Title: **What caused the 1980 recession and the 1997 economic slump in Thailand?**

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1. An overview of the business cycle in Thailand during 1971-2003.

Figure 1: Per capita annual GDP in Thailand vs its time trend at 3.8% per annum and cyclical component during 1971-2003. (Logarithm scale)
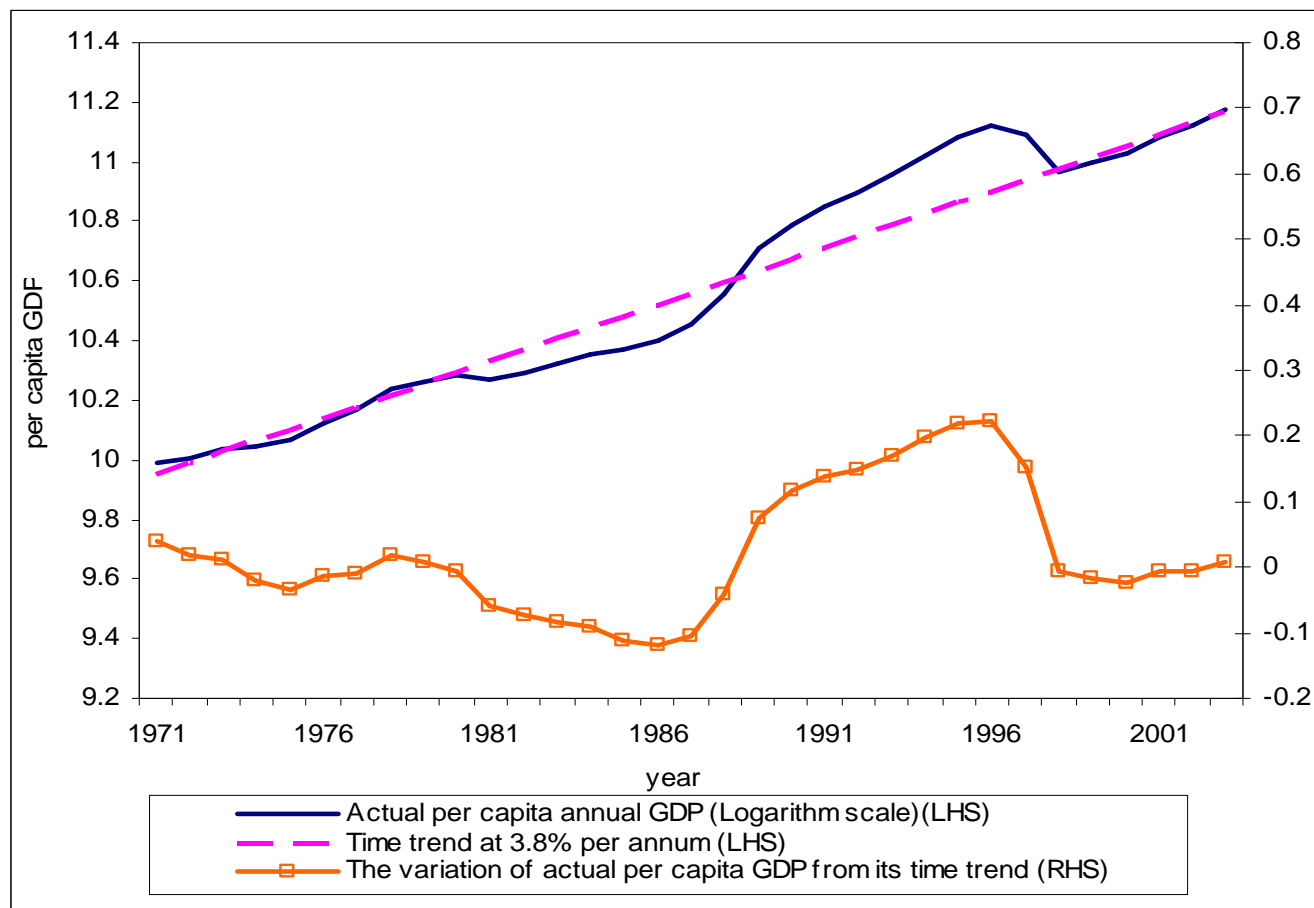
What caused the 1980 recession and the 1997 economic slump in Thailand?

Outline of the presentation

1. An overview of the business cycle in Thailand during 1971-2003.

2. Business Cycle Accounting (BCA)

3. Literature review

4. Objective of the study

5. Calibration

6. Findings

7. Conclusion

2. Business Cycle Accounting (BCA)

❑ **McGrattan (2006) states that**

   "*Real Business Cycles (RBC) are recurrent fluctuations in an economy's incomes, products, and factor inputs—especially labor—that are due to non-monetary sources.*"

❑ **Structural VARs (SVAR) is the tool to explore the underlying shocks as sources of business cycles. However, Chari, Kehoe and McGrattan (2005) find that applying SVAR procedure in their model with the non-technology shocks leads to the large quantitative misspecification.**

❑ **Business Cycle Accounting (BCA) is developed by Chari, Kehoe and McGrattan (2007) (hereafter referred to as CKM)**

❑ **Advantages of BCA technique:**
   ➢ **Dual approach to the "Kydland and Prescott approach"**
   ➢ **Based on a standard Neo-Classical growth model with time-varying wedges**
   ➢ **Allow various types of frictions rather than only one friction as a propagation mechanism within one prototype economy.**

