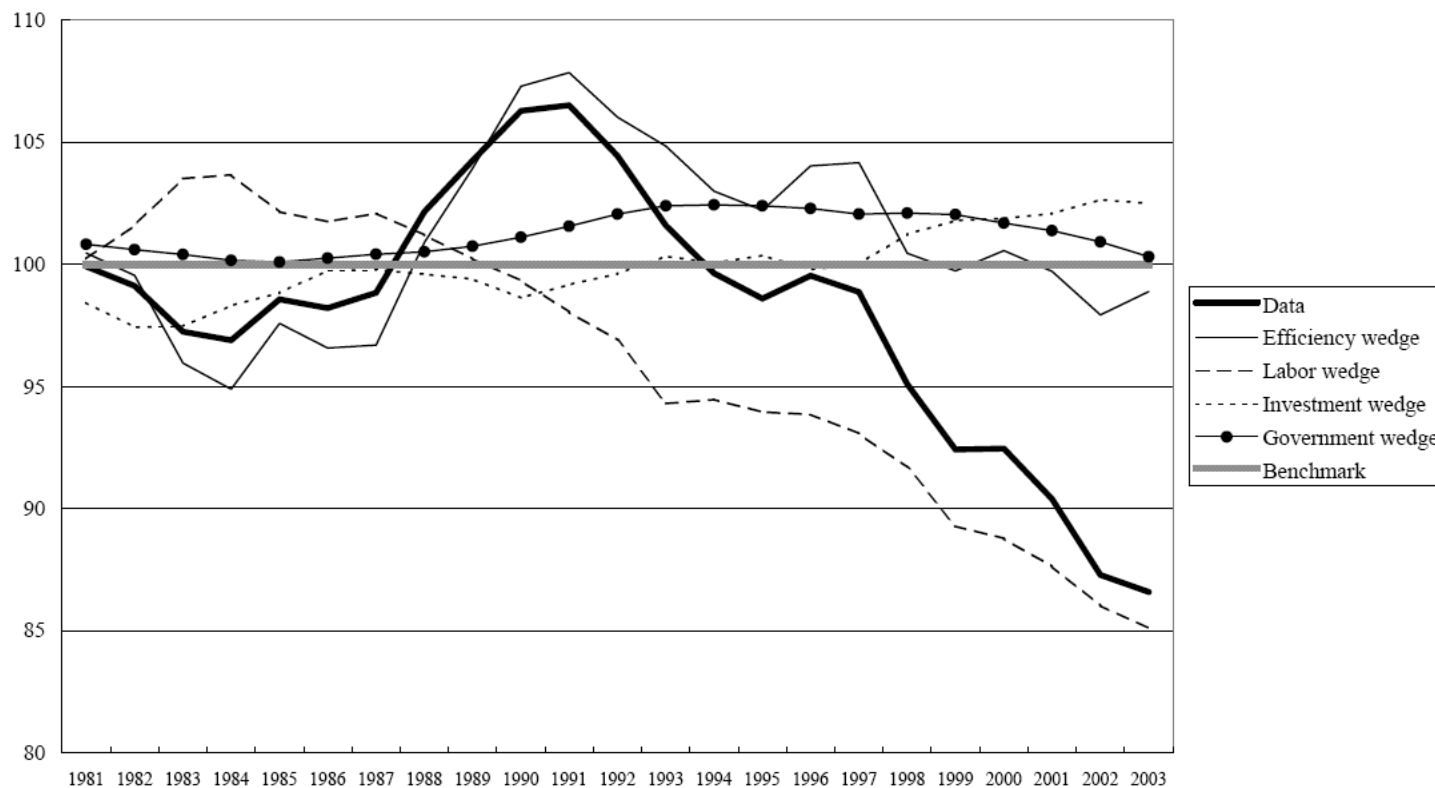
- Robustness of the results
 - Deterministic vs stochastic model.
 - Extended sample period.
 - Labor input disaggregation.
 - Gender Heterogeneity.

- Labor wedge deterioration
 - Possible causes.

