Measuring the Benefits of Political and Economic Integration of Hong Kong with China Mainland

A Panel Data Approach for Program Evaluation

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Agenda

- Introduction
- Panel Data Approach for Program Evaluation
- Assessment of the Benefits of Political and Economic Integration
- Sector Analysis
  - Individual Visitor Program
  - Others
- Concluding Remarks

Some Facts about Hong Kong

- Ceded to U.K. after the opium war in 1842
- Reverted Sovereignty on July 1, 1997

- Closer Economic Partnership Agreement (CEPA) with Mainland China signed in June 2003. Implementation of CEPA started in Jan 2004.

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- Severe Acute Respiratory Syndrome (SARS) in March 2003
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CEPA (January 1, 2004)

- Implementation in three phases:
  - Jan 2004
  - Jan 2005
  - Jan 2006
- To strengthen the linkage between mainland China and Hong Kong
  - Liberalize trades
  - Remove the tariff for various products (273 products in Jan 2004 to 713 products in Jan 2005; by Jan 2006, all Hong Kong products that meet the rules of origin criteria)
- Enhance cooperation in the area of finance
- Promote investment facilitation and mutual recognition of professional qualifications
- Launch the Individual Visit Scheme for Mainland China residents

Some Statistics about Hong Kong

- Population:
  - 2.6 million in 1950
  - 6.5 million in 1997
- Per capita income:
  - USD 410 in 1961 (13.8% of U.S.)
  - USD 23,509 in 1997 (67.2% of U.S.)
  - USD 26,491 in 2003
- Hang Seng Index
  - 15,196 in July 1997
  - 10,722 in December 1997
- Growth rate:
  - -0.67% in 2003Q2
  - 6.9% in 2007Q4
  - 7.1% in 2008Q1

What We Try to Do

- Assess the economic impact of reverting the sovereignty to China
  - Compare HK's Real GDP growth path with the Counterfactual's growth path as if there were no change of sovereignty in 1997
- Quantify the effect of the economic integration
  - Compare HK's Real GDP growth path with the Counterfactual's growth path as if there were no CEPA signed in 2003

Previous Work

- Nationalism vs. Western Supremacy
- The Focus Group on Trade and Business proposed in Sept 2006 that the Hong Kong Administration should carry out researches on the economic benefits of CEPA on Hong Kong economy to facilitate CEPA promotional work
- Eden Yu and K. Wang (2005) "CEPA: Its Impact on the Economy of Hong Kong and Mainland China and Development Outlook"
- Legislative Council Panel on Commerce and Industry has produced several reports on the impact of CEPA on the Hong Kong economy (CB(1)861/04-05(03), CB(1) 1259/04-05(03), CB(1) 1849/06-07(04))

Why An Additional One ?

- Theoretical literature on growth and development highly abstract
- Econometric Modelling
  - translate theory into empirical studies often rely on highly improbable (or restrictive) assumptions
  - data demand is huge
  - policy change $\Longrightarrow$ changes in expectation

    Structural Change
    (Not enough sample observations to estimate key parameters after structural break)

Challenges

- Observe either outcomes under the (policy) intervention or outcomes without intervention, but not both
- y_{it}^1 = outcomes of the ith unit at time t under treatment or intervention
- y_{it}^0 = outcomes of the ith unit at time t with no treatment or intervention
- Treatment effect for the ith unit at time t

$$\Delta_{it} = y_{it}^1 - y_{it}^0$$

- Can only observe either y_{it}^1 or y_{it}^0
- Observed data $y_{it} = d_{it} y_{it}^1 + (1 - d_{it}) y_{it}^0$
- $d_{it} = \begin{cases} 1 & \text{if } i\text{th unit at time } t \text{ is under treatment} \\ 0 & \text{otherwise} \end{cases}$

Challenges

- To assess the effect of policy intervention we need to be able to construct counterfactuals – outcomes of a subject had there been no such policy implemented
- Need to know:
  - How and why Hong Kong economy has grown over time ?
  - How China factor plays a role in Hong Kong's investment, labor, entrepot, immigration, tourism, international finance center (the role of portfolio investment, transfer pricing, etc.), center for creativity, etc?
  - Are there any common factors affecting the whole region ?
  - How changes in policy affects people's expectation and behavior ?

Growth Rates for H.K., Taiwan, South Korea, Singapore, and Mainland China

Year	H.K.	Taiwan	South Korea	Singapore	Mainland China
1961 – 1966	7.80	5.05	3.60	2.76	3.88
1966 – 1971	4.17	6.54	8.23	10.72	6.70
1971 - 1981	6.52	7.45	6.41	7.60	6.10
1981 – 1991	4.98	6.83	8.04	7.47	9.75
1991 – 1996	3.51	5.52	6.22	6.60	12.08
1997 – 2003	2.61	3.50	4.04	3.98	8.09
2004 – 2006	7.41	2.60	4.55	7.49	10.30

Sources: H.K. Census & Statistics Department, U.N. Statistical Yearbook for Asia & Pacific, Asian Development Bank, Asian Development Outlook, and http://www.chinability.com/GDP.htm

- Assume that y_{it}^{0} is generated by a dynamic factor model of the form,

$$y_{it}^{0} = \alpha_i + \mathbf{b}_i'\mathbf{f}_t + \varepsilon_{it}$$

  - α_i = individual-specific effects
  - $\mathbf{f}_t$ = $K \times 1$ (unobserved) common factors that vary over time
  - $\mathbf{b}_i'$ = $1 \times K$ vector of constants that may vary across i
  - K = number of common factors
  - ε_{it} = ith unit idiosyncratic component

