How high is the natural rate of unemployment in Hong Kong? (A technical note)

Introduction

Natural rate of unemployment, which refers to a situation of full employment and stable inflation, is one of the core issues in economic analysis with significant implications in various policy arenas. This paper provides a technical review of the estimation of the time-varying natural rate of unemployment, as measured by the non-accelerating inflation rate of unemployment (NAIRU), over the past two decades (1994 - 2013), organized as follows. **Part 1** describes the methodology of the NAIRU estimation. **Part 2** reports the model estimation results. Detailed discussion on the estimated NAIRU series and its salient features are given in **Part 3**.

Part 1. Methodology

2. The empirical estimation of NAIRU broadly follows the analytical framework as set out by Adams and Coe (1990) for estimation of the natural rate of unemployment. A system of simultaneous equations is developed to explain aggregate wage and price setting behavior, whilst also taking into account the supply side factors as well as the structural aspects in Hong Kong's labour market. The use of simultaneous equation system has the merit that the natural rate of unemployment and potential output can be jointly determined, while integrating the wage and price relationship with the relevant cyclical and structural factors. The resultant estimates of NAIRU and potential output, as well as the output gap so derived, are thus fully consistent with each other.

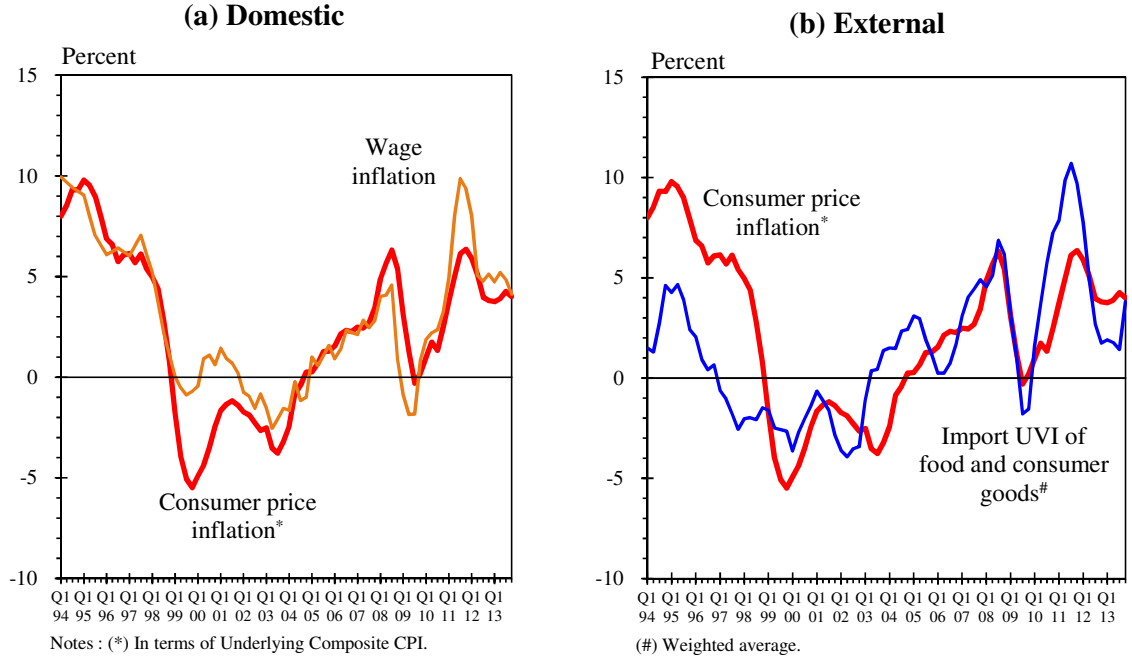
3. In this exercise, we distinguish between general inflation and consumer price inflation in inflation modelling, as recent data suggest that wage is more likely to be determined by the consumer price inflation whilst the unit labour cost tends to be determined by wage cost relative to general inflation. Meanwhile, we have also taken into account the structural change to the wage dynamics from the implementation of the Statutory Minimum Wage (SMW) in 2011 and its subsequent uprating in 2013. In specific, the structural equations are set out in details, as follows.

(1) Consumer price inflation equation – UCCPI

$$\Delta CPI = f(\Delta w, \frac{Y}{Yp} - 1, \Delta(\frac{Y}{N}), \Delta(MP), Vac)$$

4. The inflation series, ΔCPI, used in the model is the rate of change in the underlying Composite Consumer Price Index (UCCPI), which excludes the effects of all Government's one-off relief measures. The movements of wage growth, Δw, net of labour productivity growth, $\Delta(Y/N)$, features prominently as the key determinant of locally generated cost pressures, whilst the overall vacancy rate, Vac [(1)], is to capture the impact on consumer price inflation due to rental movements from the property market cycles. Import prices of food and consumer goods, $\Delta(MP)$, are to gauge the price pressures from external sources (***Chart 1***). The extent of these domestic and external influences that can be passed through to the local retail price level would be reflected in a change in profit margin as proxied by the change in output gap, $Y/Y_P - 1$, a key measures of the aggregate demand and supply balance in the local economy[(2)].

Chart 1
Consumer price inflation and its underlying local and external factors



Notes : (*) In terms of Underlying Composite CPI.
(#) Weighted average.

(1) Overall vacancy rate refers to the average vacancy rate of the private residential flats, office, commercial and retail spaces, and flatted factories, weighted by their corresponding value at 2000 prices.

(2) The potential output Y_P featured in the output gap is derived from a separately estimated production function, assuming full employment in the labour market, and with the stock of machinery and building investment utilised at their normal intensity of usage. Please see the paragraphs 9-11 for further elaboration.

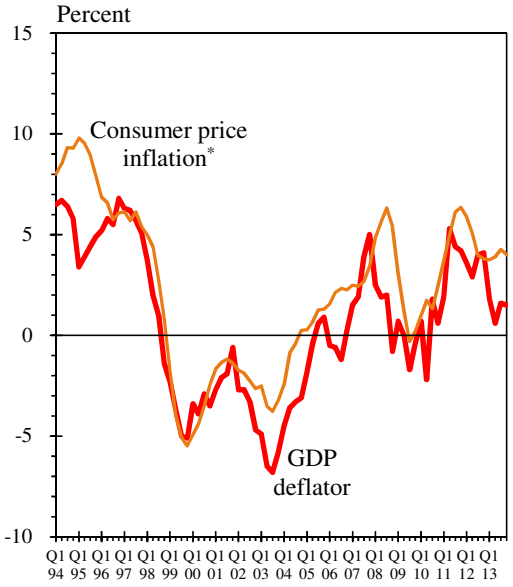
(2) General inflation equation – GDP Deflator

$$\Delta GDPD = f(\Delta CPI, \frac{Y}{Yp} - 1, \Delta(\frac{P_x}{P_m}))$$

5. General inflation, $\Delta GDPD$, as measured by the rate of change in the GDP deflator, is the broadest measure of inflation in the economy. Alongside the consumer price inflation and output gap as explanatory variables, the change in terms of trade, $\Delta(P_x / P_m)$, is included to capture the terms of trade shock from the external environment (e.g. oil price hike; exchange rate fluctuations) ***(Chart 2)***.

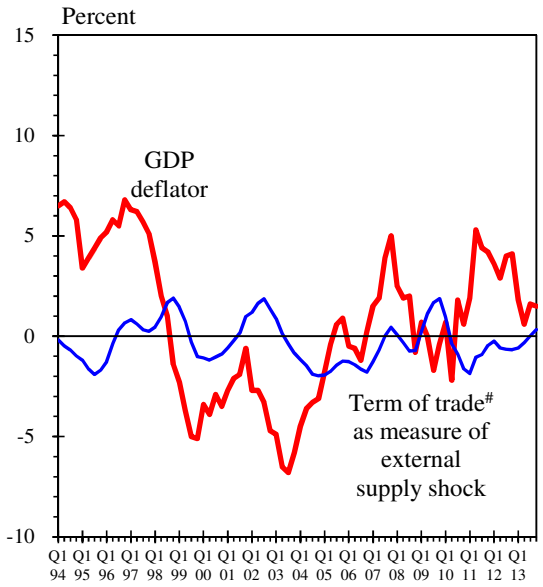
Chart 2

(a) General inflation and CPI inflation



Notes : (*) In terms of Underlying Composite CPI.