Government Wedge

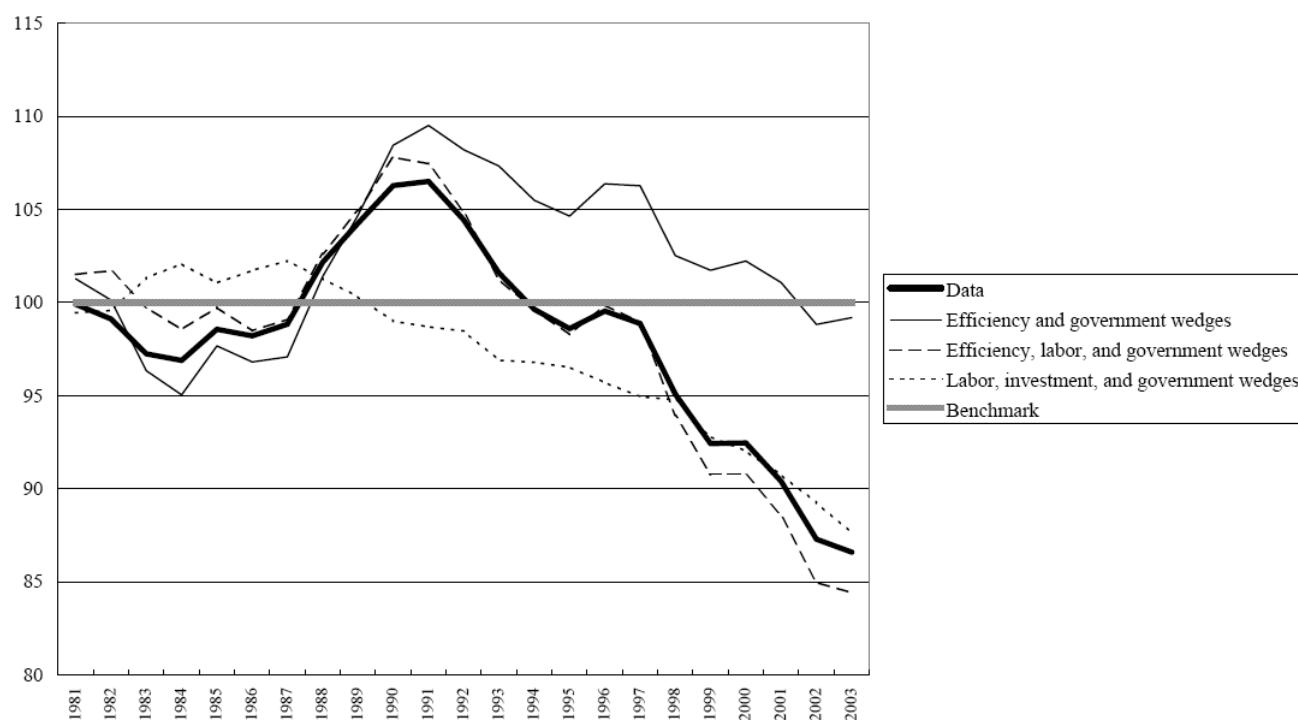
- Kobayashi and Inaba state that efficiency, gov. and labor wedges can account for most of the output fluctuations in the Lost Decade.
- They do decomposition with only one wedge and with combinations of various wedges.

Figure 2. Decomposition of output with just one wedge



Government Wedge (cont.)