2. Business Cycle Accounting (BCA)

The benchmark prototype economy:

➢ A finite number of identical households maximize their utilities under the following constraints.

$$\max_{c_t, 1-l_t, k_{t+1}} E_0[\sum_{t=0}^{\infty} \beta^t \{u_t(c_t, (1-l_t))\}N_t]$$

Subject to

$$c_t + (1+\tau_{xt})x_t = (1-\tau_{lt})w_t l_t + r_t k_t + tr_t$$

$$(1+\eta_t)k_{t+1} = (1-\delta)k_t + x_t$$

Note that all lower-case variables are per capita values.
where c_t is consumption in period t, l_t is labor supply in period t
       N_t is population in period t, β is discount factor
       τ_{xt} is tax rate on investment, x_t is investment in period t
       τ_{lt} is tax rate on labor income, k_t is capital stock in period t
       w_t is labor income in period t, r_t is capital income in period t
       tr_t is lump-sum transfer in period t
       δ is depreciation rate of capital, η_t is growth rate of population

2. Business Cycle Accounting (BCA)

➢ **The production function is described by labor-augmenting technology as follows.**

$$y_t = A_t F(k_t, (1+\lambda)^t l_t)$$

where λ is the rate of labor-augmenting technical progress.

➢ **Firms maximize their profit as follows.**

$$\max_{k_t, l_t} A_t F(k_t, (1+\lambda)^t l_t) - r_t k_t - w_t l_t$$

➢ **The resource constraint is:**

$$y_t = c_t + x_t + g_t$$

2. Business Cycle Accounting (BCA)

❑ **Wedges are distortions/frictions that deviates an economy's equilibrium from a perfectly competitive.**

❑ **Four wedges:**

   ❑ **Efficiency wedge: A_t**
    It is the productivity shock or the total productivity factor in the Neoclassical Growth Model.

   ❑ **Labor wedge: $1 - \tau_{lt}$**

    τ_{lt} represents the tax rate on labor income.

   ❑ **Investment wedge: $\dfrac{1}{1 + \tau_{xt}}$**

    τ_{xt} represents the tax rate on investment.

   ❑ **Government wedge: g_t**
    It is the government spending plus net export.

2. Business Cycle Accounting (BCA)

Two steps of BCA:

1) Measure the wedges by using data & equilibrium conditions of the prototype economy ➜ This gives us the **"Measured Wedges".**

2) Feed the **"Measured wedges"** back into the prototype model one at a time & in combinations to decompose the observed movements of output.

3. Literature review

Chari, Kehoe, and McGrattan (2007):

- ❑ The efficiency wedge and the labor wedge are the substantial propagation mechanisms in economic downturns during the Great Depression and the 1982 recession.
- ❑ The investment wedge can be ignored in business cycle study.
- ❑ The government consumption wedge plays a trivial role in business cycle.

Chakraborty (2005) employs the *original BCA* to Japan's data between 1980 and 2000. She finds that the investment wedge is more crucial than the efficiency wedge to account for the economic fluctuation over that period.

3. Literature review

Kobayashi and Inaba (2005):

❑ They employ *the BCA with perfect foresight* to Japan's data during the 1990s and find that, apart from efficiency wedge, labor wedge is substantial to account for the 1990s recession.

❑ Using *capital wedge* instead of investment wedge, they find that financial frictions are crucial factor accounting for the Great Depression in the U.S. and this outcome contradicts the original BCA by Chari, Kehoe, and McGrattan (2006)

❑ Lastly, they propose a simple model of *bank distress* which can lead to a subsequent deterioration in labor wedge and capital wedge.

3. Literature review

❑ **Lama (2005)** uses the BCA exercise to assess the economic fluctuations in Argentina, Brazil and Mexico during 1990 and find that TFP and labor wedge account for the output fluctuation.

❑ **Cociuba and Ueberfeldt (2006)** also find that TFP and labor wedge are the key propagation mechanisms in Canadian economy for the post 1950 period.

❑ **Otsu (2007)** finds that the efficiency wedge is crucial for the sudden drop in output of four Asian countries (Hong Kong, Korea, Singapore and Thailand) during the 1990s crises. For Thailand, the foreign debt wedge is the key factor to explain the decline in consumption.

4. Objective of the study

❑   To investigate the propagation mechanisms that account for the 1980 recession and the 1997 economic slump in Thailand.

5. Calibration

The benchmark prototype economy:

➢ A finite number of identical households maximize their utilities under the following constraints.

$$\max_{c_t, 1-l_t, k_{t+1}} E_0[\sum_{t=0}^{\infty} \beta^t \{(1-\phi)\ln c_t + \phi \ln(1-l_t)\} N_t]$$

Subject to

$$c_t + (1+\tau_{xt})x_t = (1-\tau_{lt})w_t l_t + r_t k_t + tr_t$$

$$(1+\eta_t)k_{t+1} = (1-\delta)k_t + x_t$$

➢ Firms maximize their profit as follows.

$$\max_{k_t, l_t} A_t k_t^{\alpha} l_t^{1-\alpha} - r_t k_t - w_t l_t$$

➢ The resource constraint is:

$$y_t = c_t + x_t + g_t$$

5. Calibration

"Four Realized Wedges" are obtained from the equilibrium condition.

