Sectoral Shifts and Unemployment Rate in Hong Kong

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Executive Summary

- Hong Kong underwent a large scale of economic restructuring in the 1980s and the 1990s, evolving from a manufacturing-based to a service-oriented economy. The share of employment in the manufacturing sector fell while that in the services sector increased greatly. This study aims to investigate the impact of structural/sectoral shifts on Hong Kong's unemployment rate between 1982Q4 and 2011Q1.

- Lilien Index is computed to measure the extent of sectoral shifts.

$$\sigma_t = \sqrt{\sum_i \frac{x_{it}}{X_t}\left(\Delta \ln x_{it} - \Delta \ln X_{it}\right)^2}$$

where x_{it} is sector *i*'s employment at time *t*, $\Delta \ln x_{it}$ is the employment growth rate in sector *i*, X_{it} is the total employment in all sectors and $\Delta \ln X_{it}$ is the growth rate of the total employment. Lilien index can be regarded as the weighted standard deviation of the growth rates of employment in the different sectors.

- During the period 1982Q4-1997Q4, sectoral shifts had a small but significant effect on the unemployment rate of Hong Kong. But from then onwards up to 2011Q1, the unemployment rate was not significantly affected by sectoral shifts.

1. Introduction

Fluctuations of product demand within individual markets usually occur, resulting in changes in labour demand and wage differentials between markets. On the one hand, some industries expand its production in response to an increase in demand for their outputs and thus firms in these industries would hire more workers. On the other hand, labour demand in the shrinking industries would fall which in turn would result in jobs cut. Moreover, the earnings of workers are usually higher in those expanding industries. Thus, the wage differentials also induce workers to move from low-wage to high-wage factor markets. Such shift is called structural or sectoral shifts. Structural shifts could have no influence on unemployment as long as workers find jobs in other sectors immediately. However, it may not be the case. Sectoral shifts usually lead to more unemployment as it takes time and effort for laid-off workers to secure employment either in the original sector or in other sectors.

Hong Kong underwent major economic restructuring in the 1980s and the 1990s, evolving from a manufacturing-based to a service-oriented economy. In recent years, Hong Kong is approaching a knowledge-based economy in which information technology, the usage of computer and knowledge becomes more important in any economic activities. This study attempts to analyse the impact of sectoral shifts on unemployment rate since the early 1980s up to the first quarter of 2011.

2. Sectoral Shifts in Hong Kong

To understand the trend of sectoral shifts in Hong Kong's labour market, we can see the Appendix Figures 1 to 8.[1] It is obvious that there was a continuous decline in (1)

[1] In this study, the quarterly unemployment rate figures come from the General Household Survey (GHS) while the employment figures used in this study refer to the number of persons engaged in private sector (excluding civil service) from the Quarterly Survey of Employment and Vacancies (SEV). Despite both surveys have employment figures by sector based on the HSIC v1.1 up to 2008, the SEV has employment figures by sector based on HSIC v2.0 from 2000 onwards while GHS has data only from 2008 onwards. In order to have longer series of employment by sector based on HSIC v2.0, employment figures from SEV are used.
In the HSIC v1.1, there are 8 broad sectors including (1) Mining and quarrying; (2) Manufacturing; (3) Electricity and gas; (4) Construction; (5) Wholesale, retail and import/export trades, restaurants and hotels; (6) Transport, storage and communication; (7) Financing, insurance, real estate and business services; and (8) Community, social and personal services.
In the HSIC v2.0, there are 13 broad sectors including (1) Mining and quarrying; (2) Manufacturing; (3) Electricity, gas and waste management; (4) Construction (manual workers at construction sites only in SEV); (5) Import/export trade and wholesale; (6) Retail; (7) Transportation, storage, postal and courier services; (8) Accommodation and food services; (9) Information and communications; (10) Financing and insurance; (11) Real estate; (12) Professional and business services; and (13) Social and personal services.
For simplicity, Appendix Figures 1 to 8 display the employment by 8 sectors classified by the HSIC

mining and quarrying sector (see Appendix Figure 1), a massive decline in (2) manufacturing sector (see Appendix Figure 2) mainly in the 1990s, a moderate fall in (3) electricity and gas sector in the late 1990s (see Appendix Figure 3) and (4) construction sector (see Appendix Figure 4). On the other hand, there was a huge increase in (5) sales and trade related sector and (6) transport related sector (see Appendix Figures 5 and 6) in the 1980s and the 1990s, (7) financing related and (8) community & personal services sectors (see Appendix Figures 7 and 8) during 1981-2008.

On the one hand, between 1981 and 2008, the number of persons engaged in the manufacturing sector fell from 910 613 to 151 618.[2] The number of jobs lost from the manufacturing sector alone was 30.6% of total employment in private sector of Hong Kong in 2008. On the other hand, the employment share in the financing, insurance, real estate and business services rose almost three times during the same period. These great changes in employment opportunities between sectors imply that a lot of workers switch jobs across sectors. Such large scale structural changes between sectors especially in the 1980s and the 1990s might push up the transitional unemployment during the process.

To quantify the extent of structural shift, we construct an index called Lilien index as follows:

$$\sigma_t = \sqrt{\sum_i \frac{x_{it}}{X_t}\left(\Delta \ln x_{it} - \Delta \ln X_{it}\right)^2}\ , \qquad (1)$$

where x_{it} is sector *i*'s employment at time *t*[3], $\Delta \ln x_{it}$ is the employment growth rate in sector *i*, X_{it} is the total employment and $\Delta \ln X_{it}$ is the growth rate of the total employment.