Figure 3. Combined effect of two and three wedges on output

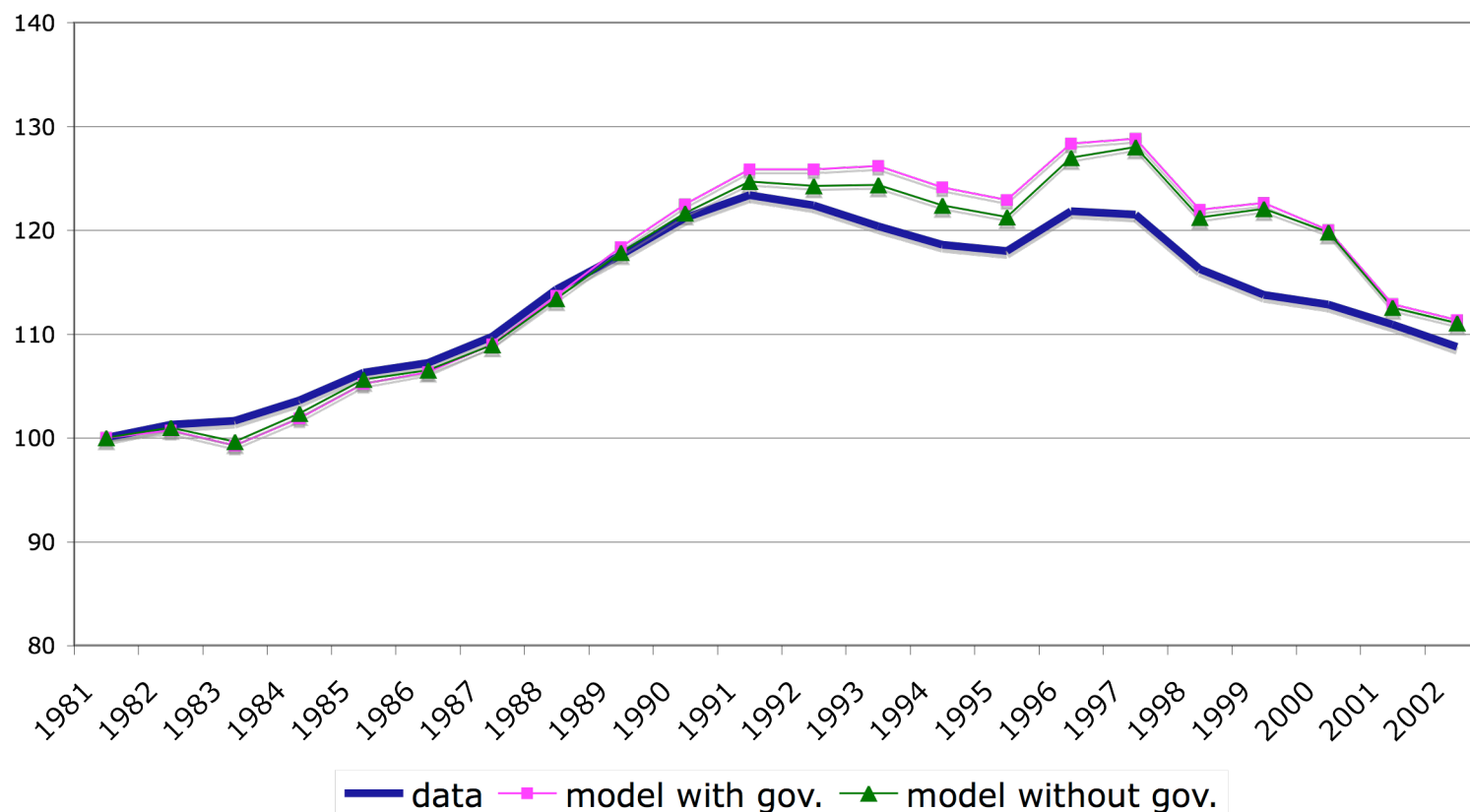


- Why not put only two shocks at a time?
- Would not efficiency and labor account for most of the movements?
- Also for the U.S. Great Depression, would not efficiency and labor account for most of the movements?

Government Wedge (cont.)

- Using Braun, Okada and Sudou (2006) model, feeding TFP and government consumption.

Output from Data and Model with and without gov. wedge



Robustness

- Kobayashi and Inaba study the robustness of the results to:
 - Time varying labor share
 - They find similar results, but the adjusted labor wedge starts to decrease at the beginning of the 1990s and not in 1984.
 - Different assumptions on future wedges
 - Efficiency, government and labor wedges results are similar, but not the results of investment are not robust.
 - Use of capital wedge instead of investment wedge
 - *Japan's Lost Decade*: capital wedge does not change results of efficiency, government and labor, but capital wedge results are not robust.
 - *U.S. Great Depression*: capital wedge seems to have a negative effect on output, whereas investment wedge did not.
- Should the sensitivity analysis be extended further?

Robustness (cont.)

- Stochastic framework

- Robustness of the analysis to stochastic model or at least not perfect foresight for the whole sample period.