(b) General inflation and External factors



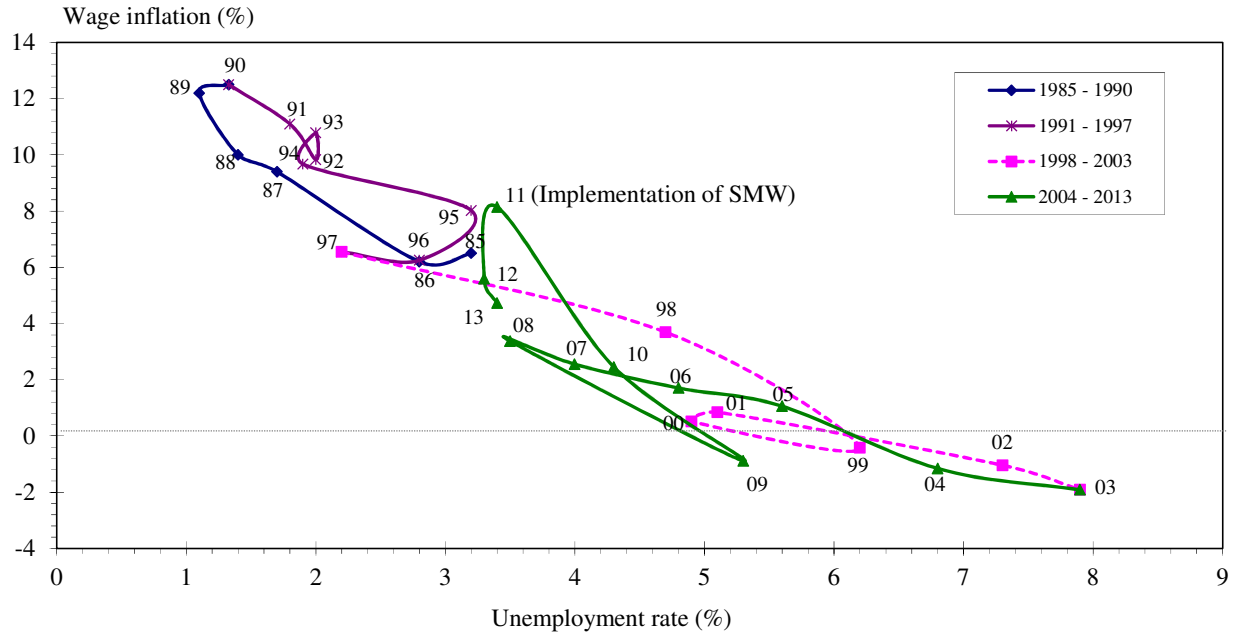
(#) 4-quarter moving average.

(3) Phillip's Curve

$$\Delta w = g(\Delta CPI, \quad u - u_n, \quad \Delta(\frac{Y}{N}), \quad , D\_SMW_{11}, \quad \Delta SMW_{13})$$

6. This is a typical Phillips curve where in the long run, the wage growth trend is linked to consumer price inflation, ΔCPI, and labour productivity growth, $\Delta(Y / N)$. But in the short run, nominal wage growth will adjust in response to the dis-equilibrium in the labour market, as depicted by the deviation of the unemployment rate u from its natural rate u_n, the latter being a measure of the degree of tightness in the labour market ***(Chart 3)***. Meanwhile, by incorporating directly the one-off impact on nominal wages from the implementation of the SMW in 2011, D_SMW_{11}, and the rate of increase in SMW rate in 2013, ΔSMW_{13}, which are separately calibrated, the distortionary impact from SMW upon the Phillip's Curve has been netted out.

Chart 3
Phillips curve for Hong Kong



(4) Unemployment rate equation

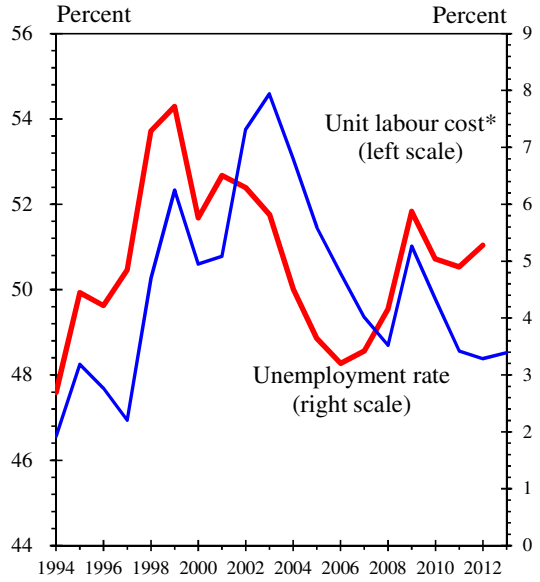
$$u = h(\Delta(\frac{w \cdot N}{Y \cdot GDPD}),\ \frac{Y}{Y_p} - 1,\ \sigma,\ mpf,\ cssa,\ c - \bar{c},\ I_c - \bar{I_c},\ demo\_factor)$$

7. This is an augmented Okun's Law equation, which relates the level of unemployment to the balance of demand and supply in the macro economy as depicted by the output gap. The unit labour cost, as measured by $\Delta(w \cdot N / Y \cdot GDPD)$, features as a key factor affecting the level of unemployment rate, in the sense that if unit labour cost can adjust downwards flexibly after a major macro-economic shock, the burden of adjustment will fall less on unemployment (***Chart 4***). The inclusion of the short-run fluctuation of the GDP shares of consumption and construction, denoted by $c - \bar{c}$ and $I_c - \bar{I_c}$ respectively, is to capture the cyclicality factor caused by unbalanced growth pattern. This is to take on board the earlier analysis that consumption is the most effective driver in creating employment among all the components in the GDP, and also factoring in the immense tightness in construction sector despite sub-par economic growth in recent years.

8. As to the structural factors, the dispersion of unemployment rate across occupation (σ)[3] is to capture the skill mismatch in the process of economic restructuring. Also, following Adams and Coe (1990), the impact on unemployment rate due to the changes in the age-gender-education composition, as denoted by $demo\_factor$, which has been separately estimated using constant labour shares, enters directly into the unemployment equation[4]. Finally, two variables have been added to filter the effects on the unemployment rates from the ratio of CSSA payment for the unemployment to wage index, *cssa*, and the employers' contribution in Mandatory Provident Fund, *mpf*, this being proxied by the share of payment in kind of the compensation of employee.

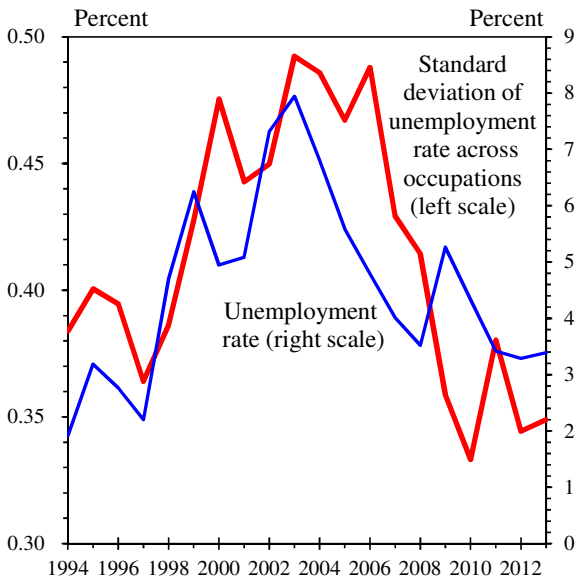
Chart 4

(a) High unemployment in late 90s being affected by rising unit labour cost



Note: (*) Compensation of employees as a ratio of GDP.