➢   **Efficiency wedge: A$_t$**

$$A_t = \frac{\tilde{y}_t}{\tilde{k}_t^{\alpha} l_t^{1-\alpha}}$$

➢   **Labor wedge: $1 - \tau_{lt}$**

$$(1 - \tau_{lt}) \times (\frac{1-\phi}{\phi}) = \frac{\tilde{c}_t}{1-l_t} \times \frac{l_t^{\alpha}}{A_t(1+\lambda)^t(1-\alpha)\tilde{k}_t^{\alpha}}$$

➢   **Investment wedge: $\dfrac{1}{1+\tau_{xt}}$**

$$(1 + \tau_{xt}) \times \frac{1}{\tilde{c}_t} = \beta E_t \{ \frac{1}{\tilde{c}_{t+1}} [\alpha \times A_{t+1} \times (\frac{l_{t+1}}{\tilde{k}_{t+1}})^{1-\alpha} + (1-\delta)(1+\tau_{xt+1})] \}$$

➢   **Government wedge: g$_t$**

$$\tilde{g}_t = \tilde{y}_t - \tilde{c}_t - \tilde{x}_t$$

5. Calibration

BCA procedure:
- ❑ **Step 1: Estimate/ Adopt the value of parameters as follows:**
  - ❑ **Capital share in output (α) is 0.4**
  - ❑ **Discount factor (β) is 0.96**
  - ❑ **Depreciation rate (δ) is 0.0558**
  - ❑ **Long-term growth rate of per capita output (λ) is 0.038**