- Sample period

- Extend the analysis to a larger sample of years.
- Chari et al. (2004) do an analysis of the whole post-war period.
 - They find that the results are consistent with those found for the Great Depression and the 1982 recession.

Robustness - Labor Input

- Braun, Esteban-Pretel, Okada, Sudou (2006) show that in Japan distinction between the extensive and intensive margins and gender heterogeneity is important to account for labor market fluctuations.
- Intensive and extensive margins
 - Volatility of employment is lower than volatility in hours, and employment is more correlated with output than hours.
- Male and female differences
 - Volatility of hours is similar by gender, but female employment volatility is higher than volatility of male emp.

Robustness - Labor Input (cont.)

- Braun et al (2006) specify a two worker household model with employment and hours decision.

- The household chooses $\{c_t, k_{t+1}, e_{1t}, e_{2t}, h_{1t}, h_{2t}\}_{t=1}^{\infty}$ to solve:

$$\max E_0 \sum_{t=0}^{\infty} \beta^t U(c_t, e_{1t}, e_{2t}, h_{1t}, h_{2t})$$

$$\text{st } 2c_t + k_{t+1} = k_t + (1 - \tau_t)(w_{1t}e_{1t}h_{1t} + w_{2t}e_{2t}h_{2t}) + (1 - \tau_t)(r_t - \delta)k_t + TR_t$$

- This problem of the household delivers 4 labor wedges

$$e_{1t}: \frac{U_{e_{1t}}}{U_{c_t} w_{1t}} = (1 - \tau_t^{e_1}) \quad h_{1t}: \frac{U_{h_{1t}}}{U_{c_t} w_{1t}} = (1 - \tau_t^{h_1})$$

$$e_{2t}: \frac{U_{e_{2t}}}{U_{c_t} w_{2t}} = (1 - \tau_t^{e_2}) \quad h_{2t}: \frac{U_{h_{2t}}}{U_{c_t} w_{2t}} = (1 - \tau_t^{h_2})$$

Robustness - Labor Input (cont.)

- Functional forms:

$Y_t = A_t k_t^\theta H_t^{1-\theta}$ where $H_t = e_{1t} h_{1t} + \lambda e_{2t} h_{2t}$ and λ is the efficiency of worker 2

$$U(c_t, e_{1t}, e_{2t}, h_{1t}, h_{2t}) = 2u(c_t) - v_1(h_{1t})e_{1t} - v_2(h_{2t})e_{2t} - m_1(e_{1t})e_{1t} - m_2(e_{2t})e_{2t}$$

- $u(c) = \ln(c)$: utility from consumption.

- $v_i(h) = \alpha_{hi} \frac{h^{1+\gamma_{hi}}}{1+\gamma_{hi}}$, $\alpha_{hi} > 0, \gamma_{hi} > 0$: disutility for worker $i=\{1,2\}$ for working h hours.

- $m_i(e) = \alpha_{ei} \frac{e^{1+\gamma_{ei}}}{1+\gamma_{ei}}$, $\alpha_{ei} > 0, \gamma_{ei} > -1$: disutility for worker $i=\{1,2\}$ for working e days.