(b) Dispersion of unemployment declining in recent years



(3) σ is defined by $\sigma^2 = \sum w_i \left(\frac{u_i}{u} - 1 \right)^2$, where w_i is the labour force share of the i^{th} occupation.

(4) It essentially means using the age-gender-education adjusted unemployment rate series in the estimation of parameters for the various cyclical and structural factors in the unemployment rate equation, i.e. having already filtered the effect of demographic changes on unemployment rate. For details of the series, see **Annexes I** and **II**.

The production function

9. Potential output is taken as an economy's production capacity under normal intensity of usage of its factors of production. In our existing framework, a Cobb-Douglas production function is adopted to provide a functional form for modeling output in terms of the underlying factor inputs, i.e. labour and capital stock. For the purpose of estimating the production function, data series on two types of capital stock, viz. building stock and machinery stock, have been compiled by aggregating the corresponding gross investment flows, net of depreciation which is assumed to follow a declining-balance schedule with varying depreciation rates on different investment components(5).

10. Under this specification, the actual level of output can be expressed as a function of the actual employment, occupied building stock and machinery stock, adjusted for variations in the intensity of usage of factor inputs. That is:

$$\log(Y_t) = a_1 \log(l_t L_t) + a_2 \log(b_t B_t) + a_3 \log(m_t M_t) + a_4 \log(SER_t)$$

$$= a_1 \log(L_t) + a_2 \log(B_t) + a_3 \log(M_t) + \{a_1 \log(l_t) + a_2 \log(b_t) + a_3 \log(m_t)\} + a_4 \log(SER_t)$$

where:

L	=	Total employment
B	=	Occupied building stock
M	=	Machinery stock
l,b,m	=	Intensity of usage of various factor inputs(6)
SER	=	Share of employment in services sector(7)

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(5) The assumed depreciation rates for machinery stock and building stock, though necessarily with some degree of subjectivity, are the result of a sensitivity search after testing different depreciation rate assumptions to derive the potential GDP and output gap estimates that can better explain the price trend in Hong Kong. For details, see the "Growth accounting framework applied to Hong Kong – A technical note".

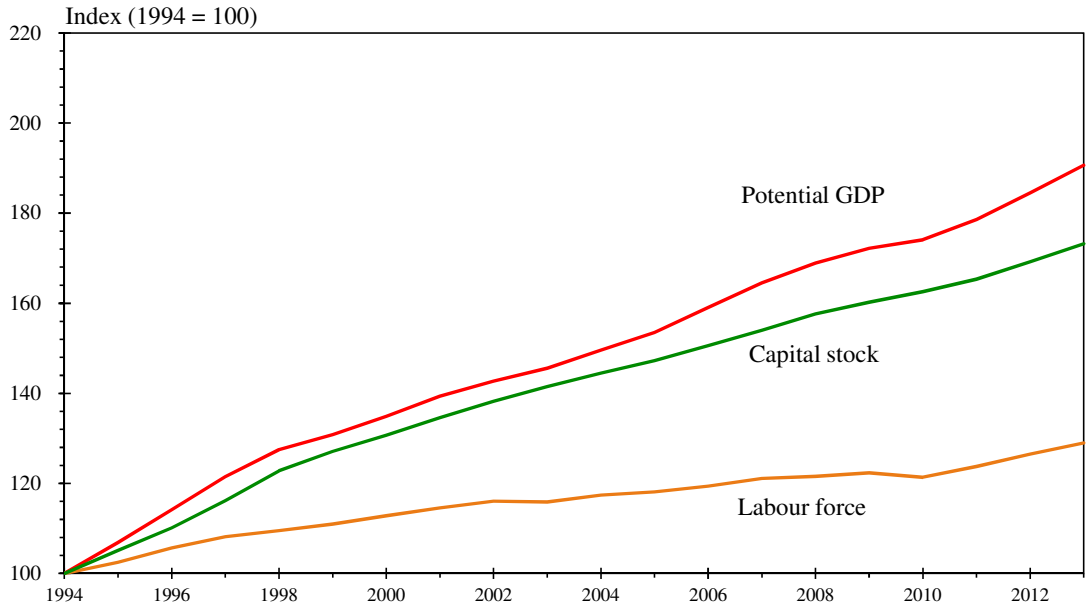
(6) The inclusion of measures of intensity of usage in the production function is based on the proposition that any unexpected variations in output in the short run are usually absorbed by changes in the intensity of usage of the factor inputs, as adjustment in the levels of capital and labour will take some time to achieve. Instead of separately quantifying the intensity of usage for each type of factor inputs, the overall intensity of usage of factor inputs is proxied by:

$$\{a_1 \log(l_t) + a_2 \log(b_t) + a_3 \log(m_t)\} = \{a_5 \log(I_t) + a_6 \log(I_t)_L\}$$

where I_t is defined as the ratio of the growth rate of Y_t to its 11-year centred moving average, and $(I_t)_L$ is a geometrically distributed lag variable beginning in period t-1.

(7) The inclusion of share of employment in services sector in the production function is to capture the additional productivity gain arising from the economic re-structuring towards services sector over the past three decades or so.

Chart 5
Potential GDP as obtained from the estimated production function



11. The potential output is obtained from the estimated parameters[8], assuming full-employment condition and also with normal intensity of usage of factor inputs, i.e. when the unemployment rate is at its natural rate and I_t=1[9] (***Chart 5***).

Part 2: Model estimation results

12. The structural equations are re-calibrated with the entire estimation period from Q1 1994 to Q4 2013. Because the natural rate of unemployment is both an input variable to the production function for estimating the potential output and a

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(8) The production function is estimated using annual data from 1986 to 2013. The estimated parameters are all correctly signed (corresponding *t*-statistics depicted in brackets) :

	$\log(L_t)$	$\log(B_t)$	$\log(M_t)$	$\log(SER_t)$	$\text{Log}(I_t)$	$\log(I_t)_L$
$\text{Log}(Y_t)$	0.5000	0.1971	0.2854	0.2525	0.8049	3.5584
		(2.95)	(3.87)	(1.41)	(8.19)	(5.23)

R^2=0.9977

* The t-statistics are in the parenthesis.
The autoregressiveness of shocks have been taken into account during the estimation.

Note that the coefficient of $\log(L_t)$ is set to be 0.5, which is the long-run average of the share of compensation of employers in the GDP as obtained in the national income accounts.

(9) Another common method of estimating potential output, viz. the Hodrick-Prescott (HP) Filter, has also been tried out. Yet the resultant estimate of output gap is less correlated with the core inflation rate, suggesting that it is not as good an indicator of the overall supply-demand balance as that obtained from the Cobb-Douglas production function. Also, the choice of sampling period when using the HP Filter has a relatively significant bearing on the ultimate output gap estimate, due to the inherent limitation of this smoothing technique.

variable to be ascertained from the simultaneous equation model, an iterative procedure is carried out until the resultant estimates of the natural rate of unemployment and the output gap so derived converge in successive runs. The parameters and the key diagnostic statistics of the model are in the table below. The charts on simulated vs actual values of the four equations indicate that the model is able to capture the turning points well (***Chart 6(a)-(d)***).