- Matrix representation

$$\mathbf{y}_t^0 = \boldsymbol{\alpha} + B\mathbf{f}_t + \boldsymbol{\varepsilon}_t \quad , \; t = 1, ..., T_1 \tag{1}$$

$\mathbf{y}_t^0 = \left(y_{1t}^0, ..., y_{Nt}^0\right)'$
$\boldsymbol{\alpha} = \left(\alpha_1, ..., \alpha_N\right)'$
$\boldsymbol{\varepsilon}_t = \left(\varepsilon_{1t}, ..., \varepsilon_{Nt}\right)'$
B is the $N \times K$ factor loading matrix $B = \left(\mathbf{b}_i'\right)$

Assumptions

$$y_{1t} = \begin{cases} y_{1t}^0 & \text{for } t = 1, ..., T_1 \\ y_{1t}^1 & \text{for } t = T_1 + 1, ..., T \end{cases}$$

$$y_{jt} = \{ \; y_{jt}^0 \quad \text{for } j = 2, ..., N \text{ ; and } t = 1, ..., T_1, T_1 + 1, ..., T$$

Assumption 1: $\lim \frac{1}{N} \sum_{i=1}^{N} \alpha_i^2 = O(1)$.

Assumption 2: $\boldsymbol{\varepsilon}_t$ is $I(0)$ with $E(\boldsymbol{\varepsilon}_t) = 0$ and $E(\boldsymbol{\varepsilon}_t \boldsymbol{\varepsilon}_t') = V$, where V is a diagonal constant matrix.

Assumption 3: $E(\boldsymbol{\alpha} \boldsymbol{\varepsilon}_t') = \mathbf{0}$.

Assumption 4: $rank(B) = K$.

Assumption 5: $E(\varepsilon_{js} | d_{it}) = 0$ for all $j \neq i$.

Assumption 6: There exists a $\mathbf{w} \in N(B)$ such that in the neighborhood of $\mathbf{w}$,

$$E\left[\frac{1}{T_1}\left(\mathbf{y}_1^0 - \mathbf{e}\bar{\alpha} - Y\boldsymbol{\beta}\right)' A \left(\mathbf{y}_1^0 - \mathbf{e}\bar{\alpha} - Y\boldsymbol{\beta}\right)\right] \tag{2}$$

has a unique minimum.

Meaning of the Model and Assumptions

- The outcomes can be affected by:
  - individual specific components: α_i and ε_{it}
  - common factors $\mathbf{f}_t$ at different levels $\mathbf{b}_i \neq \mathbf{b}_j$
- No assumption is made about the time series properties of $\mathbf{f}_t$
  - nonstationary or stationary
- A4 implies that $N > K$ which matches with the existing literature that the number of common factors driving many macro economic time series is usually quite small
- Relax the assumptions about zero correlation between ε_{it} and $\mathbf{f}_t$

Transformation of Model (1)

- Notations:
  - $\mathbf{w}' = \left(1, -\mathbf{w}'_{-1}\right) = 1 \times N$ vector that lies on the null space of B
  - $\mathbf{y}_{-\mathbf{1}t} = \left(y_{2t}, ..., y_{Nt}\right)'$
  - $\boldsymbol{\varepsilon}_{-\mathbf{1}t} = \left(\varepsilon_{2t}, ..., \varepsilon_{Nt}\right)'$
- Then:

$$\mathbf{w}'B = \mathbf{0}' \tag{3}$$

$$y_{1t}^{0} = \bar{\alpha} + \mathbf{w}'_{-1}\mathbf{y}_{-\mathbf{1}t} + \varepsilon_{1t} - \mathbf{w}'_{-1}\boldsymbol{\varepsilon}_{-\mathbf{1}t} \tag{4}$$

Transformation of Model (1)

The Mean

Then for any $\mathbf{w} \in N(B)$,

$$y_{1t}^{0} = E\left(y_{1t}^{0}|\mathbf{y_{-1t}}\right) + u_{1t}, \quad (5)$$

$$\begin{aligned} E\left(y_{1t}^{0}|\mathbf{y_{-1t}}\right) &= \bar{\alpha} + \mathbf{w}_{-1}'\mathbf{y_{-1t}} + E\left(\varepsilon_{1t}|\mathbf{y_{-1t}}\right) - E\left(\mathbf{w}_{-1}'\boldsymbol{\varepsilon}_{\mathbf{-1t}}|\mathbf{y_{-1t}}\right) \quad (6) \\ &= \bar{\alpha} + \boldsymbol{\beta}'\mathbf{y_{-1t}} \end{aligned}$$

$$\begin{aligned} \boldsymbol{\beta}' &= \mathbf{w}_{-1}'\left(I_{N-1} - Cov\left(\boldsymbol{\varepsilon}_{\mathbf{-1t}}, \mathbf{y_{-1t}}\right) Var\left(\mathbf{y_{-1t}}\right)^{-1}\right) \quad (7) \\ &\quad + Cov\left(\varepsilon_{1t}, \mathbf{y_{-1t}}\right) Var\left(\mathbf{y_{-1t}}\right)^{-1} \end{aligned}$$

$$\begin{aligned} u_{1t} &= \mathbf{w}'\boldsymbol{\varepsilon}_{t} - Cov\left(\varepsilon_{1t}, \mathbf{y_{-1t}}\right) Var\left(\mathbf{y_{-1t}}\right)^{-1}\mathbf{y_{-1t}} \quad (8) \\ &\quad + \mathbf{w}_{-1}' Cov\left(\boldsymbol{\varepsilon}_{\mathbf{-1t}}, \mathbf{y_{-1t}}\right) Var\left(\mathbf{y_{-1t}}\right)^{-1}\mathbf{y_{-1t}} \end{aligned}$$