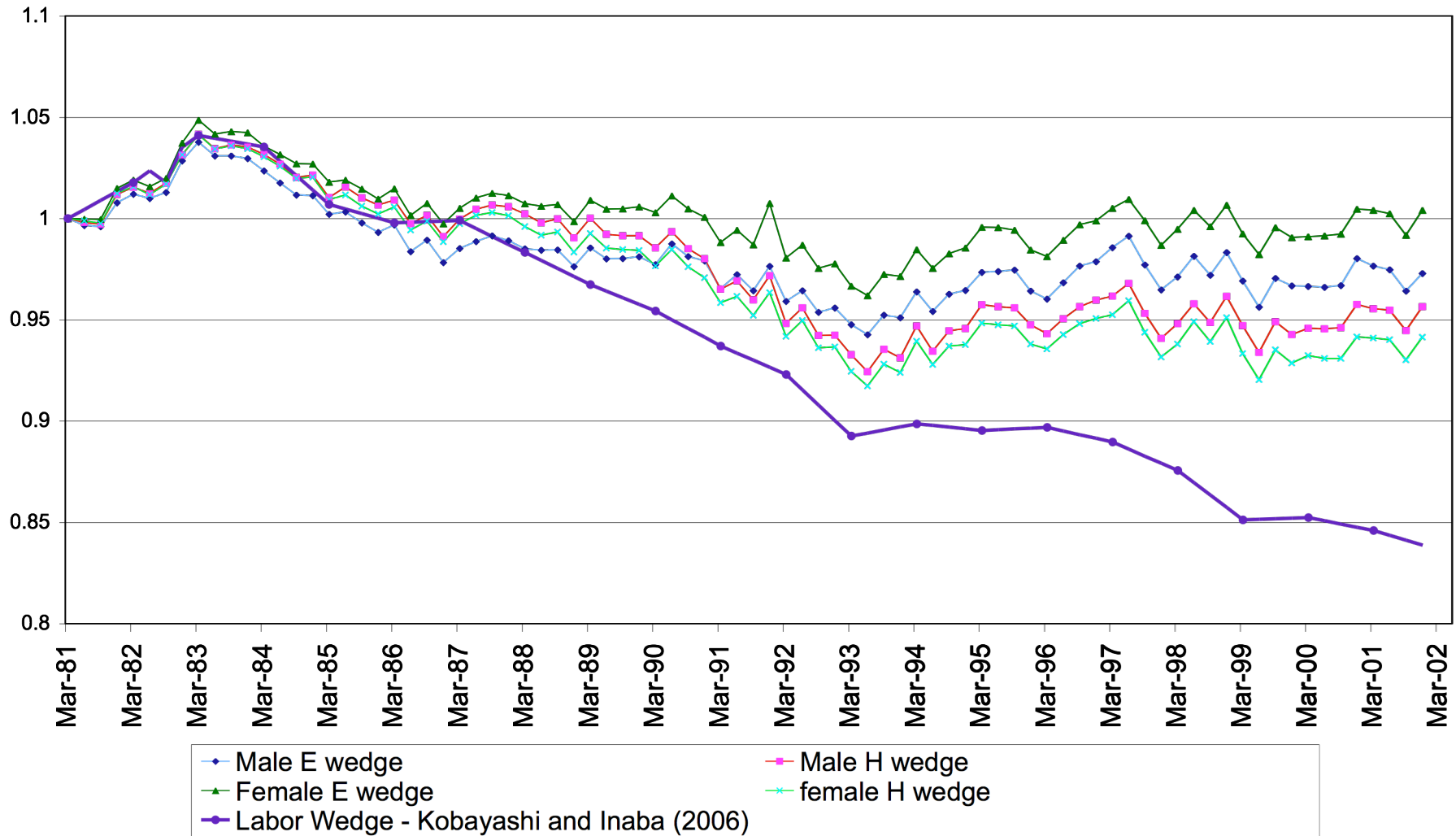
- Preference parameters are estimated using GMM to match Japanese data.

Preference Parameters

γ_{h1}	0.23	α_{h1}	4.71
γ_{h2}	0.21	α_{h2}	2.89
γ_{e1}	1.15	α_{e1}	0.23
γ_{e2}	0.10	α_{e2}	0.12

Robustness - Labor Input (cont.)