	Equation			
	(1)	**(2)**	**(3)**	**(4)**
Variables	ΔCPI	$\Delta GDPD$	Δw	u
Δw				0.2056* (+6.15)
$\phi_L(\Delta w)$	0.4818 (+6.58)			
$\Delta GDPD$				-0.2056* (+6.15)
ΔCPI		0.9513 (24.29)	0.5640 (+12.18)	
$u - u_n$			-0.5059 (-4.38)	
$\frac{Y}{Yp} - 1$	0.3145 (6.71)	0.0058 (+4.17)		-0.1999 (-8.16)
$\Delta(\frac{Y}{N})$	-0.1612 (-3.18)		0.6131 (+10.52)	-0.2056* (+6.15)
$\Delta(\frac{P_x}{P_m})$		0.2492 (+6.19)		
$\Delta(MP)$	0.1142 (3.01)			
VAC_t	-0.0072 (-3.69)			
$c - \bar{c}$				-0.2219 (-8.03)
$I_c - \overline{I_c}$				-0.0006 (-4.02)
σ				0.0225 (+1.96)
mpf				0.6946 (+4.41)
cssa				0.0062 (2.31)
Dummy for 2003				0.0103 (+3.00)
Asian Financial Crisis dummy	-0.0224 (-6.72)			
Dummy for 2013		-0.023 (-3.78)		
Adjusted R-Square	0.9190	0.8664	0.8697	0.9091
D-W Statistics	0.4316	0.9887	0.4741	0.8203
Theil	0.1729	0.2809	0.2383	0.1023

t-statistics are in the parenthesis; Chow tests indicate that there have been no structural breaks throughout the estimation period.

* For the unemployment equation, unit labour cost growth is represented by $\Delta W - \Delta P - \Delta(\frac{Y}{N})$, hence restrictions have been placed on the coefficients for these three variables in the estimation process accordingly.