Transformation of Model (1)

The Variance

Then for any $\mathbf{w} \in N(B)$,

$$
\begin{aligned}
& Var\left(y_{1t}^{0} | \mathbf{y}_{-\mathbf{1}t}\right) \quad (9) \\
= \; & Var\left(\varepsilon_{1t}\right) - Cov(\varepsilon_{1t}, \mathbf{y}_{-\mathbf{1}t}) Var(\mathbf{y}_{-\mathbf{1}t})^{-1} Cov(\mathbf{y}_{-\mathbf{1}t}, \varepsilon_{1t}) \\
& + \mathbf{w}'_{-1} Var(\boldsymbol{\varepsilon}_{-\mathbf{1}t}) \mathbf{w}_{-1} \\
& - \mathbf{w}'_{-1} \left[Cov(\boldsymbol{\varepsilon}_{-\mathbf{1}t}, \mathbf{y}_{-\mathbf{1}t}) Var(\mathbf{y}_{-\mathbf{1}t})^{-1} Cov(\mathbf{y}_{-\mathbf{1}t}, \boldsymbol{\varepsilon}_{-\mathbf{1}t}) \right] \mathbf{w}_{-1} \quad (10)
\end{aligned}
$$

- For any $\mathbf{w} \in N(B)$, denote $\theta \equiv \left(\bar{\alpha}, \boldsymbol{\beta}'\right)$, the objective function is:

$$\frac{1}{T_1}\left(\mathbf{y}_1^0 - \mathbf{e}\bar{\alpha} - Y\boldsymbol{\beta}\right)' A \left(\mathbf{y}_1^0 - \mathbf{e}\bar{\alpha} - Y\boldsymbol{\beta}\right) \quad (11)$$

$\mathbf{y}_1^0 = (y_{1,1}, ..., y_{1,T_1})$
$\mathbf{e}$ is a $T_1 \times 1$ vector of 1's
Y is a $T_1 \times (N-1)$ matrix of T_1 time series observations of $\left(\mathbf{y}'_{-\mathbf{1}t}\right)$
A is a $T_1 \times T_1$ positive definite matrix

- Consistency:
  - Under A1-A6, the solution of (11), $\widehat{\theta} \equiv \left(\widehat{\overline{\alpha}}, \widehat{\boldsymbol{\beta}}'\right)'$ converges to a $\theta \equiv \left(\overline{\alpha}, \boldsymbol{\beta}'\right)'$ that corresponds to a $\mathbf{w} \in N(B)$.
- Efficiency:
  - When $A = I$, and $\mathbf{y}_t$ is stationary, the estimator (7) is the least squares estimator.
  - When A equals the inverse of $E\left(\mathbf{u}_1\mathbf{u}_1'\right)$, where $\mathbf{u}_1 = \left(u_{1,1}, ..., u_{1,T_1}\right)'$, the estimator is efficient.

- Notation:
  - $Y_t' = (\mathbf{y}_{-1,1}, ..., \mathbf{y}_{-1,t})$ is a $(N-1) \times t$ matrix
- Estimator:

$$\widehat{\Delta}_{1t} = y_{1t} - \widehat{y}_{1t}^0 \text{ for } t = T_1 + 1, ..., T, \tag{12}$$

- Mean:

$$E\left(\widehat{\Delta}_{1t} | Y_{T_1}', \mathbf{y_{-1t}}\right) = \Delta_{1t} \text{ for } t = T_1 + 1, ..., T, \tag{13}$$

- Variance:

$$Var\left(\widehat{\Delta}_{1t}\right) = Var\left(u_{1t}\right) + \left(1, \mathbf{y}_{-1t}'\right) \Sigma \left(1, \mathbf{y}_{-1t}'\right)' \tag{14}$$

where Σ is the variance covariance matrix of $\widehat{\theta}$

- Assumption 7: $\{\varepsilon_{it}\}$ is weakly dependent (mixing) for all i
- Suppose the treatment effects, Δ_{1t}, follow an autoregressive moving average model (ARMA)
- If the treatment effect is stationary, then the long-term treatment effect is:

$$\Delta_1 = a\left(L\right)^{-1}\mu = \mu^* \tag{15}$$

- If one of the roots of $a(L) = 0$ lies on the unit circle, Δ_{1t} is nonstationary, $I(1)$.
- Box-Jenkins (1970) procedure:

$$\widetilde{a}\left(L\right)\widehat{\Delta}_{1t} = \widetilde{\mu} + \widetilde{\theta}\left(L\right)v_t, \tag{16}$$

Lemma 4: Suppose the roots of $a(L) = 0$ lie outside the unit circle, under A1 - A7, when both T_1 and $(T - T_1)$ go to infinity,

$$p\lim \widetilde{a}(L)^{-1}\widetilde{\mu} = p\lim \widehat{\mu}^* = \mu^* = a\left(L\right)^{-1}\mu \tag{17}$$

and

$$\sqrt{T - T_1}\left(\widehat{\mu}^* - \mu^*\right) \sim N\left(0, \sigma^2_{\mu^*}\right), \tag{18}$$

where

$$\sigma^2_{\mu^*} = \frac{\partial \mu^*}{\partial \gamma'} Var\left(\sqrt{T - T_1}\widehat{\gamma}\right)\frac{\partial \mu^*}{\partial \gamma} \tag{19}$$

and $\gamma = (\widetilde{\mu}, \widetilde{a}_1, ..., \widetilde{a}_p)'$, assuming $\widetilde{a}(L)$ is of p-th order.