- ❑ **Step 2: Three realized wedges, i.e. A_t, $\mathcal{T}_{lt}$, g_t, can be obtained directly from the equilibrium equations.**

- ❑ **Step 3: To get the realized investment wedge ($\mathcal{T}_{xt}$), we assume the perfect foresight by agents.**

- ❑ **Step 4: Feed all realized wedges back into the model, one at a time and in combination. (Note that baseline period is between 1979 and 1980.)**

- ❑ **Step 5: Plot actual output v.s. simulated output with different wedges, one at a time and in combinations.**

6. Findings

Figure 2: Detrended Actual Output vs Four Measured Wedges in Thailand, Annually, 1979-1989, Normalized to equal 100 in 1979.
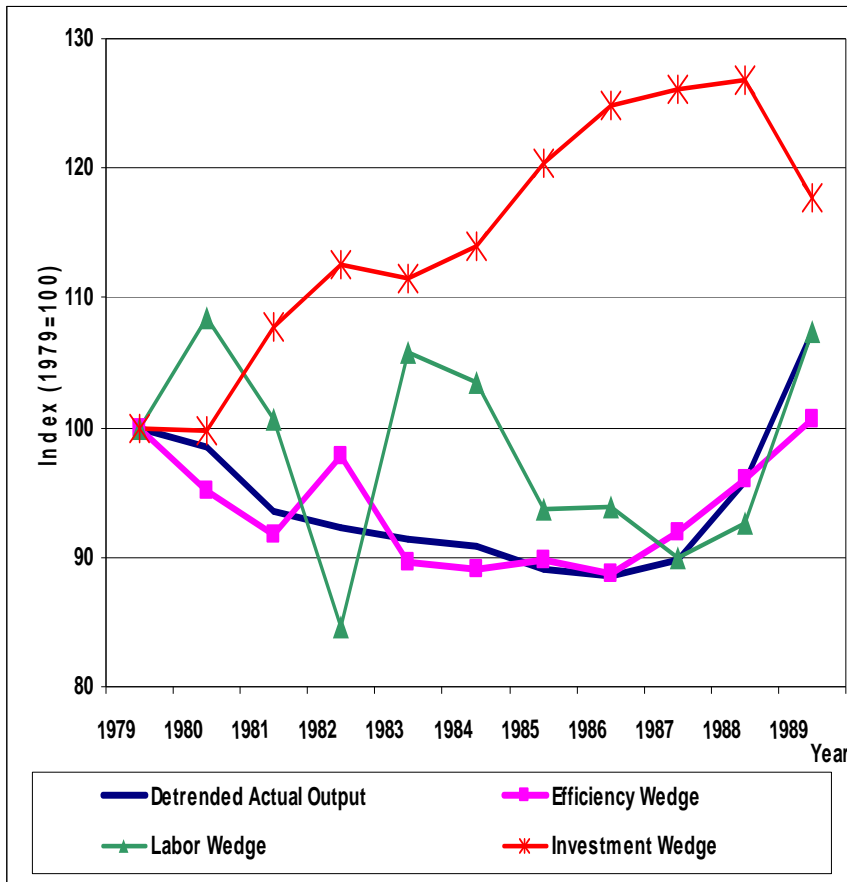
Figure 3: Detrended Actual Output vs Models with One Wedge at a Time in Thailand, Annually, 1979-1989, Normalized to equal 100 in 1979.
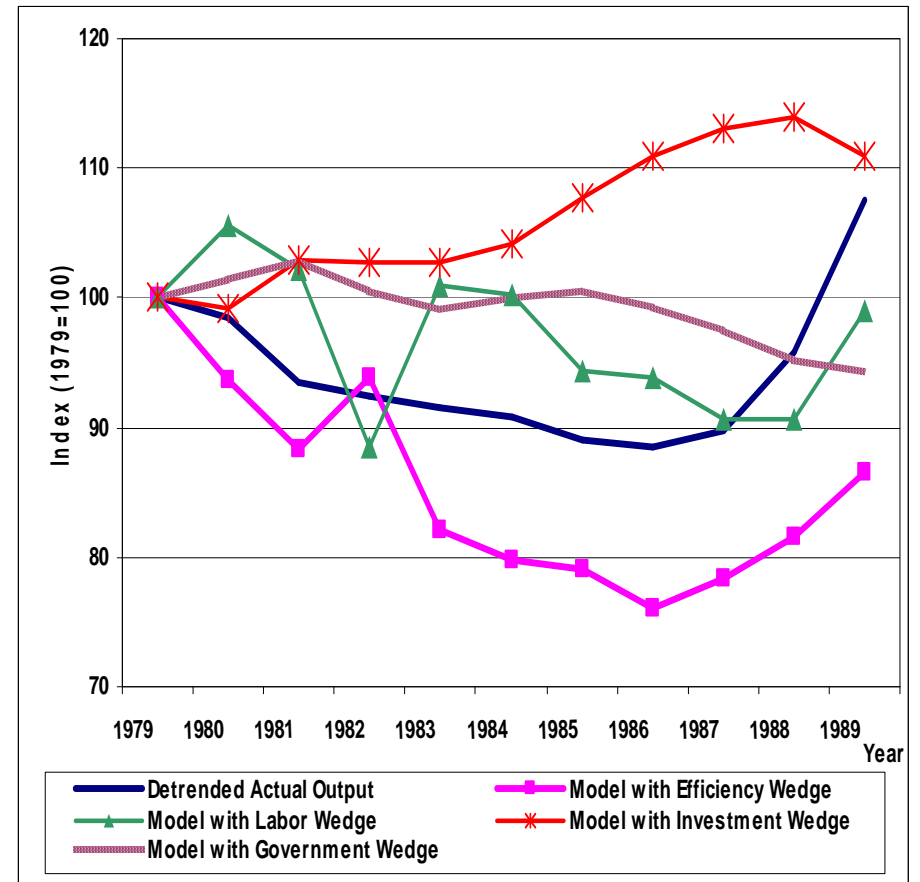
6. Findings