Δ denotes rate of change

Chart 6 (a)
Composite CPI: Actual vs Simulated

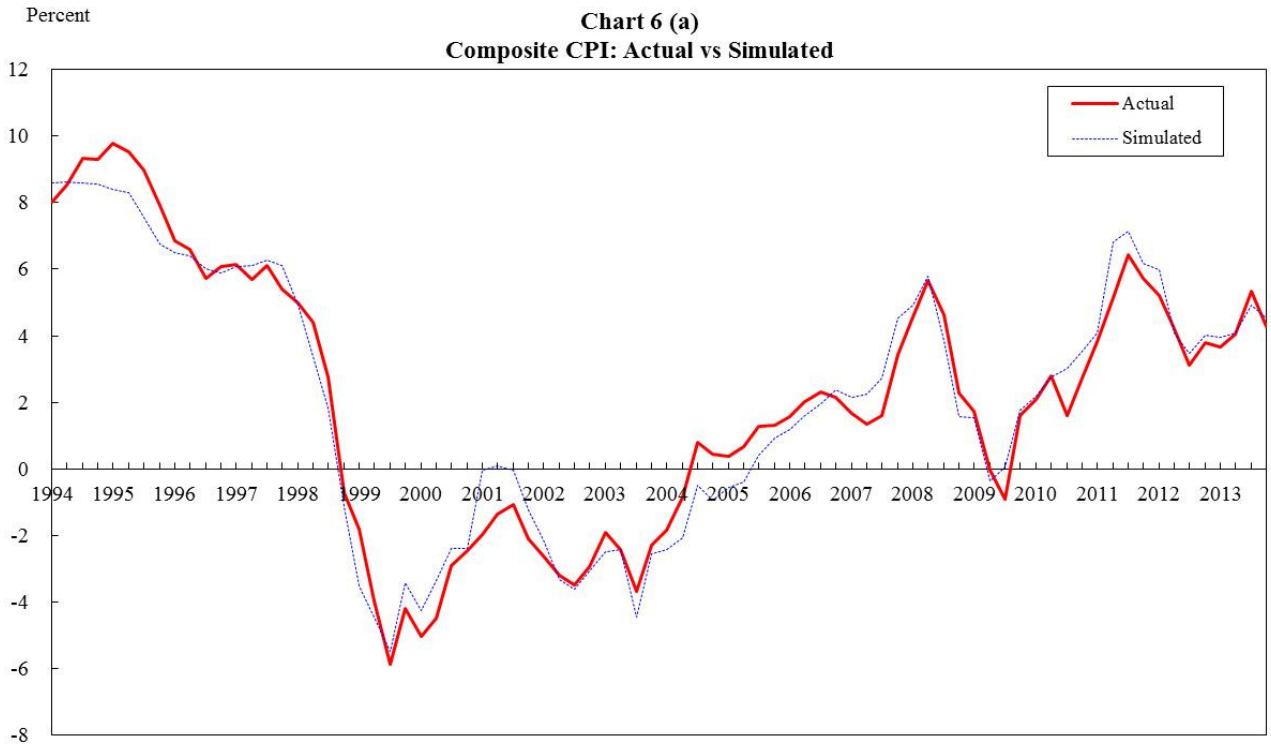


Chart 6 (b)
GDP Deflator: Actual vs Simulated

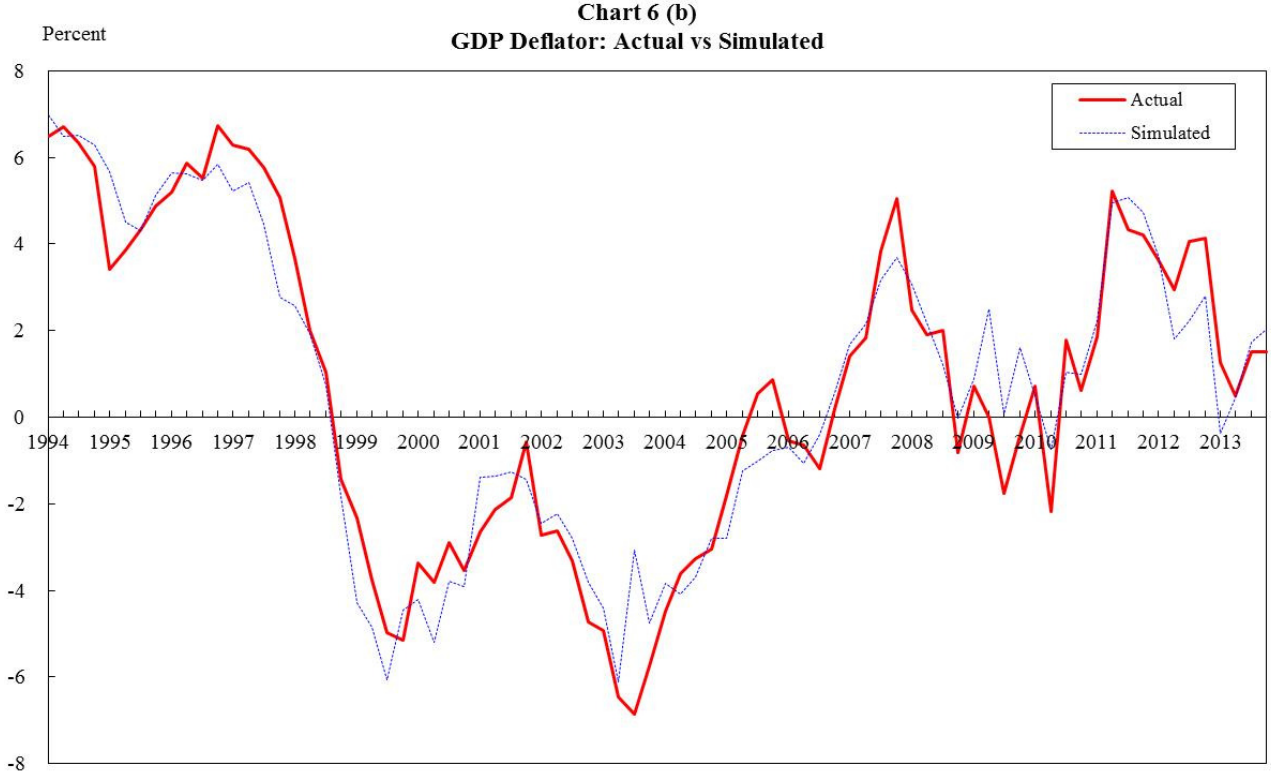


Chart 6 (c)
Wage inflation: Actual vs Simulated

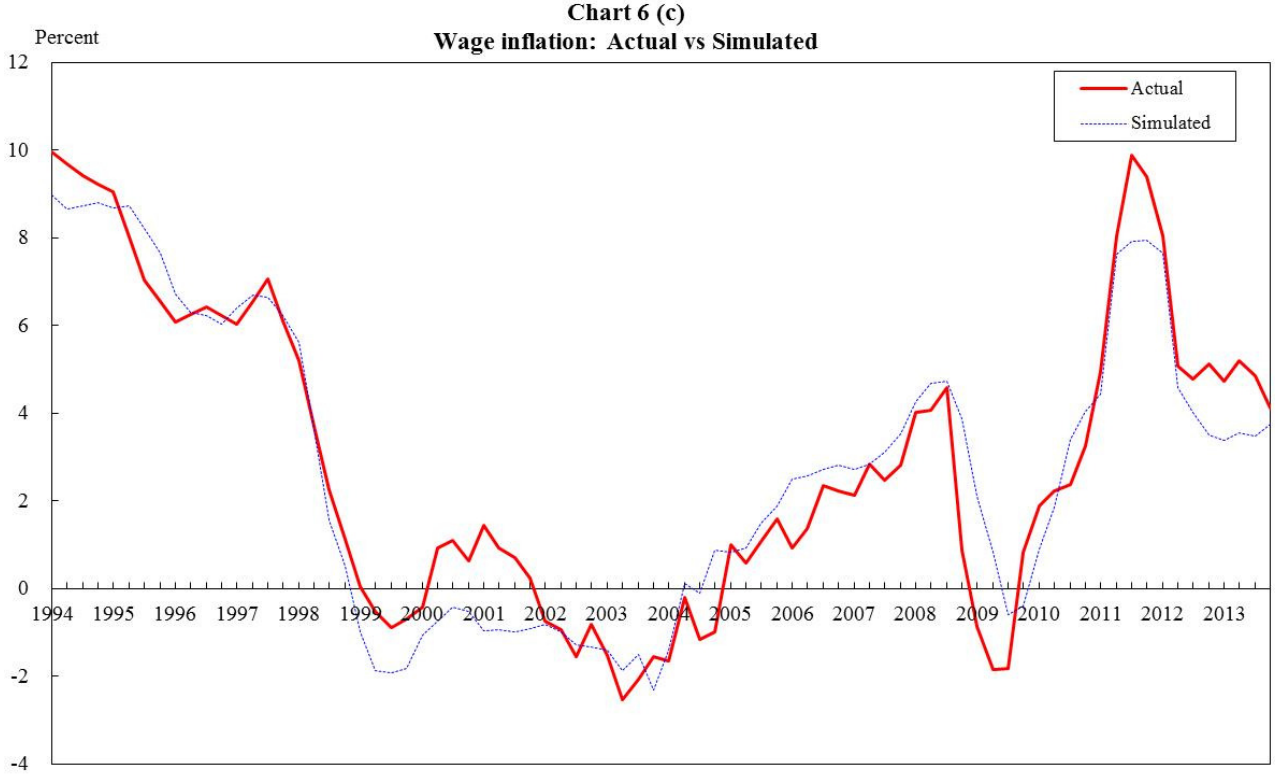
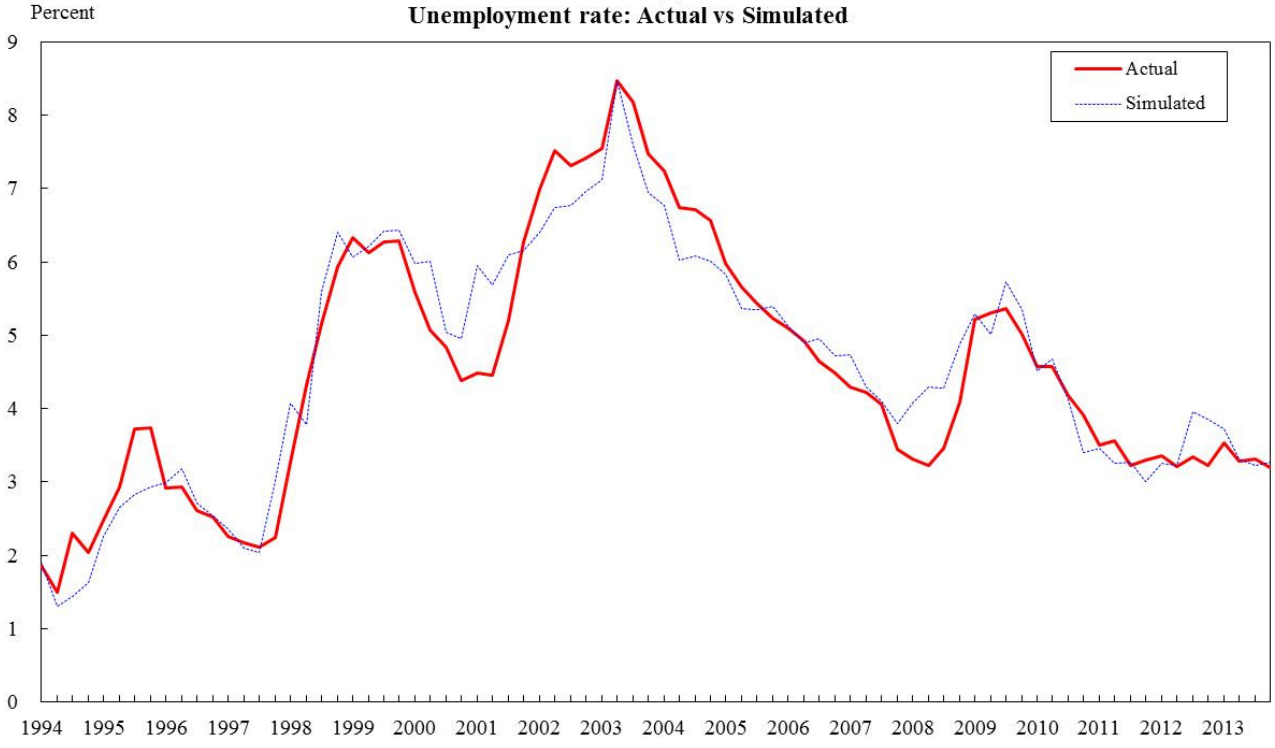


Chart 6 (d)
Unemployment rate: Actual vs Simulated



13. By definition, the non-accelerating inflation rate of unemployment, u_n, corresponds to the situation when wage growth and inflation are both steady (i.e. non-accelerating), while GDP is at its full potential level, net of all cyclical factors; the labour market is in full employment and the demand/supply situation of the property market (as proxied by the vacancy rate) is at its long-term average. Technically, this implies the following steady state conditions:

1. $\Delta GDPD_t = \Delta GDPD_{t-1}$
2. $\Delta CPI_t = \Delta CPI_{t-1}$
3. $\Delta w_t = \Delta w_{t-1}$
4. $u_t = u_{t-1} = u_n$
5. $Y_t = Y_P$
6. $N_t = N_P = L_t(1-u_n)$
7. $Vac_t = \overline{Vac}$, i.e. long-term average
8. wage = steady state wage level under full employment conditions, i.e. clear of cyclical disturbances.

Part 3. NAIRU estimates

14. Applying the above steady state conditions to solve for the reduced form, the natural rate of unemployment, u_n, can be computed as follows:

$$u_n = demo\_factor - 0.0942\Delta(\frac{Y}{N}) + 0.0225\sigma + 0.0045D\_SMW_{11} + 0.0061\Delta SMW_{13} - 0.0396$$

15. As the reduced form equation shows, a faster increase in labour productivity growth will mean a lower natural rate of unemployment. This highlights the importance of investment in education to raise the quality of the workforce to fit in with the needs of a knowledge-based economy. Enhanced labour productivity is indeed the key to sustainable economic growth, particularly in face of an ageing population.

16. Another important determinant in the NAIRU's reduced form is the dispersion of unemployment rate, usually taken as a proxy of the extent of skill mismatch. The positive sign suggests that NAIRU will rise with a higher dispersion of unemployment when the economy shifts to high value-added activities without adequate investment in education and job upgrading. That the proxy for the extent of skill mismatch narrows in recent years reflects the past effort of sizable investment in education and job upgrading of the workforce, thus providing some cushion against the upward pressure on NAIRU in recent years (***Chart 4b***). Once again, the policy implication is very clear – the importance to tackle skill mismatch through life-long learning, job training and retraining.