Tests for Significance of Policy Intervention

Lemma 5: Suppose all the roots of $a(L) = 0$ lie outside the unit circle, under A1 - A7, when both T_1 and $(T - T_1)$ go to infinity,

$$\underset{(T-T_1)\longrightarrow\infty}{p\lim} \frac{1}{T - T_1} \sum_{t=T_1+1}^{T} \widehat{\Delta}_{1t} = \Delta_1 \tag{20}$$

The variance of (20) can be approximated by the heteroscedastic-autocorrelation consistent (HAC) estimator of Newey and West (1987).

Data

- Period: 1993Q1 to 2007Q1
- Quarterly Real Growth Rate
- Countries: China, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, US
- Sources:
    - International Financial Statistics
    - CEIC Database
    - China's National Bureau of Statistics
    - U.S.'s Bureau of Economic Analysis

Political Integration

- Handover on July 1, 1997
- Use 1993Q1 to 1997Q2 to construct optimal weights
- Statistically insignificant result:

$$\widehat{\Delta}_{1t} = \underset{(.0059)}{-.0021} + \underset{(.1824)}{1.2137}\widehat{\Delta}_{1t-1} - \underset{(.1824)}{.5175}\widehat{\Delta}_{1t-2} + \eta_{1t} \tag{21}$$

Optimal Weights (Political Integration)

1993Q1 – 1997Q2

	Beta	STD	T-ratio
Constant	-0.0178	0.0532	-0.3342
Singapore	-0.0003	0.1787	-0.0018
Korea	-0.2974	0.2960	-1.0048
Japan	-0.3160	0.1542	-2.0489
Philippines	0.1691	0.1516	1.1153
Indonesia	0.2787	0.1331	2.0941
Malaysia	-0.0408	0.0805	-0.5075
Thailand	0.0383	0.1024	0.3740
Taiwan	0.1166	0.2610	0.4466
US	0.2341	0.3293	0.7110
China	0.4389	0.2907	1.5095

R-Square = 0.8861

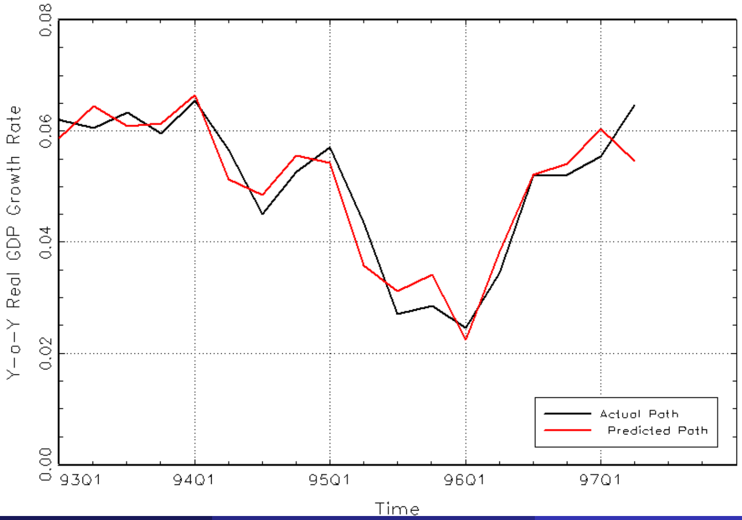
Treatment Effect of Political Integration

1997Q3 – 2003Q4

	Actual	Control	Treatment
Sep-97	0.0569	0.0606	-0.0037
Dec-97	0.0243	0.0610	-0.0368
Mar-98	-0.0302	0.0958	-0.1260
Jun-98	-0.0583	0.0590	-0.1173
Sep-98	-0.0755	0.0356	-0.1111
Dec-98	-0.0586	0.0119	-0.0705
Mar-99	-0.0217	-0.0312	0.0094
Jun-99	0.0238	-0.0077	0.0315
Sep-99	0.0515	0.0062	0.0453
Dec-99	0.0949	0.0220	0.0729
Mar-00	0.1249	0.0539	0.0710
Jun-00	0.0946	0.0719	0.0227
Sep-00	0.0963	0.0737	0.0226
Dec-00	0.0686	0.0792	-0.0106
Mar-01	0.0239	0.0466	-0.0227
Jun-01	0.0163	0.0447	-0.0284
Sep-01	-0.0029	0.0304	-0.0332
Dec-01	-0.0099	0.0257	-0.0356
Mar-02	-0.0099	0.0124	-0.0223
Jun-02	0.0037	0.0063	-0.0027
Sep-02	0.0289	0.0111	0.0178
Dec-02	0.0465	0.0150	0.0316
Mar-03	0.0431	0.0402	0.0028
Jun-03	-0.0067	0.0261	-0.0328
Sep-03	0.0395	0.0441	-0.0046
Dec-03	0.0471	0.0372	0.0099
MEAN	0.0235	0.0358	-0.0123
STD	0.0505	0.0292	0.0513