Figure 4: Detrended Actual Output vs Models with A Combination of Wedges (No Investment Wedge) in Thailand, Annually, 1979-1989, Normalized to equal 100 in 1979.
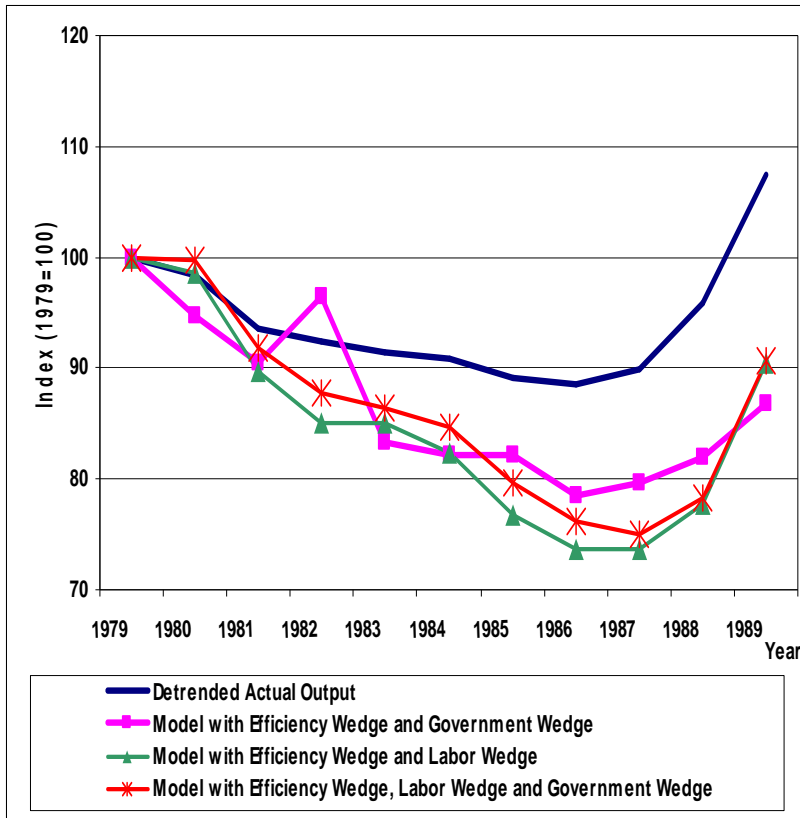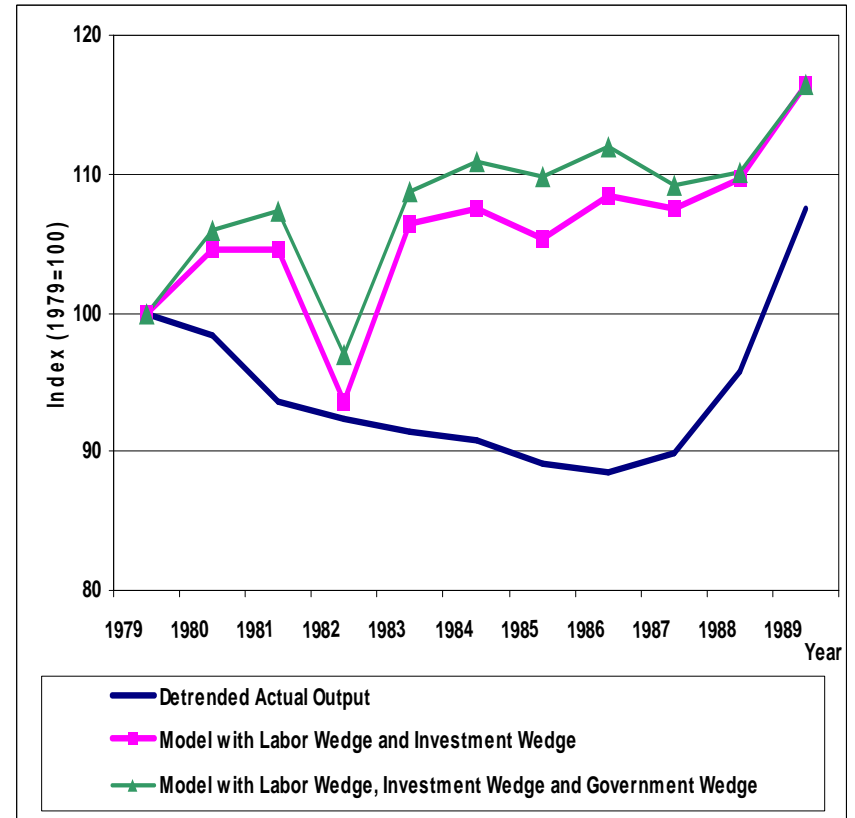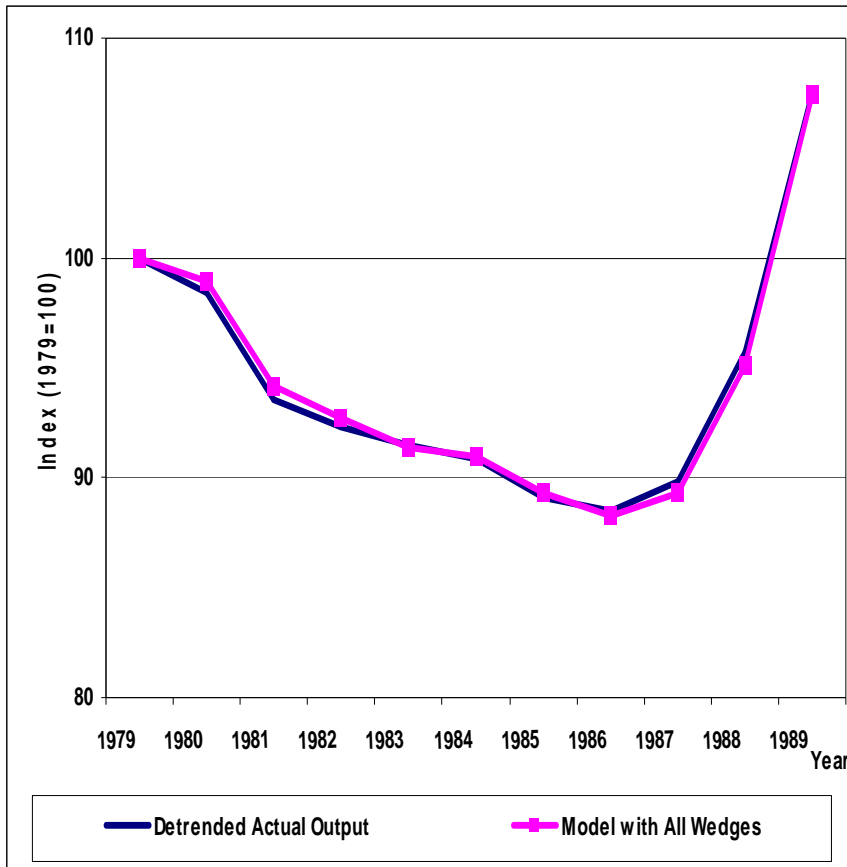
Figure 5: Detrended Actual Output vs Models with A Combination of Wedges (No Efficiency Wedge) in Thailand, Annually, 1979-1989, Normalized to equal 100 in 1979.