17. Added to the reduced form equation are the dummy for implementation of the SMW in 2011, D_SMW_{11}, and the rate of change in SWM rate, ΔSMW_{13}, in 2013. The positive signs of these factors suggest that NAIRU has been subject to upward pressures at the onset and subsequent uprating of the SMW in 2011 and 2013 respectively. This underscores the significance to maintain a balance between the SMW's objectives of preventing unreasonably low wages and minimizing the loss of low-paid jobs, especially if the labour productivity growth provide little cushion against the upward pressure on NAIRU amidst less sanguine economic conditions.

18. In short, the impact of economic structural change on the long-run unemployment rate actually comprises three forces at play (1) the rise of service industries lifts up labour productivity over time, and in turn lowers the natural rate of unemployment through productivity gains and job generation in a broad spectrum of activities (the productivity factor); (2) there could be a growing number of workers who find their skills obsolete and are struggling to be employed if no appropriate training and retraining (the skill mismatch factor); (3) the SMW implementation and uprating could raise the labour cost of the business, and thus push up the natural rate of unemployment. That the NAIRU estimates for Hong Kong remained broadly stable over the past 20 years indicates that at least empirically, the impact of economic restructuring on structural unemployment has not been as significant as many people have thought – thanks again to the hefty investment in education and continuous job upgrading of the existing workforce.

Table 1: Estimated results of the natural rate of unemployment

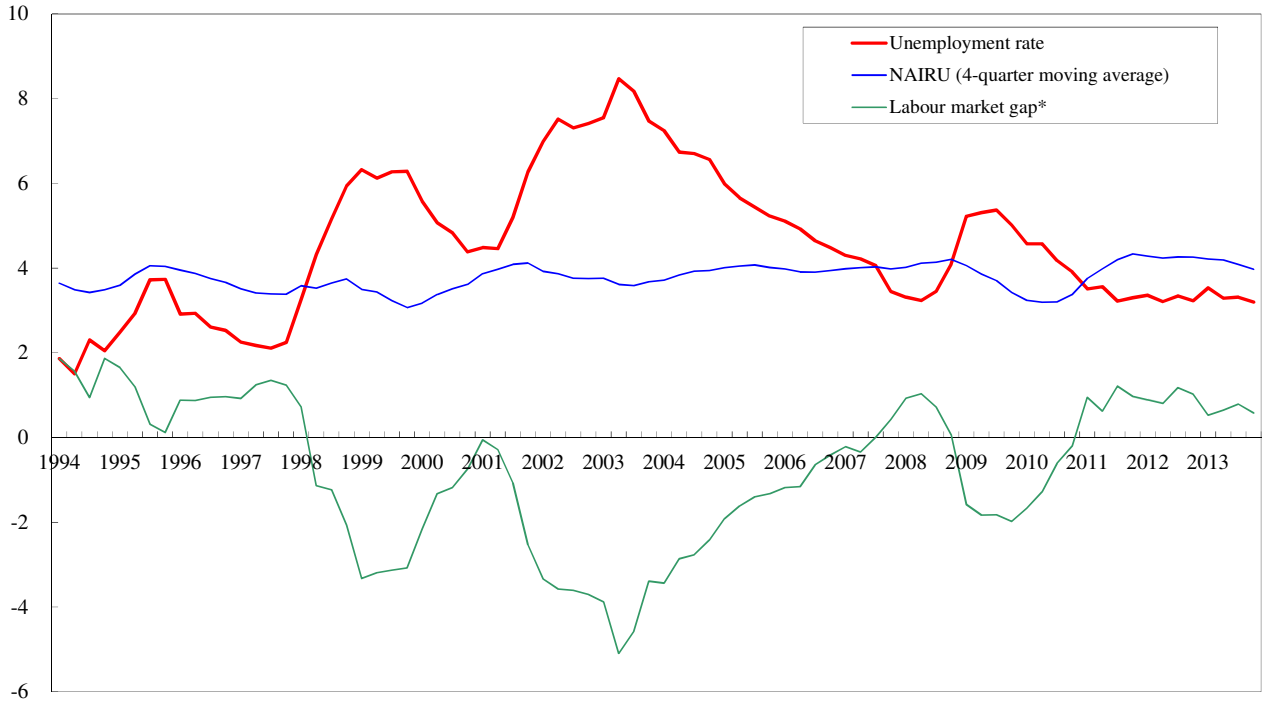
Annual average for:	**Natural rate of unemployment (%)**	**Actual unemployment rate (%)**	**Labour market gap* (%)**
1994-98 (5 years)	3.7	3.0	-0.7
1999-2003 (5 years)	3.7	6.3	2.6
2004-08 (5 years)	4.0	4.9	0.9
2009-13 (5 years)	3.9	3.9	0.0

Note: (*) Difference between actual unemployment rate and the natural rate of unemployment; positive figure indicates excess labour supply relative to labour demand, negative figure indicates excess labour demand relative to labour supply.

19. Estimates of the natural rate of unemployment over the period 1994-2013 are shown in Table 1, along with the actual unemployment rate. A number of salient observations can be made by analyzing the NAIRU estimates in the context of the macro developments of the Hong Kong economy in the 1990s and recent years:

(1) Over the entire time span of estimation, NAIRU held largely stable, with the long-term average of 3.8% (***Chart 7***).

Chart 7
NAIRU held largely steady over the past two decades



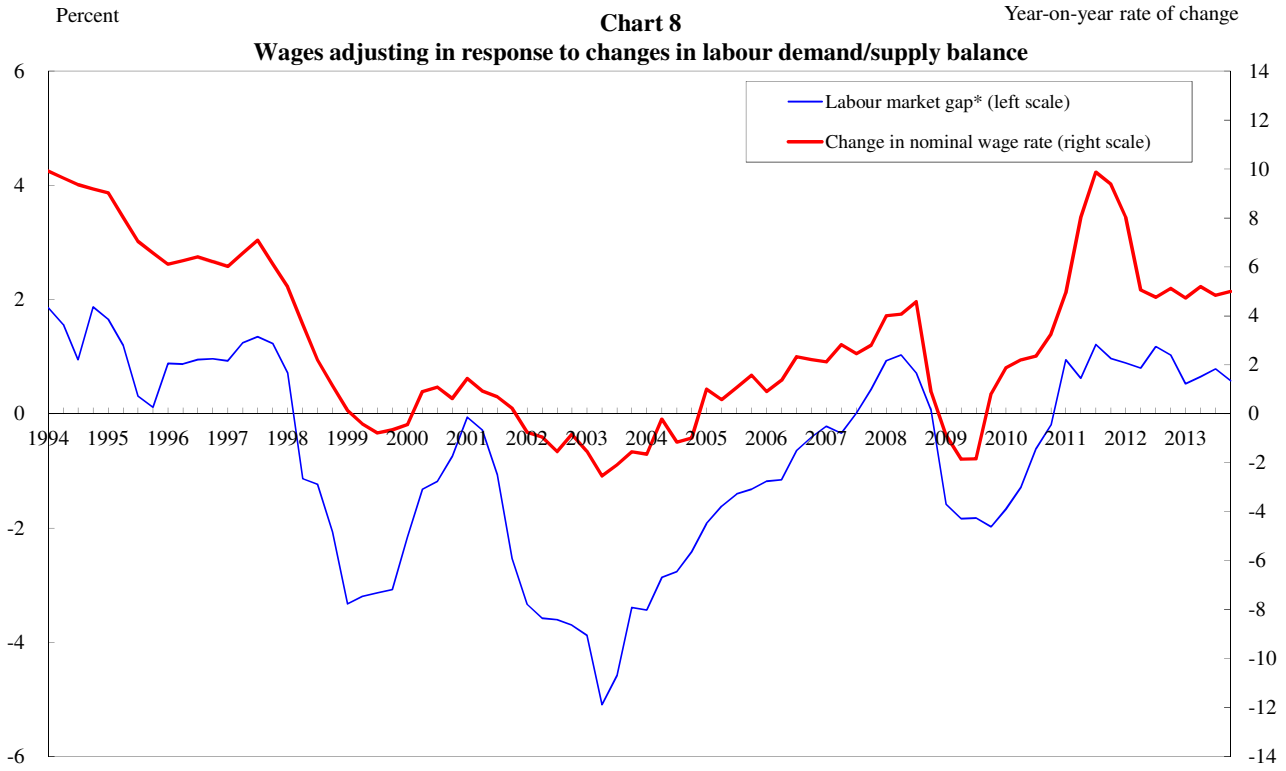
Note: (*) Difference between actual unemployment rate and NAIRU. Inverted scale.