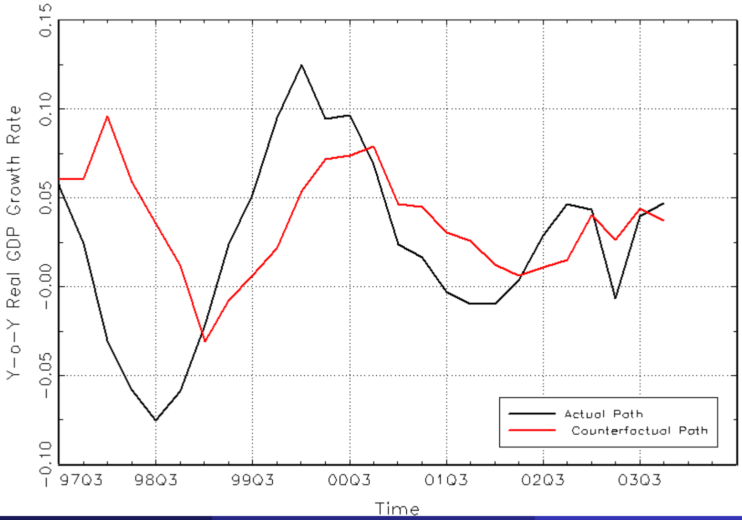
Actual and Predicted Real GDP Growth (Political Integration)

1993Q1 – 1997Q2



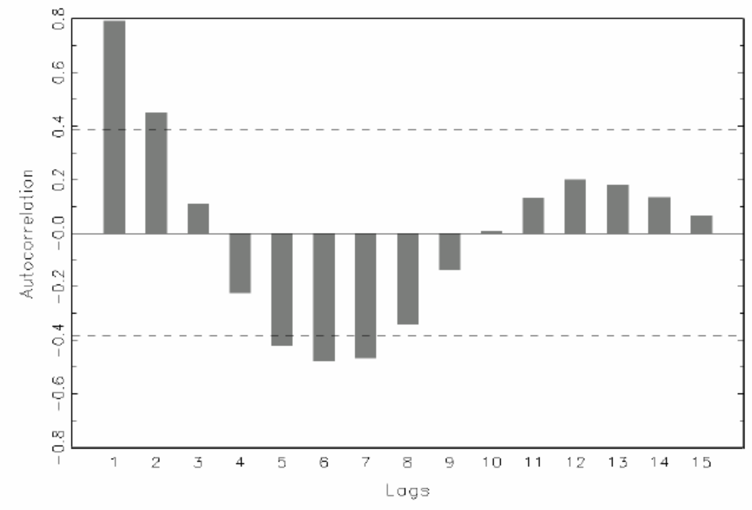
Actual and Counterfactual Real GDP Growth (Political Integration)

1997Q3 – 2003Q4



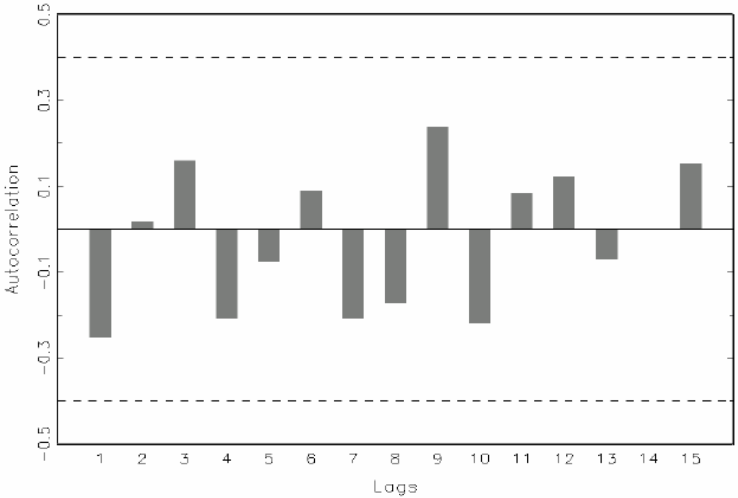
Autocorrelation of Treatment Effect (Political Integration)

1997Q3 – 2003Q4



Error of Treatment Effect Model AR(2) (Political Integration)

1997Q3 – 2003Q4



Economic Integration

- CEPA signed in 2003Q2
- Given no significant effect of political integration, the data is pooled to construct optimal weight
- Use 1993Q1 to 2004Q1 to construct optimal weights
- Results: Statistically significant

Optimal Weights (Economic Integration)

1993Q1 – 2003Q4

	Beta	STD	T-ratio
Constant	-0.0410	0.0208	-1.9706
Singapore	0.2022	0.1123	1.8007
Korea	0.3020	0.1036	2.9150
Japan	-0.0695	0.1595	-0.4355
Philippines	0.2656	0.1454	1.8264
Indonesia	0.1323	0.0429	3.0823
Malaysia	0.0753	0.0763	0.9859
Thailand	0.0241	0.0900	0.2679
Taiwan	-0.1624	0.1632	-0.9952
US	0.4016	0.2658	1.5109
China	0.1849	0.2072	0.8924
R-Square = 0.8948			

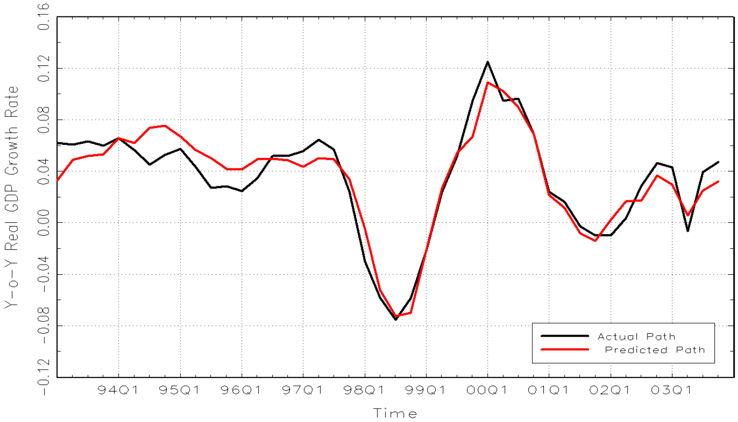
Treatment Effect of Economic Integration