6. Findings

Figure 6: Detrended Actual Output vs Model With All Wedges
in Thailand, Annually, 1979-1989, Normalized to equal 100 in
1979.

6. Findings

Figure 7: Detrended Actual Output vs Four Measured Wedges in Thailand, Annually, 1994-2003, Normalized to equal 100 in 1994.
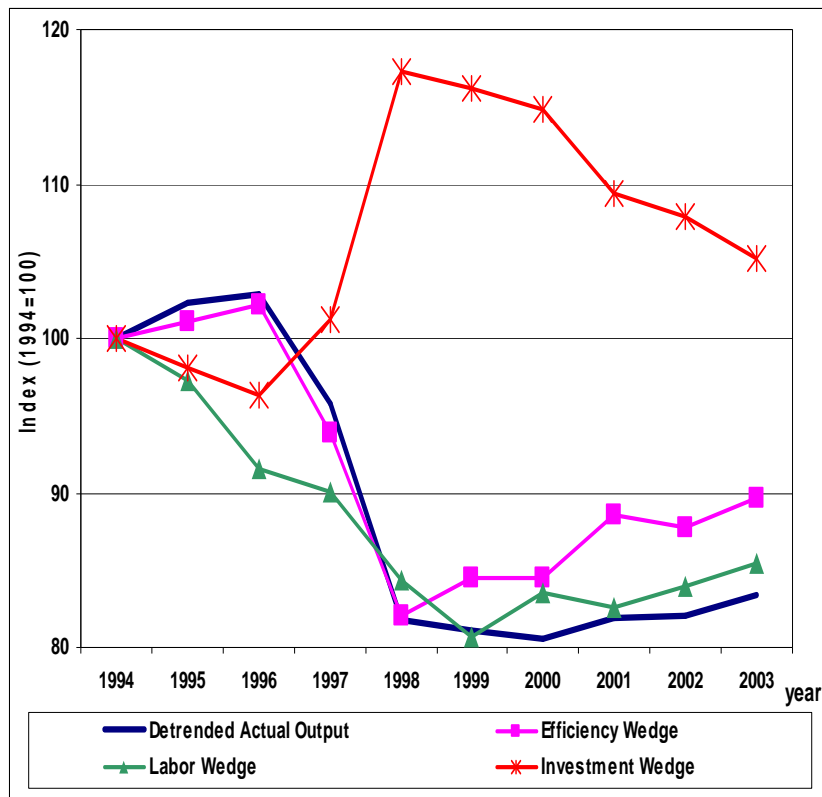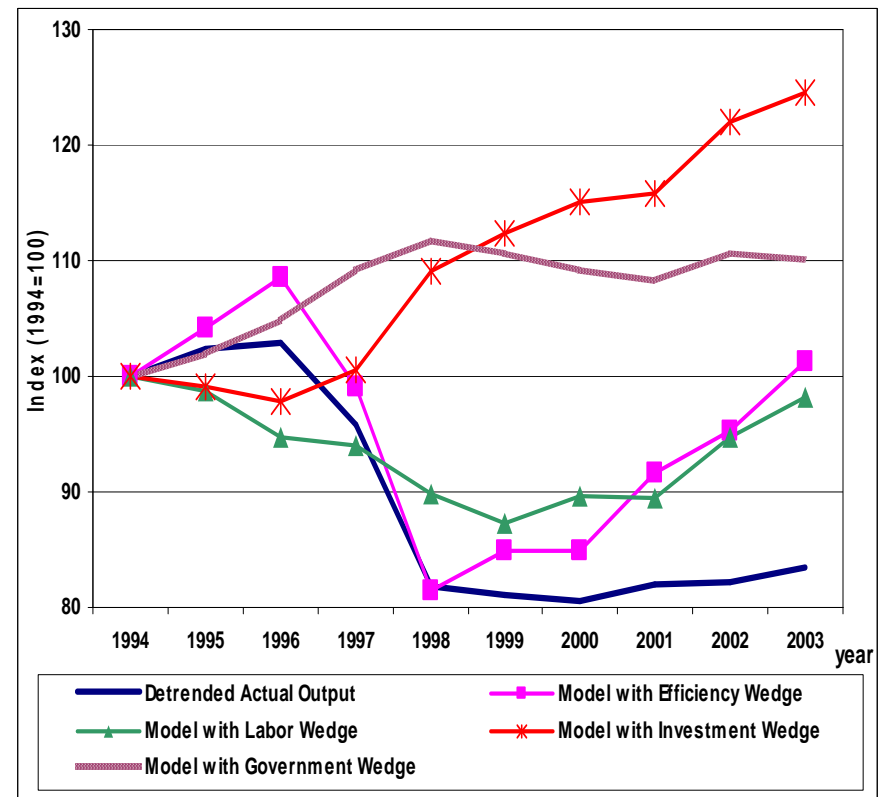
Figure 8: Detrended Actual Output vs Models With One Wedge At A Time in Thailand, Annually, 1994-2003, Normalized to equal 100 in 1994.