Lilien index can be interpreted as the weighted standard deviation of the growth rates of employment in different sectors.[4] The larger is the variation of the employment in different sectors, the higher is the σ_t. We use the quarterly data to compute the Lilien

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v1.1 from 1981Q1 up to 2008Q4.

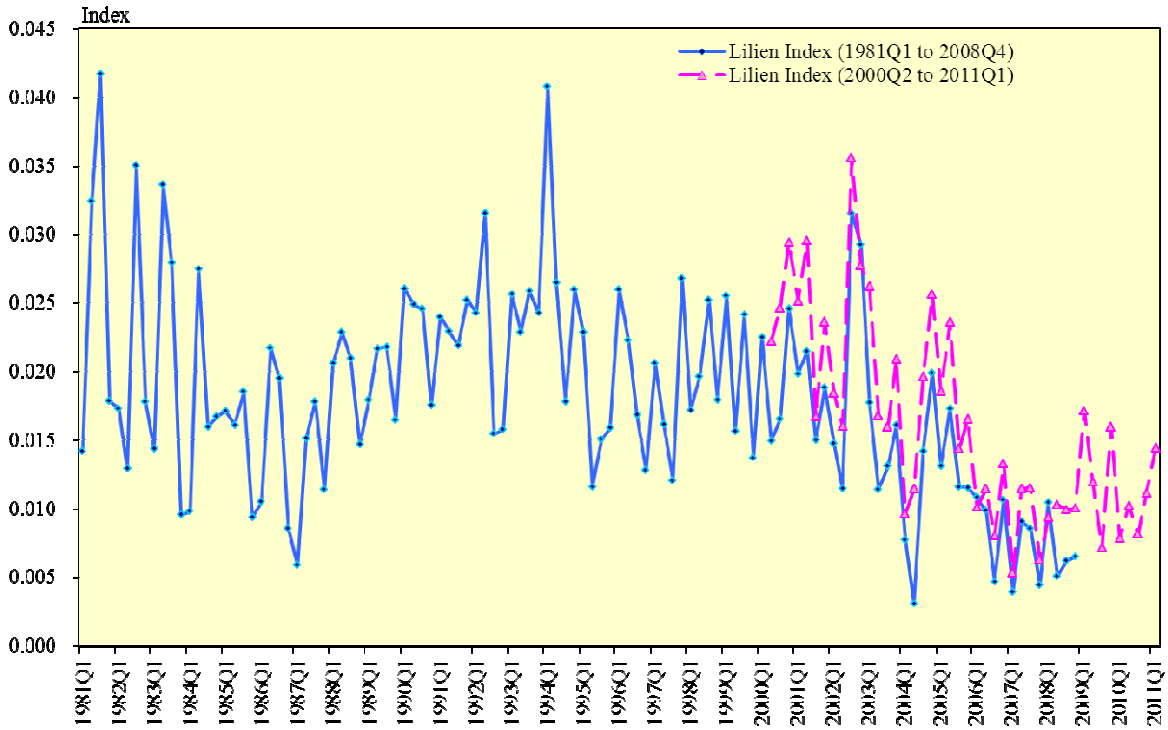
[2] These annual figures are average of quarterly figures.

[3] In this study, we calculate two series of Lilien index: one is from 1980Q3 to 2008Q4 according to data based on HSIC v1.1; another is from 2000Q2 to 2011Q1 according to the data based on HSIC v2.0.

[4] Lilien (1982) constructs the index and finds that structural shifts can account for more than half of the variation of the US's unemployment in the 1970s.

index for each quarter, shown in Figure 1. Visual inspection indicates that the structural shifts were more significant in the 1980s and the 1990s as the index was more volatile and the extent was greater during this period.

Figure 1. Lilien Index Measuring Sectoral Shifts (1981Q1 to 2011Q1)



3. Econometric Model

This study mainly follows the approach used in Kwan, Lian and Lui (1995) to estimate the impact of sectoral shifts on Hong Kong's unemployment. We first look at the following regression equation:

$$\Delta U_t = \alpha_0 + \sum_{k=0}^{L} \beta_k \ln \sigma_{t-k} + \sum_j \gamma_j DMR_{t-j} + \sum_m \rho_m DLF_{t-m} + \sum_n \tau_n DHSI_{t-n} + v_t . \quad (2)$$

- U_t refers to the seasonally adjusted quarterly unemployment rate at time t, ΔU_t is the first difference between U_t and U_{t-1}[5] ;

[5] An augmented Dickey-Fuller (ADF) test is conducted for each variable. U_t is nonstationary I(1), and hence ΔU_t is used as the dependent variable.

- $\ln \sigma_{t-k}$ denotes the logarithm of the current and lagged values of Lilien index[6];
- *DMR* denotes the unanticipated monetary shock series which is regarded as the residuals from a money supply equation in this study, the latter being fitted as an AR model in *M3* growth rate (DM_t)[7];
- *DLF* refers to the growth rate of labour force. Higher unemployment rate may be due to an increase in labour supply as the existing job opportunities are not sufficient to cover an extra increase in labour force[8]; and
- *DHSI* refers to the growth rate of Hang Seng Index which serves as a proxy for the aggregate demand shocks. Hong Kong's unemployment condition is likely to be affected by aggregate demand shocks, e.g., Asian Financial Crisis, SARS outbreak.

The details of the data used in this study are illustrated in the appendix.