2004Q1 – 2007Q1

	Actual	Control	Treatment
Mar-04	0.0776	0.0434	0.0343
Jun-04	0.1167	0.0615	0.0552
Sep-04	0.0651	0.0479	0.0172
Dec-04	0.0729	0.0469	0.0260
Mar-05	0.0612	0.0348	0.0264
Jun-05	0.0725	0.0412	0.0313
Sep-05	0.0805	0.0498	0.0307
Dec-05	0.0748	0.0409	0.0339
Mar-06	0.0777	0.0542	0.0234
Jun-06	0.0543	0.0438	0.0105
Sep-06	0.0655	0.0362	0.0293
Dec-06	0.0702	0.0400	0.0302
Mar-07	0.0557	0.0375	0.0182
MEAN	**0.0727**	**0.0445**	**0.0282**
STD	**0.0156**	**0.0076**	**0.0107**

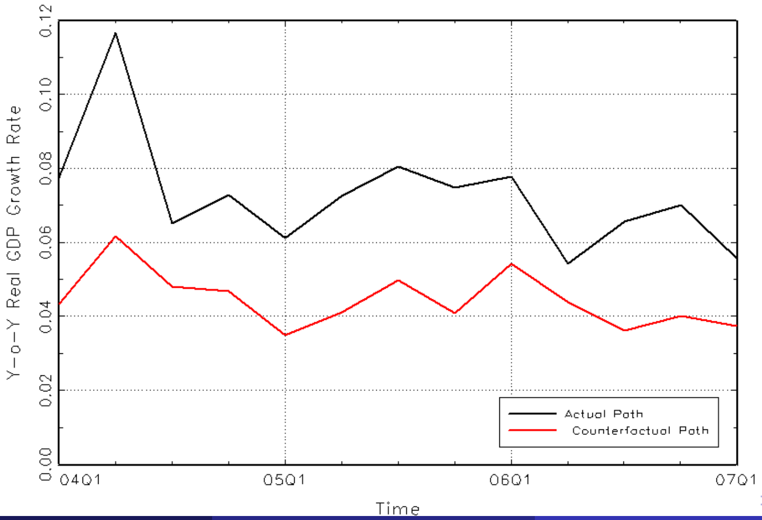
Actual and Predicted Real GDP Growth (Economic Integration)

1993Q1 – 2003Q4



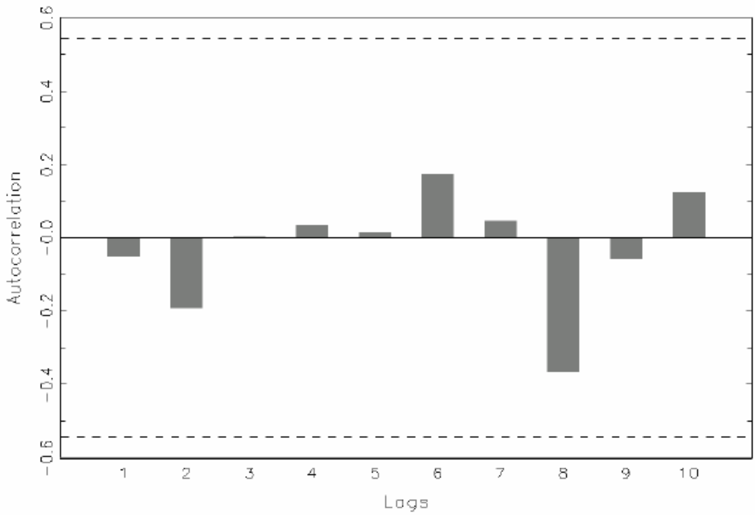
Actual and Predicted Real GDP Growth (Economic Integration)

2004Q1 – 2007Q1



Autocorrelation of Treatment Effect (Economic Integration)

2004Q1 – 2007Q1



Regression Results of Log(Real GDP) I

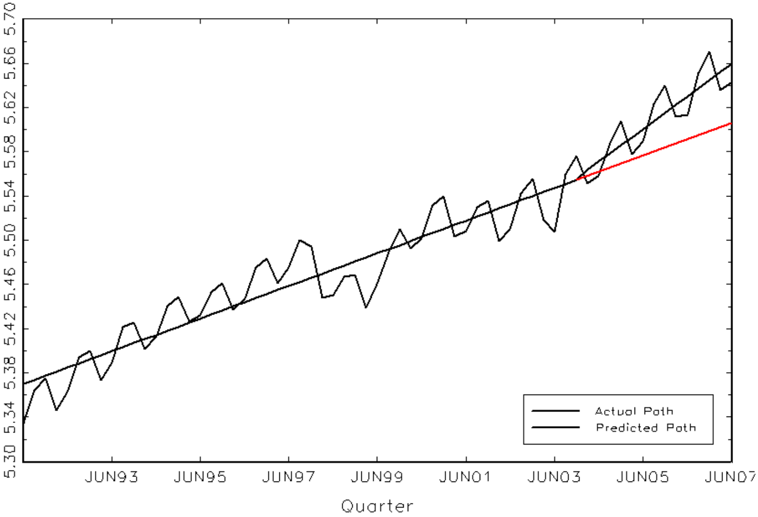
$$\log(GDP_t) = a + bt + v_t$$

	(1) 1991Q2 – 2007Q4		
	Beta	Std	T-test
Constant	5.3565	0.0057	937.9468
Time	0.0042	0.0002	27.7915