Gender Based Labor Wedges



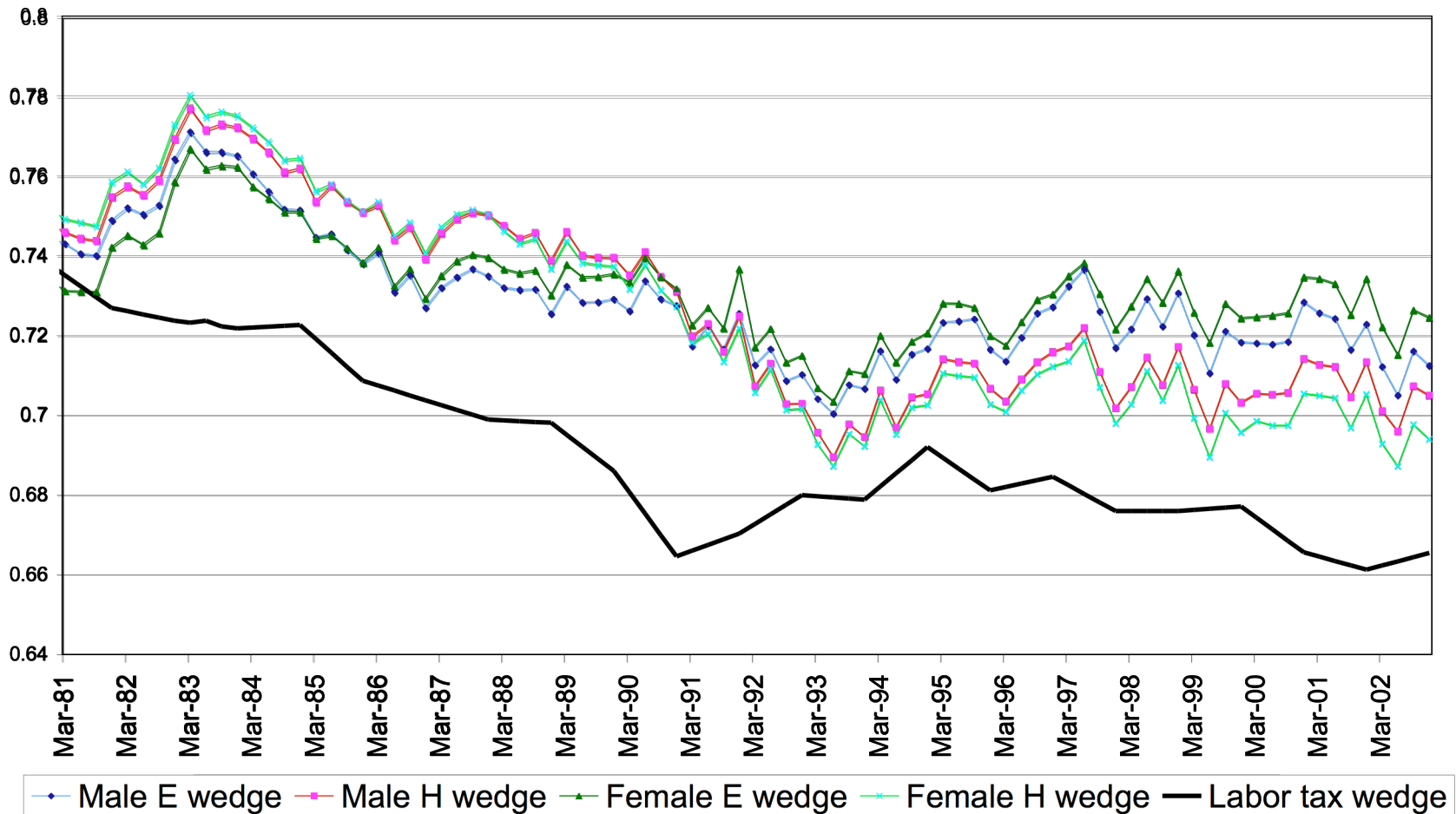
Labor wedge deterioration

- What is behind the deterioration of the labor wedges during the 1990s?
 - **Kobayashi and Inaba** conjecture that for the first half of the 1990s it could be sticky wages joint with monetary shock and for the second half it could be due continued asset-price decline with binding collateral constraints.
 - **Tax movements** as suggested by Ahearne et al. (2005) for Ireland.
 - Define Labor Tax Wedge as $(1-\tau_L)/(1+\tau_c)$, where τ_c and τ_L are the consumption effective labor tax rate as in Mendoza, Razin and Tesar (1994).

Labor wedge deterioration

- Tax movements?

Gender Based Wages and Labor Tax Wedge



Conclusions

- Interesting paper with new insights of the driving forces of the Lost Decade.
- Different aggregation of wedges will help understanding the role of gov.
- Since the BCA results are sensitive to model assumption, how robust are them to:
 - Making the model a stochastic one?
 - Changes in the sample period of study?
 - Introduction of labor input heterogeneity?
- Their results open the question of what drives the deterioration of the labor wedge.