The impact of the structural shifts can linger for certain periods. When several lagged terms of $\ln \sigma_{t-k}$ are added, previous findings indicate that the coefficients of the lagged terms would show erratic behavior. Following Kwan, Lian and Lui (1995), this study uses the polynomial distributed lag (PDL) approach in the unemployment regression equation. This approach imposes smoothness constraints on the lagged coefficients and thus can rule out the erratic behavior of the lagged coefficients a priori. With quarterly data we find that 9 lagged terms and a quadratic polynomial give the most satisfactory result:

$$\beta_k = \alpha_1 + \alpha_2 k + \alpha_3 k^2, \quad k = 1,2,3,\ldots,9. \tag{3}$$

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[6] According to prior literature, the impact of sectoral shifts is likely to have a lingering effect. Later, we will illustrate a polynomial distributed lag (PDL) model to obtain more smoothed coefficients of the current and lagged terms of $\ln \sigma$.

[7] Only an unanticipated change in money supply would affect output and unemployment as people confuse inflation with changes in demand in the short run. The sign is expected to be negative. In this study, *M3*(HK$) is used and the quarterly *M3* is constructed by taking the average of 3-month *M3*.

$$DM_t = \delta_0 + \sum_s DM_{t-s} + \varepsilon_t .$$

The residual term (ε_t) is a forecast error, representing the required unanticipated shocks. The appropriate length of lag is determined by AIC and SIC.

[8] The amount of newly arrived immigrants with one-way permits will also be used as the measure. The data are available from 1998Q4 onwards.

Substitute (3) into (2), the equation can be written as:

$$\Delta U_t = \alpha_0 + \alpha_1 S_{1t} + \alpha_2 S_{2t} + \alpha_3 S_{3t} + \sum_j \gamma_j DMR_{t-j} + \sum_m \rho_m DLF_{t-m} + \sum_n \tau_n DHSI_{t-n} + v_t, \quad (4)$$

where $S_{1t} = \sum_{k=0}^{L} \ln \sigma_{t-k}, S_{2t} = \sum_{k=0}^{L} k \ln \sigma_{t-k}, S_{3t} = \sum_{k=0}^{L} k^2 \ln \sigma_{t-k}$.

This study mainly uses the regression results from Equation (4) for analysis.

Figure 2 displays Lilien index along with the unemployment rate from 1981Q1 to 2011Q1. To give a clear picture for the relationship between the unemployment rate and the sectoral shifts, we separate the time period into 2 phases: from 1981Q1 to 1997Q4 (see Figure 3) and from 1998Q1 to 2011Q1 (see Figure 4).