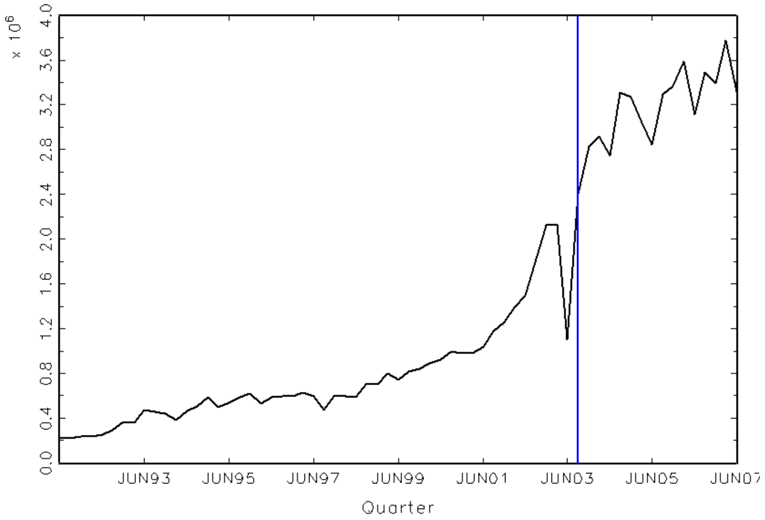
(2) 1991Q2 – 2003Q4		
Beta	Std	T-test
5.3665	0.006	895.0409
0.0037	0.0002	18.3791

(3) 2004Q1 – 2007Q2		
Beta	Std	T-test
5.1816	0.0704	73.649
0.0073	0.0012	6.125

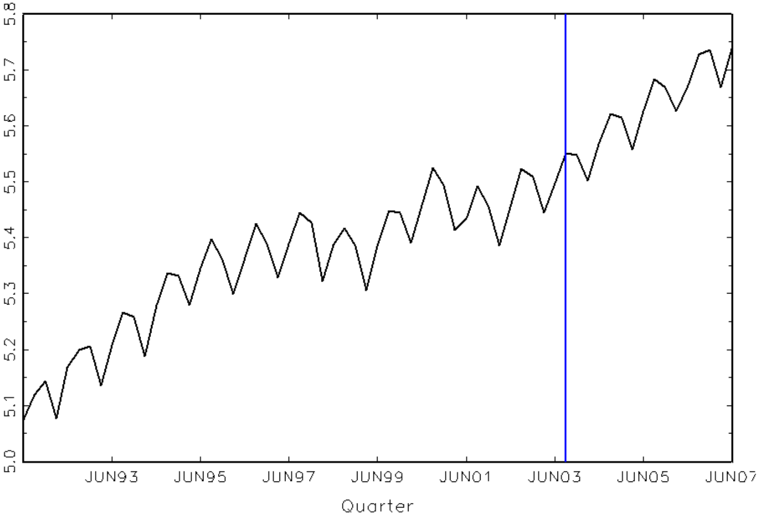
Time Plot of Log(Real GDP)



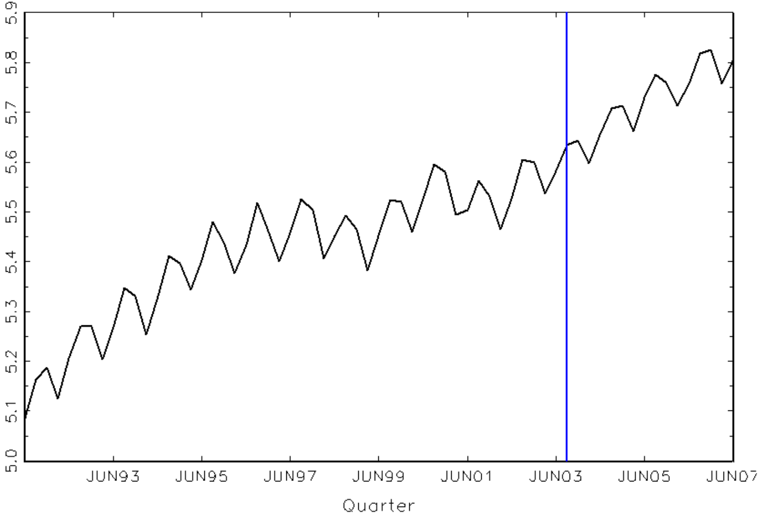
Time Trend of Number of Visitors



Time Trend of Log(Import)



Time Trend of Log(Re-Export from China)



Regression Results of Log(Real GDP) II

$$\log(GDP_t) = a + b\log(Re - Export\ from\ China_t) + c\log(Import_t) + d\log(Visitor) + v_t$$

	(1) 1991Q2 – 2007Q4		
	Beta	Std	T-test
Constant	3.19	0.083	38.4439
Log(Re-Export from China)	-0.0121	0.1429	-0.0846
Log(Import)	0.3662	0.1487	2.4618
Log(Visitor)	0.0648	0.0119	5.4312

(2) 1991Q2 – 2003Q2		
Beta	Std	T-test
3.3469	0.1042	32.1136
0.1052	0.1619	0.6495
0.219	0.1738	1.2602
0.0638	0.0143	4.4588

(3) 2003Q3 – 2007Q2		
Beta	Std	T-test
2.1416	0.3638	5.8871
0.4131	0.3501	1.18
0.0036	0.3267	0.0111
0.1663	0.0757	2.1971

Regression Results of Log(Real GDP) III

	(1) 1991Q2 – 2007Q4		
	Beta	Std	T-test
Constant	3.1923	0.0776	41.1429
Log(Import)	0.3538	0.0254	13.929
Log(Visitor)	0.0645	0.0114	5.6479