(2) From the mid-1990s and up until 1997 when the economy was buoyant, notwithstanding a temporary relapse in 1995, the actual unemployment rate was persistently below the natural rate of unemployment by a considerable margin. The tight labour market condition thus ensued manifested itself also in a persistently positive output gap indicating supply bottlenecks and an overheated economy. This in turn generated significant upward pressures on nominal wages and hence consumer prices, which surged by an annual average of 7.6% and 7.5% respectively between 1994 and 1997 (***Chart 8*** *and* ***Chart 9***).

(3) The macro picture changed completely in 1998, when Hong Kong was thrown into a serious recession in the aftermath of the Asian financial turmoil and property market bubble burst. With the slackening in aggregate demand, output gap turned negative in 1998, signifying a severe slump which led to the onset of a 68-month long deflation era. In tandem with this, manpower resource balance swung from labour market tightness (i.e. negative unemployment gap) in the pre-1998 period to persistently inadequate demand

and labour supply glut (i.e. positive unemployment gap) after 1998. The unemployment rate shot up from just above 2% in late 1997 to 6.5% in Q3 1999, causing nominal wage to fall as part of the adjustment process to restore external competitiveness and a better balance in the labour market. Despite a brief improvement in 2000, unemployment rate soared again to a historical high of 8.5% in Q2 2003, resulting in a renewed widening in unemployment gap and declining in nominal wages.

Chart 8
Wages adjusting in response to changes in labour demand/supply balance



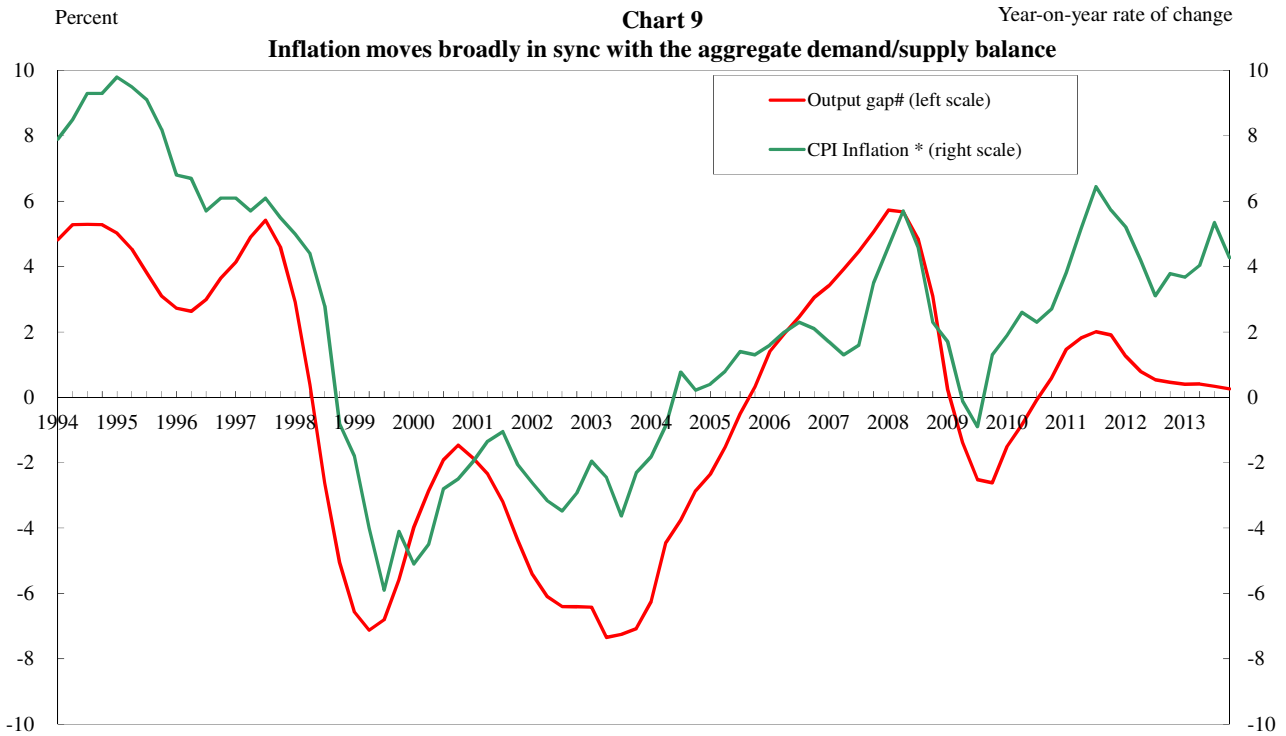
Note: (*) Difference between actual unemployment rate and NAIRU. The scale has been inverted to facilitate matching with the nominal wage.

(4) As the economy entered into a V-shaped rebound in 2004 after the waning of the negative impacts due to the SARS outbreak in 2003, the aggregate demand/supply balance improved in tandem, and switched back to the positive region in early 2005. Nominal wages resumed increase since 2005 Q1 alongside with gradual pick-up in CPI inflation. From 2004 onwards when the economy sustained a robust growth momentum, unemployment rate dwindled successively from the all-time high in 2003 to slightly over 3% in more recent years, only interrupted by a brief relapse in 2009 amid the Global Financial Crisis. In light of the tightened manpower resource balance, coupled with the SMW implementation and uprating in 2011 and 2013 respectively, nominal wage and consumer price inflation picked up notably between 2010 and 2013.

(5) Indeed, the macro trends in nominal wages and CPI inflation over the entire period 1994-2013 are highly consistent with the movements of the estimated output gap and labour market gap (***Chart 8*** *and* ***Chart 9***), as in the preceding exercises. This can also be confirmed from the strong correlation between nominal wages and labour market gap (0.89); and between the consumer price inflation and the estimated output gap (0.85).

Chart 9

Inflation moves broadly in sync with the aggregate demand/supply balance



Notes: (#) 4-quarter moving average.
(*) In terms of underlying Composite CPI

(6) The model-run results also suggest that wage flexibility in Hong Kong's labour market has been hampered somewhat during the deflation period in 1998-2003. Conceivably, nominal wages are easier to adjust upward when inflation is high, but may be more rigid in downward adjustments when prices are falling. Because of this, unit labour cost (payroll cost per $ of output) might have stayed higher than the desired level throughout the deflation era (***Chart 4a***), and the labour market had to adjust both by way of nominal wage decline, and also through retrenchment and lay-offs amidst the deflationary spiral. This may explain partly why the unemployment rate had stayed high in most of the deflation period despite the rebound in real activity.

(7) The high unit labour cost during 1998-2003 in fact signified the need to scale back on labour inputs when business outlook deteriorated with the cyclical downturn at that time. But as the economy subsequently recovered and business returned, unit labour cost has fallen back successively, indicating that much of the slack in labour market has been worked off by around 2007.

(8) With unemployment rate at 3.4% in 2013, versus a natural rate of unemployment of around 4%, manpower shortage is evident at the macro level, more so in individual sectors. The issue of skill mismatch remains a concern. Beyond the short term cyclicality, there is the challenge from population ageing, with labour force set to dwindle after 2018. This makes it all the more important for the Government to continue to invest in higher education and in job training and retraining, so as to raise productivity for a sustainable economic development over the longer run.