6. Findings

Figure 9: Detrended Actual Output vs Models With A Combination Of Wedges (No Investment Wedge) in Thailand, Annually, 1994-2003, Normalized to equal 100 in 1994.
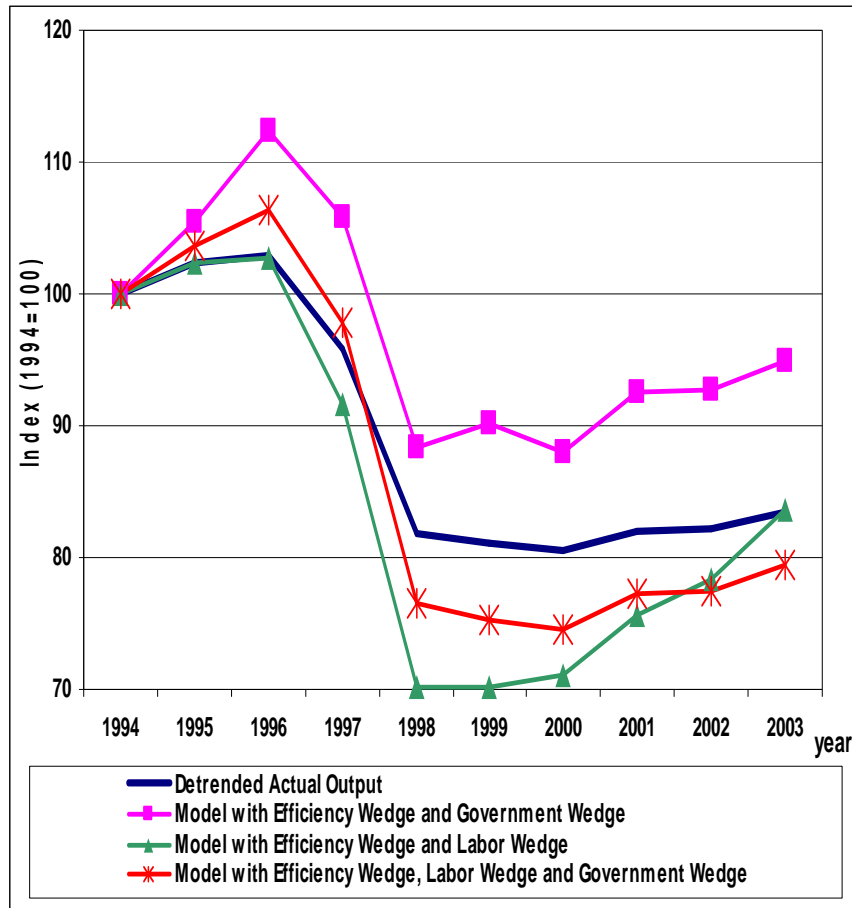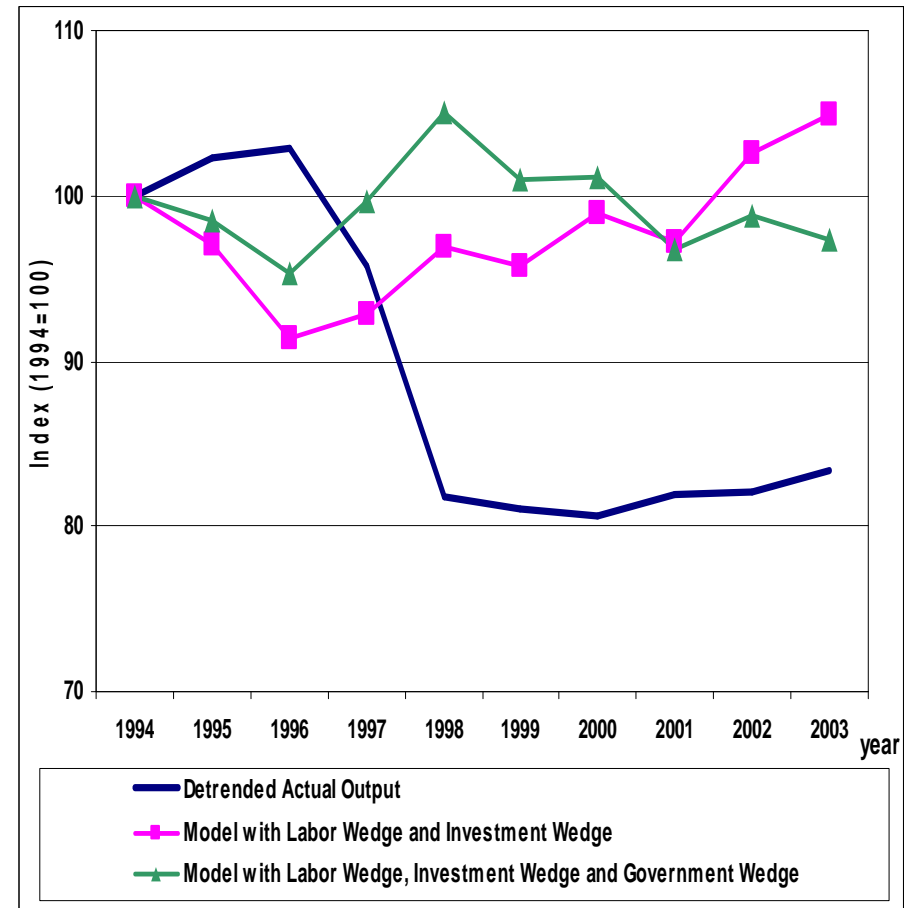
Figure 10: Detrended Actual Output vs Models with A Combination of Wedges (No Efficiency Wedge) in Thailand, Annually, 1994-2003, Normalized to Equal 100 in 1994.