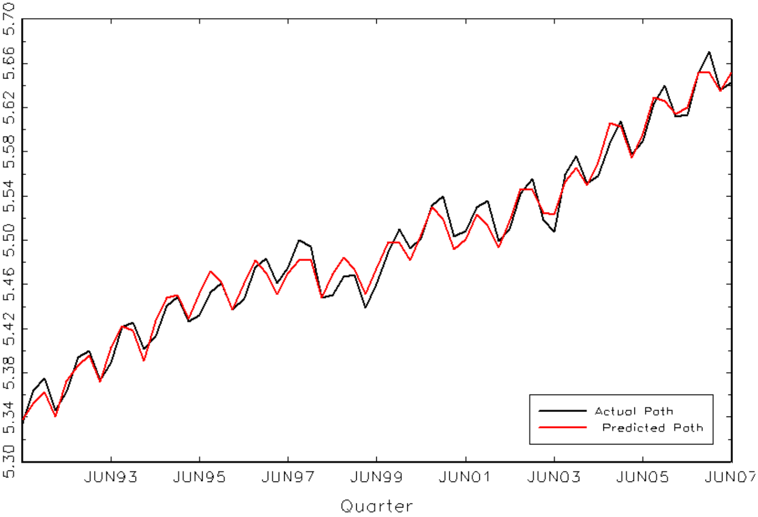
(2) 1991Q2 – 2003Q2		
Beta	Std	T-test
3.3118	0.0885	37.4252
0.3304	0.0281	11.7407
0.0654	0.014	4.6732

(3) 2003Q3 – 2007Q2		
Beta	Std	T-test
2.2358	0.3602	6.2067
0.3843	0.052	7.3854
0.1855	0.075	2.4742

Structural Break Test:

$$F[3,59] = \frac{(SSR1 - SSR2 - SSR3)/3}{(SSR2 + SSR3)/(T-6)} = 3.4492 (> 2.76)$$

Actual and Predicted Log(GDP) over time



Regression Results of Log(Real GDP) IV

	(1) 1991Q2 – 2007Q4		
	Beta	Std	T-test
Constant	3.2887	0.0756	43.5203
Log(Re-Export from China)	0.3344	0.0256	13.0732
Log(Visitor)	0.0618	0.0123	5.0086

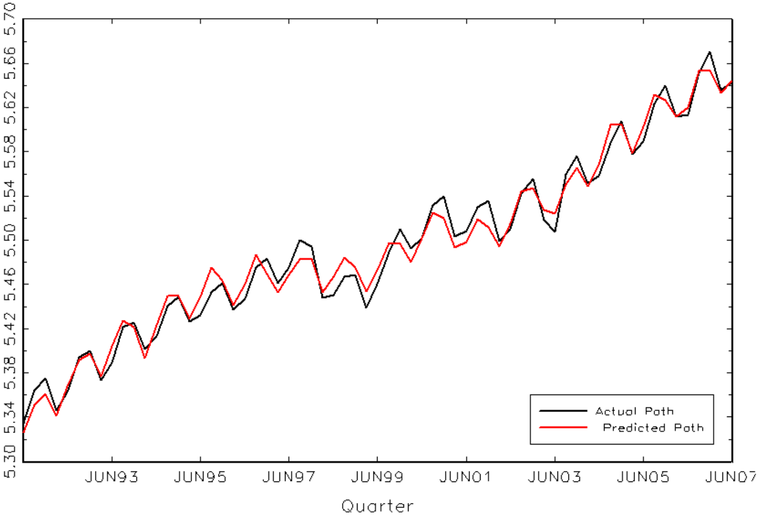
(2) 1991Q2 – 2003Q2		
Beta	Std	T-test
3.4306	0.0808	42.4477
0.3065	0.0266	11.5431
0.0632	0.0144	4.3928

(3) 2003Q3 – 2007Q2		
Beta	Std	T-test
2.1407	0.3399	6.2975
0.4169	0.0528	7.8982
0.1662	0.0723	2.2994

Structural Break Test:

$$F[3,59] = \frac{(SSR1 - SSR2 - SSR3)/3}{(SSR2 + SSR3)/(T-6)} = 5.7488(> 2.76)$$

Actual and Predicted Log(GDP) over time



Concluding Remarks

- HK & Mainland are linked together in many ways (e.g. tourism, entrepot, FDI to and from China, immigration from China, financial arrangement)
- It is very difficult to identify these linkages and the implications of each linkage.
- This paper proposed a simple to implement panel data approach to provide a quantification measure of the impact of policy intervention.
- The method also allows us to bypass the selection (a participation) issue that often complicates the study of the effects of policy intervention with a short univariate time series approach (e.g. Box and Tiao (1975))
- We find that the reversion of sovereignty of HK to China had no effect on HK's growth.
- On the other hand, CEPA has a significant impact. It raises HK's real economic growth rate by 2.82% a year compared to without such an agreement

Concluding Remarks

- The future of Hong Kong hinges on its economic integration with China Mainland
- CEPA takes concrete steps to remove barriers between Hong Kong and the Mainland
- It has also helped rebuild confidence in the economy after a prolonged period of economic stagnation
    - For instance, the value of total receipts for the restaurant sector in 2008Q1 was at $19.5 billion, up by 15.8% compared with 2007Q1
    - The value of total retail sales in March was at $22.6 billion, increased by 20% compared with a year earlier
- Challenges of economic liberalization can only stimulate competitive spirits and entrepreneurship to transform Hong Kong economy