Figure 2. Unemployment Rate and Lilien Index from 1982Q1 to 2011Q1

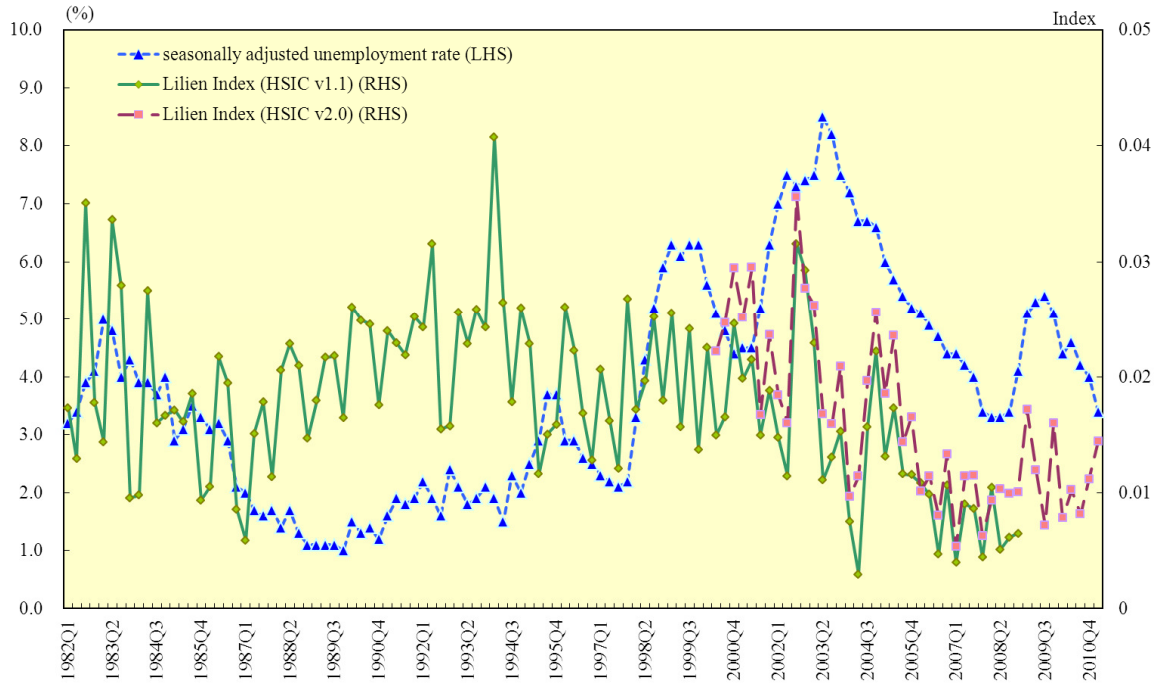


Figure 3. Unemployment Rate and Lilien Index from 1982Q1 to 1997Q4

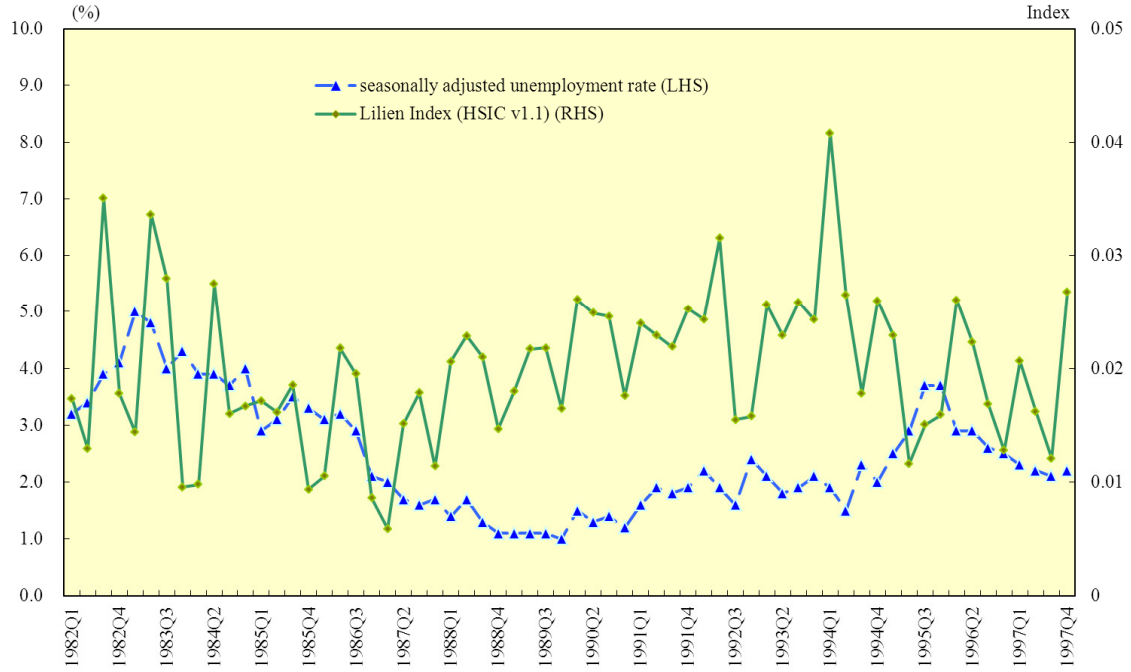
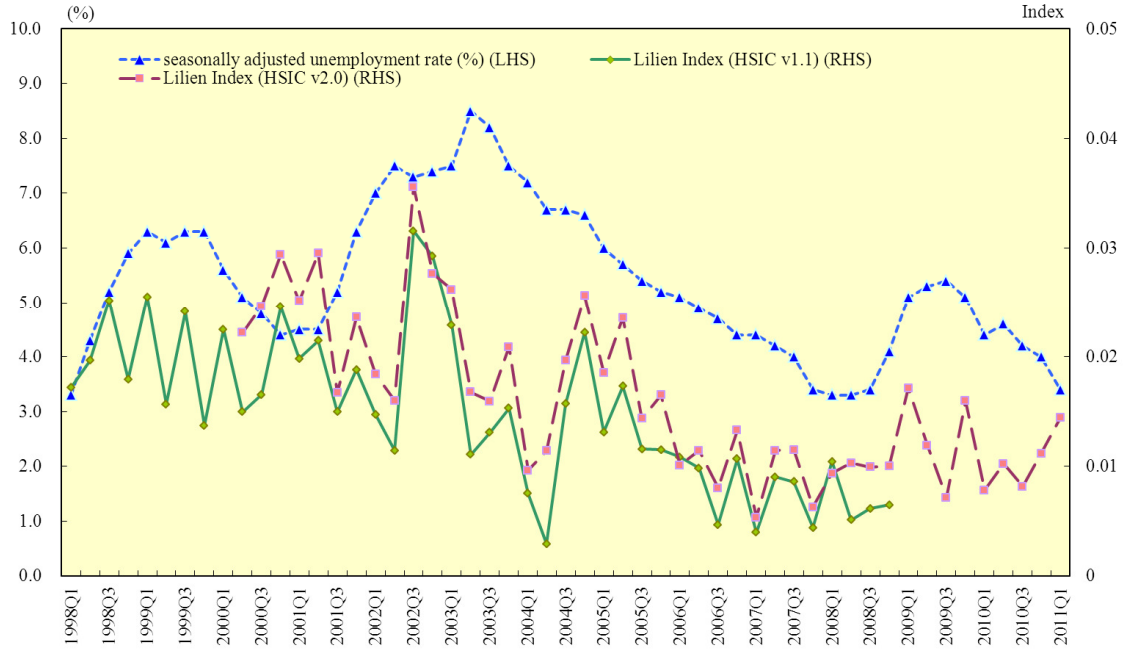


Figure 4. Unemployment Rate and Lilien Index from 1998Q1 to 2011Q1



According to the above figures, the quarter to quarter movement of the two series seems to be trending together in the 1980s and mid-1990s only. In the late 1990s, the unemployment rate rose sharply due to the Asian Financial Crisis while the Lilien

index stagnated during the same period. Moreover, the sharp down-and-up movement of the unemployment rate in the 2000s did not come together with the variation of the sectoral shifts. This may indicate that some aggregate demand shocks influence local unemployment. Preliminary checking on Chow test also suggests that the coefficients are not stable across two time regimes. Thus, we run regressions separately for the two time series: 1982Q4 to 1997Q4 and 1998Q1 to 2008Q4 (2002Q3 to 2011Q1)[9].