6. Findings

Figure 11: Detrended Actual Output vs Model With All Wedges in Thailand, Annually, 1996-2003, Normalized to Equal to 100 in 1996.
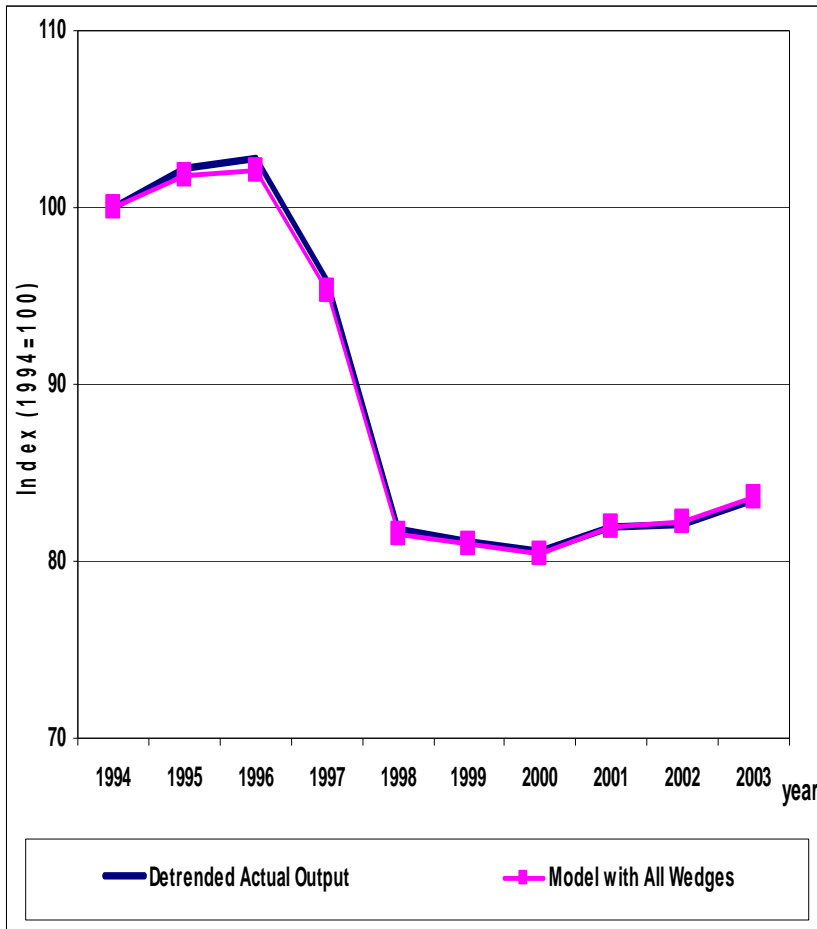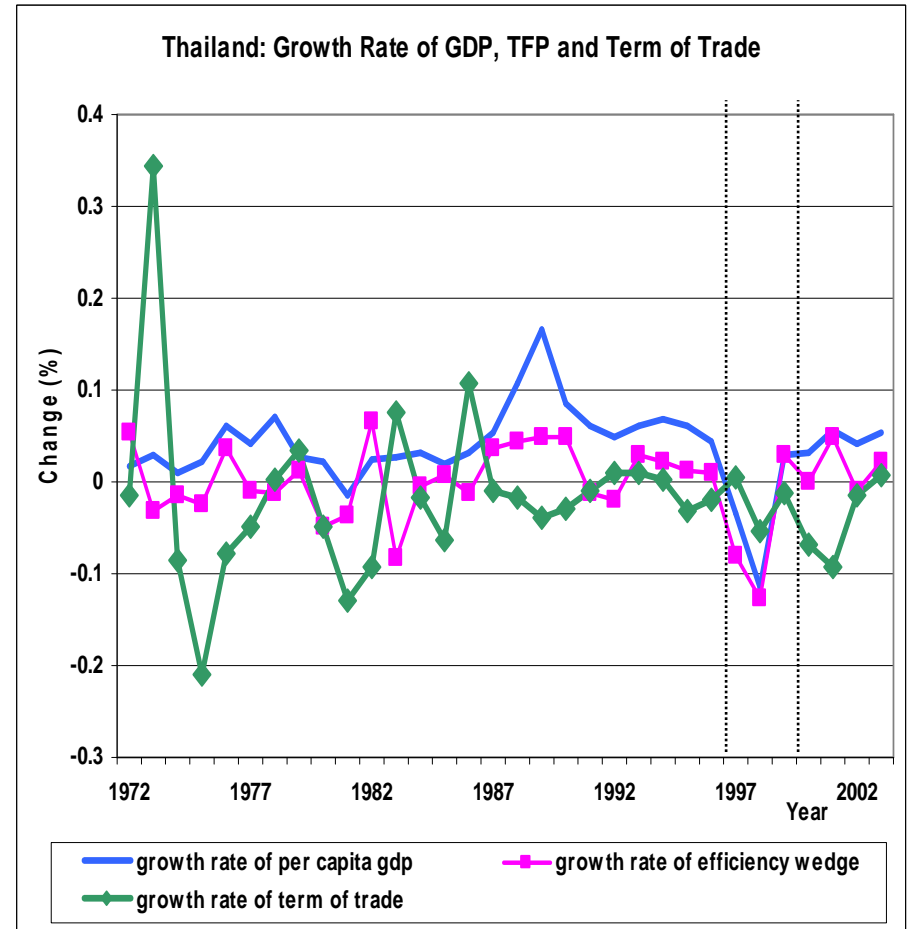
Figure 13: Growth rate of per capita GDP, efficiency wedge and terms of trade during 1972-2003.

Thailand: Growth Rate of GDP, TFP and Term of Trade

7. Conclusion

- **Efficiency Wedge**

    i. **Partial role in the 1980 recession.**

    ii. **Major role in the 1997 economic slump. This is similar to the study by Otsu (2007).**

    iii. **Equivalent to the frictions that causes an inefficient use of inputs either by firm itself or across firms (CKM, 2006)**

    iv. **Equivalent to the term of trade shock (Kehoe and Ruhl, 2007)**

    v. **May suggest a great number of inefficient use of input in the production sector or/and a misallocation of labor across firms in the 1997 recession.**

- **Labor Wedge**

    i. **Partial role in both the 1980 recession and the 1997 economic slump**

    ii. **Equivalent to shocks in followings models CKM (2006)**

        - **with sticky wages and monetary shocks**
        - **with monopoly power**

7. Conclusion

- **Investment Wedge**

    i.   **Give expansionary effects in both periods.**

    ii.   **Not promising for the economic fluctuations in Thailand.**

- **Government Wedge**

    i.   **Trivial role in both periods.**

    ii.   **Can be ignored in the study of business cycle in Thailand.**

Questions and Suggestions are welcome.