July 2014

Annex I

Population by age group and gender

	% share in total population						
Age group	2000	2001	2002	2003	2004	2005	2006
0-14	16.9	16.4	15.9	15.4	14.8	14.2	13.7
15-24	13.9	13.6	13.2	13.1	13.3	13.3	13.3
25-29	8.0	7.8	7.6	7.3	7.2	7.1	7.3
30-39	19.1	18.8	18.5	18.0	17.4	16.8	16.4
40-49	17.6	18.1	18.7	19.2	19.5	19.6	19.4
50-59	9.6	10.3	11.0	11.7	12.3	13.2	13.9
60 and above	14.8	15.0	15.1	15.3	15.5	15.7	16.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Of which : 50 and above	*24.5*	*25.2*	*26.1*	*26.9*	*27.8*	*28.9*	*29.9*
Gender group							
Male	49.2	48.9	48.6	48.4	48.2	47.9	47.7
Female	50.8	51.1	51.4	51.6	51.8	52.1	52.3

Population by age group and gender

	% share in total population						
Age group	2007	2008	2009	2010	2011	2012	2013
0-14	13.3	12.9	12.4	12.0	11.6	11.4	11.1
15-24	13.1	12.9	12.7	12.5	12.4	12.3	12.0
25-29	7.4	7.6	7.6	7.6	7.6	7.4	7.2
30-39	16.3	16.0	15.9	15.8	15.7	15.8	15.8
40-49	18.9	18.5	18.2	17.7	17.3	17.0	16.5
50-59	14.4	15.0	15.5	15.9	16.3	16.5	17.0
60 and above	16.6	17.0	17.7	18.4	19.1	19.7	20.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Of which : 50 and above	*31.0*	*32.0*	*33.2*	*34.3*	*35.4*	*36.2*	*37.4*
Gender group							
Male	47.5	47.3	47.1	46.9	46.7	46.5	46.3
Female	52.5	52.7	52.9	53.1	53.3	53.5	53.7

Annex II

Actual and demographically adjusted unemployment rates

		(A) Actual	(B) Gender adjusted	(C) Age adjusted	(D) Education adjusted	(E) Gender-age-education adjusted	(F) Demo-factor (F) = (A) – (E)
1997	Q1	2.2	2.2	2.2	2.2	2.2	0.0
	Q2	2.1	2.1	2.1	2.1	2.1	0.0
	Q3	2.2	2.2	2.2	2.2	2.2	0.0
	Q4	2.3	2.3	2.3	2.3	2.3	0.0
1998	Q1	3.3	3.3	3.2	3.3	3.3	0.0
	Q2	4.3	4.3	4.3	4.3	4.3	0.0
	Q3	5.3	5.3	5.4	5.4	5.4	0.0
	Q4	5.9	5.9	5.8	5.9	5.9	-0.1
1999	Q1	6.2	6.2	6.2	6.2	6.3	-0.2
	Q2	6.1	6.1	6.2	6.1	6.3	-0.2
	Q3	6.5	6.5	6.5	6.5	6.6	-0.1
	Q4	6.2	6.3	6.2	6.3	6.4	-0.2
2000	Q1	5.5	5.5	5.5	5.6	5.8	-0.3
	Q2	5.0	5.0	5.1	5.1	5.2	-0.2
	Q3	4.9	5.0	5.0	5.0	5.2	-0.3
	Q4	4.4	4.4	4.4	4.5	4.7	-0.3
2001	Q1	4.4	4.5	4.5	4.5	4.8	-0.4
	Q2	4.5	4.5	4.6	4.6	4.9	-0.4
	Q3	5.4	5.5	5.5	5.5	5.8	-0.4
	Q4	6.1	6.2	6.2	6.2	6.6	-0.6
2002	Q1	6.9	7.0	7.0	7.1	7.6	-0.7
	Q2	7.6	7.7	7.7	7.8	8.2	-0.7
	Q3	7.6	7.7	7.7	7.9	8.3	-0.7
	Q4	7.2	7.3	7.3	7.6	8.1	-0.9
2003	Q1	7.4	7.5	7.4	7.8	8.3	-0.9
	Q2	8.5	8.7	8.7	8.9	9.7	-1.2
	Q3	8.5	8.7	8.7	8.9	9.6	-1.1
	Q4	7.2	7.3	7.2	7.6	8.0	-0.8
2004	Q1	7.1	7.2	7.1	7.6	8.1	-1.0
	Q2	6.8	6.9	6.8	7.2	7.6	-0.8
	Q3	7.0	7.1	7.0	7.4	7.8	-0.8
	Q4	6.3	6.4	6.2	6.8	7.0	-0.7
2005	Q1	5.9	6.0	5.8	6.3	6.8	-0.9
	Q2	5.7	5.8	5.8	6.2	6.7	-1.0
	Q3	5.7	5.8	5.7	6.0	6.5	-0.8
	Q4	5.0	5.1	5.0	5.4	6.1	-1.0

Notes : The adjusted unemployed rate for a given quarter is compiled by standardising the composition of labour force by the demographic factor(s) concerned in that quarter to the corresponding composition in 1997.

All unemployment rates have not been adjusted for seasonality.

Actual and demographically adjusted unemployment rates

		(A) Actual	(B) Gender adjusted	(C) Age adjusted	(D) Education adjusted	(E) Gender-age-education adjusted	(F) Demo-factor (F) = (A) – (E)
2006	Q1	5.0	5.1	5.0	5.4	6.0	-1.0
	Q2	5.0	5.1	5.2	5.3	6.0	-1.0
	Q3	4.9	5.0	5.1	5.2	5.6	-0.7
	Q4	4.2	4.4	4.3	4.6	5.2	-0.9
2007	Q1	4.2	4.3	4.2	4.6	5.0	-0.8
	Q2	4.3	4.4	4.5	4.7	5.4	-1.1
	Q3	4.3	4.4	4.5	4.5	5.1	-0.8
	Q4	3.3	3.3	3.4	3.5	3.9	-0.7
2008	Q1	3.2	3.3	3.3	3.5	3.9	-0.6
	Q2	3.3	3.4	3.5	3.6	3.9	-0.6
	Q3	3.7	3.7	3.8	3.9	4.3	-0.7
	Q4	3.9	3.9	4.1	4.0	4.7	-0.9
2009	Q1	5.1	5.2	5.3	5.5	6.3	-1.2
	Q2	5.5	5.6	5.8	5.8	6.9	-1.4
	Q3	5.7	5.8	6.0	5.8	6.7	-1.0
	Q4	4.7	4.8	5.1	4.9	5.9	-1.1
2010	Q1	4.4	4.6	4.8	4.7	5.7	-1.2
	Q2	4.8	4.9	5.2	5.0	5.8	-1.1
	Q3	4.4	4.5	4.9	4.5	5.4	-1.0
	Q4	3.7	3.8	4.2	3.8	4.7	-1.0
2011	Q1	3.4	3.5	3.8	3.6	4.6	-1.2
	Q2	3.7	3.8	4.1	3.9	4.9	-1.2
	Q3	3.4	3.4	3.8	3.5	4.4	-1.0
	Q4	3.1	3.2	3.3	3.3	4.2	-1.1
2012	Q1	3.3	3.4	3.5	3.5	4.3	-1.0
	Q2	3.3	3.4	3.8	3.5	4.7	-1.4
	Q3	3.5	3.5	4.0	3.5	4.2	-0.7
	Q4	3.1	3.2	3.3	3.2	4.1	-1.0
2013	Q1	3.4	3.5	3.7	3.7	4.5	-1.1
	Q2	3.4	3.5	3.8	3.6	4.6	-1.2
	Q3	3.5	3.5	3.9	3.5	4.4	-0.9
	Q4	3.1	3.1	3.4	3.2	4.3	-1.2

Notes : The adjusted unemployed rate for a given quarter is compiled by standardising the composition of labour force by the demographic factor(s) concerned in that quarter to the corresponding composition in 1997.

All unemployment rates have not been adjusted for seasonality.

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