4. Results

Table 1 shows the estimation results for the unemployment equation during 1982Q4-1998Q4. Model (1) is the basic model with the PDL terms (S_1, S_2 and S_3) of log Lilien index as the explanatory variables only. Other models (2 to 4) contain additional measures as control variables including unanticipated monetary socks (*DMR*, *DMR(-1)*), total labour force growth (*DLF*, *DLF(-1)*) and the growth rate of Hang Seng Index (*DHS, DHSI(-1), DHSI(-2)*). But all the coefficients of these variables are statistically insignificant. In this case, we mainly focus on Model (1) (referred to as "the basic model" thereafter) for further discussion.

For the basic model, the R^2 is 0.135. This means that the structural shifts alone account for 13.5% of the variation of unemployment rate relative to the previous period. To understand the effect of structural shifts on unemployment, the coefficients (β_k) associated with the current and lagged terms of $\ln\sigma_{t-k}$ are recovered from the PDL coefficients and are shown in the bottom of Table 1.[10] Similar to prior literature, the PDL model provides better estimates in terms of smoothness and precision. The coefficients are significantly positive at lags 3, 4, 5 and 6. This means that the sectoral shift has a significant positive lingering effect on the unemployment rate. Based on the basic result, for example, the estimate at lag 3 is 0.139. This means that a 10% increase in the index of sectoral shifts at present, the unemployment rate three quarters later will increase by 0.0139 percentage point only as compared with the present level.

[9] During 1982Q4-1997Q4 and 1998Q1-2008Q4, Lilien index is based on the employment data of sectors classified by HSIC v1.1. During 2002Q3-2011Q1, Lilien index is based on the data of sectors classified by HSIC v2.0.

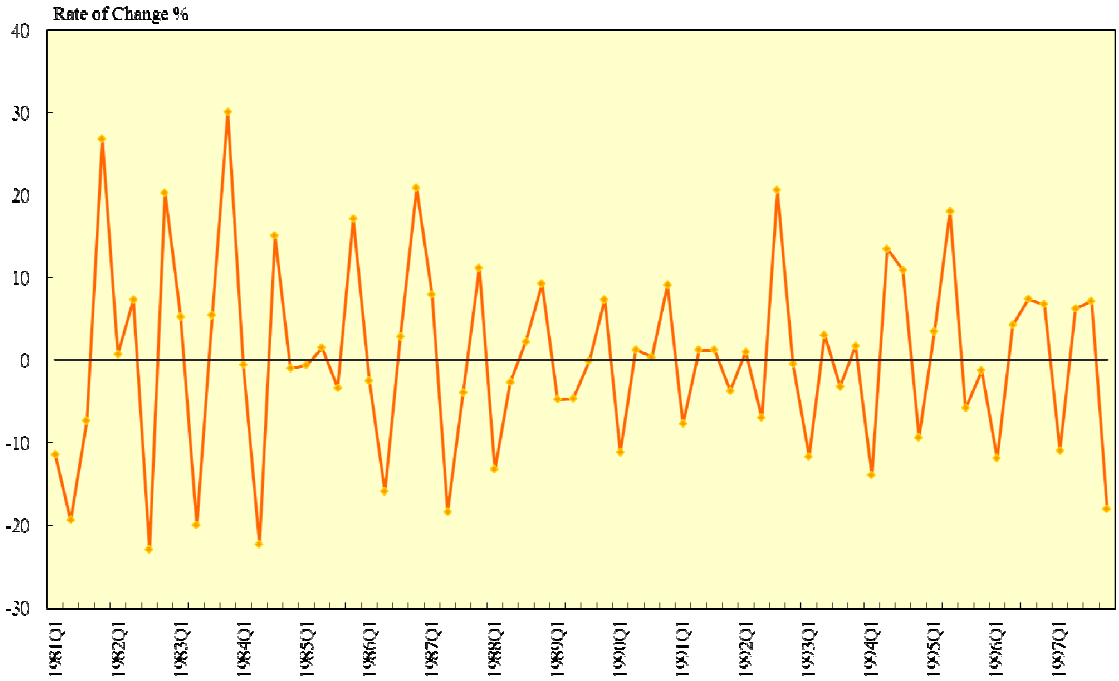
[10] Appendix Table 1 displays the estimates of current and lagged coefficients of $\ln\sigma$ without the PDL constraints. The coefficients of the lagged terms display erratic pattern. Thus, the analysis mainly bases on the results using PDL approach.

Table 1. Regression Results: 1982Q4 to 1997Q4 (HSIC v1.1)

Time Period	1982Q4 to 1997Q4							
	(1)		(2)		(3)		(4)	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
S1	-0.100	0.343	-0.074	0.512	-0.104	0.330	-0.090	0.393
S2	0.123	0.029	0.111	0.061	0.132	0.023	0.093	0.105
S3	-0.014	0.015	-0.013	0.028	-0.016	0.011	-0.010	0.098
DMR			0.010	0.514				
DMR(-1)			0.007	0.656				
DLF					0.031	0.478		
DLF(-1)					0.029	0.508		
DHSI							-0.003	0.358
DHSI(-1)							-0.006	0.103
DHSI(-2)							-0.006	0.101
Constant	1.615	0.121	1.637	0.122	1.457	0.173	1.625	0.114
R^2	0.135		0.143		0.146		0.207	
Obs	61		61		61		61	
	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.
$\ln\sigma_t$	-0.100	-0.957	-0.074	-0.660	-0.104	-0.983	-0.090	-0.861
$\ln\sigma_{t-1}$	0.008	0.126	0.024	0.339	0.012	0.181	-0.007	-0.105
$\ln\sigma_{t-2}$	0.088	1.811	0.095	1.891	0.097	1.927	0.056	1.117
$\ln\sigma_{t-3}$	**0.139**	**2.821**	**0.138**	**2.778**	**0.150**	**2.914**	**0.098**	**1.898**
$\ln\sigma_{t-4}$	**0.160**	**2.975**	**0.155**	**2.814**	**0.171**	**3.056**	**0.120**	**2.133**
$\ln\sigma_{t-5}$	**0.153**	**2.810**	**0.145**	**2.568**	**0.160**	**2.869**	**0.122**	**2.175**
$\ln\sigma_{t-6}$	**0.117**	**2.320**	**0.108**	**2.040**	**0.117**	**2.291**	**0.103**	**2.034**
$\ln\sigma_{t-7}$	0.053	1.077	0.044	0.863	0.043	0.848	0.064	1.318
$\ln\sigma_{t-8}$	-0.041	-0.649	-0.047	-0.728	-0.063	-0.914	0.005	0.075
$\ln\sigma_{t-9}$	-0.164	-1.663	-0.165	-1.654	-0.201	-1.848	-0.075	-0.714

Notes: $\ln\sigma_{t-k}$ denotes the logarithm of the current and lagged values of Lilien index.
S1, S2 and S3 refer to the polynomial distributed lag terms of $\ln\sigma$.
DMR refers to unanticipated monetary shocks.
DLF refers to the labor force growth rate.
DHSI refers to the growth rate of Hang Seng Index.

Figure 5. Percentage Change of Lilien Index from 1981Q1 to 1997Q4



Even we consider the cumulative impact over time, a 10% increase in the index will lead to an overall 0.056 (=0.1*(0.139 + 0.160 + 0.153 + 0.117)) percentage point increase in the unemployment rate in the next 6 quarters as a whole. Figure 5 displays the percentage change of Lilien index over time. Over the sample period, the average absolute percentage change in the index is about 8%. In brief, the effect of sectoral shifts on the unemployment rate is significant but small.

Table 2 displays the regression results during 1998Q1-2008Q4 with Lilien index generated based on HSIC v1.1. In the first three models, the coefficients of $\ln \sigma_{t-k}$ are significant at lags 1 and 2. But the significance of these lagged terms disappears once the growth rate of Hang Seng Index (*DHSI*) and its lagged terms are added as control variables. As noted earlier, the growth rate of Hang Seng Index is used as a proxy for the aggregate demand shocks. The above results may suggest that the unemployment rate in Hong Kong in the 2000s was largely affected by the change in the aggregate demand in labour market rather than the structural shifts.

Table 2. Regression Results: 1998Q1 to 2008Q4 (HSIC v1.1)

Time Period	1998Q1 to 2008Q4							
	(1)		(2)		(3)		(4)	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
S1	0.186	0.094	0.165	0.122	0.163	0.160	0.020	0.816
S2	-0.052	0.392	-0.042	0.467	-0.036	0.576	0.026	0.584
S3	0.002	0.721	0.001	0.810	0.001	0.932	-0.004	0.388
DMR			-0.023	0.311				
DMR(-1)			**-0.047**	**0.031**				
DLF					-0.133	0.402		
DLF(-1)					-0.011	0.930		
DHSI							-0.007	0.132
DHSI(-1)							**-0.022**	**0.000**
DHSI(-2)							**-0.015**	**0.005**
Constant	0.877	0.377	0.733	0.440	0.923	0.368	0.791	0.296
R^2	0.114		0.233		0.133		0.553	
Obs	44		44		44		44	
	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.
$\ln\sigma_t$	0.186	1.715	0.165	1.580	0.163	1.435	0.020	0.234
$\ln\sigma_{t-1}$	**0.137**	**2.092**	**0.124**	**1.976**	**0.128**	**1.899**	0.042	0.806
$\ln\sigma_{t-2}$	**0.092**	**2.020**	**0.086**	**1.978**	**0.094**	**2.031**	0.055	1.585
$\ln\sigma_{t-3}$	0.052	1.077	0.051	1.121	0.061	1.227	0.059	1.668
$\ln\sigma_{t-4}$	0.016	0.287	0.020	0.371	0.029	0.505	0.055	1.338
$\ln\sigma_{t-5}$	-0.015	-0.269	-0.009	-0.170	-0.001	-0.021	0.043	0.978
$\ln\sigma_{t-6}$	-0.042	-0.749	-0.035	-0.657	-0.031	-0.520	0.022	0.514
$\ln\sigma_{t-7}$	-0.064	-1.081	-0.058	-1.025	-0.059	-0.962	-0.007	-0.152
$\ln\sigma_{t-8}$	-0.082	-1.028	-0.078	-1.027	-0.086	-1.057	-0.045	-0.747
$\ln\sigma_{t-9}$	-0.095	-0.789	-0.096	-0.828	-0.112	-0.905	-0.091	-1.015

Notes: $\ln\sigma_{t-k}$ denotes the logarithm of the current and lagged values of Lilien index.
S1, S2 and S3 refer to the polynomial distributed lag terms of $\ln\sigma$.
DMR refers to unanticipated monetary shocks.
DLF refers to the labor force growth rate.
DHSI refers to the growth rate of Hang Seng Index.

Table 3 below shows the regression results during 2002Q3-2011Q1 with Lilien index generated based on the HSIC v2.0. The results reflect similar implications as shown in Table 2 since all the estimates of current and lagged terms of $\ln\sigma$ are insignificant.

Table 3. Regression Results: from 2002Q3 to 2011Q1 (HSIC v2.0)

Time Period	2002Q3 to 2011Q1									
	(1)		(2)		(3)		(4)		(5)	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
S1	0.199	0.116	0.159	0.217	0.222	0.100	0.209	0.128	0.008	0.943
S2	-0.101	0.150	-0.083	0.244	-0.114	0.123	-0.130	0.104	-0.013	0.824
S3	0.009	0.248	0.007	0.346	0.010	0.207	0.013	0.146	0.001	0.818
DMR			-0.001	0.947						
DMR(-1)			-0.027	0.164						
DLF					0.099	0.496				
DLF(-1)					-0.042	0.773				
DIMMI							0.001	0.604		
DIMMI(-1)							0.004	0.180		
DIMMI(-2)							0.003	0.390		
DIMMI(-3)							0.002	0.472		
DIMMI(-4)							0.003	0.258		
DHSI									-0.007	0.201
DHSI(-1)									**-0.016**	**0.005**
DHSI(-2)									**-0.010**	**0.078**
Constant	-0.437	0.631	-0.546	0.550	-0.449	0.630	-0.636	0.510	-0.493	0.502
R^2	0.099		0.158		0.118		0.184		0.476	
Obs	35		35		35		35		35	
	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.	Coeff.	T-stat.
$\ln\sigma_t$	0.199	1.617	0.159	1.262	0.222	1.698	0.209	1.572	0.008	0.073
$\ln\sigma_{t-1}$	0.107	1.426	0.084	1.092	0.118	1.472	0.092	1.132	-0.004	-0.058
$\ln\sigma_{t-2}$	0.032	0.591	0.022	0.409	0.033	0.577	0.000	0.004	-0.013	-0.284
$\ln\sigma_{t-3}$	-0.026	-0.448	-0.025	-0.435	-0.031	-0.522	-0.066	-0.964	-0.019	-0.412
$\ln\sigma_{t-4}$	-0.066	-1.043	-0.058	-0.911	-0.076	-1.145	-0.106	-1.425	-0.022	-0.428
$\ln\sigma_{t-5}$	-0.089	-1.429	-0.077	-1.219	-0.101	-1.537	-0.121	-1.698	-0.023	-0.431
$\ln\sigma_{t-6}$	-0.095	-1.756	-0.081	-1.482	-0.105	-1.842	-0.110	-1.866	-0.020	-0.430
$\ln\sigma_{t-7}$	-0.084	-1.701	-0.072	-1.442	-0.090	-1.705	-0.073	-1.388	-0.015	-0.349
$\ln\sigma_{t-8}$	-0.055	-0.780	-0.048	-0.682	-0.055	-0.728	-0.011	-0.129	-0.007	-0.117
$\ln\sigma_{t-9}$	-0.009	-0.074	-0.010	-0.085	0.000	0.000	0.077	0.534	0.004	0.044

Notes: $\ln\sigma_{t-k}$ denotes the logarithm of the current and lagged values of Lilien index.
S1, S2 and S3 refer to the polynomial distributed lag terms of $\ln\sigma$.
DMR refers to unanticipated monetary shocks.
DLF refers to the labor force growth rate.
DHSI refers to the growth rate of Hang Seng Index.
DIMMIG refers to the growth rate of new arrivals from the Mainland.

5. Concluding Remarks

In short, Lilien Index is computed to measure the extent of sectoral shift over time. During 1982Q4-1997Q4, sectoral shifts had a small but significant impact on the unemployment rate of Hong Kong. But from then onwards, the unemployment rate is not significantly affected by sectoral shifts.

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Appendix: Data Description

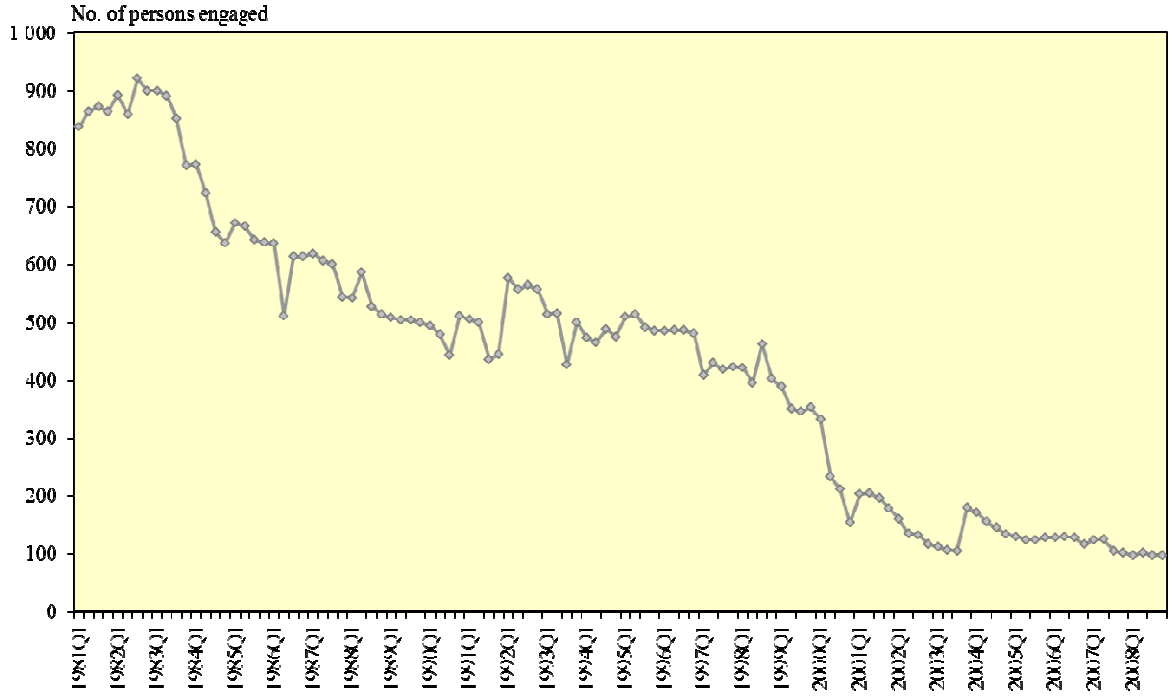
Data used in this study mainly includes time series data on unemployment rate from the General Household Survey, employment statistics (HSIC v1.1 and HSIC v2.0) from the Quarterly Survey of Employment and Vacancies, money supply (M3), the Hang Seng Index and the amount of new arrivals from the Mainland.

Appendix Table 1. Regression Results: 1982Q4 to 1997Q4 (HSIC v1.1)

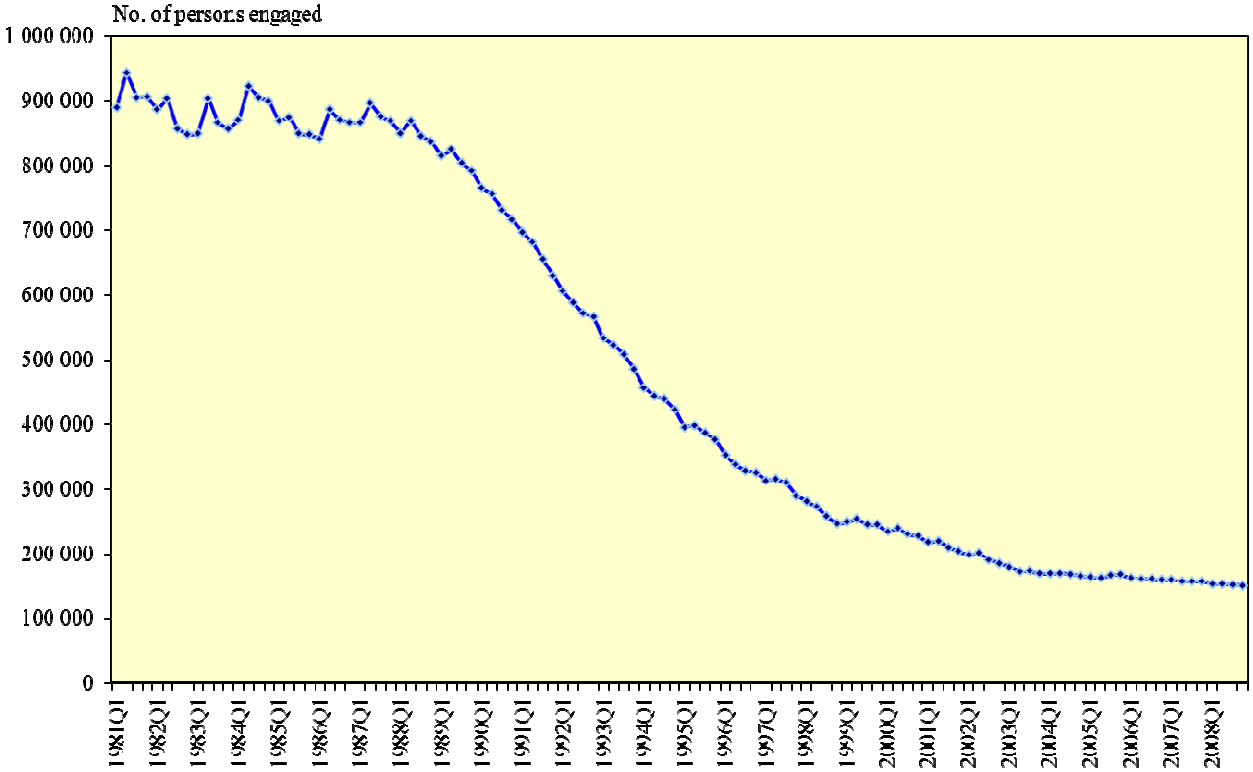
Time Period	1982Q4 to 1997Q4							
	(1)		(2)		(3)		(4)	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
$\ln\sigma_t$	0.052	0.760	0.049	0.786	0.020	0.912	0.014	0.936
$\ln\sigma_{t-1}$	-0.233	0.194	-0.188	0.326	-0.206	0.267	-0.269	0.134
$\ln\sigma_{t-2}$	0.394	0.021	0.397	0.026	0.434	0.016	0.384	0.025
$\ln\sigma_{t-3}$	-0.176	0.305	-0.195	0.269	-0.160	0.370	-0.178	0.294
$\ln\sigma_{t-4}$	0.310	0.072	0.307	0.079	0.316	0.070	0.345	0.045
$\ln\sigma_{t-5}$	0.173	0.301	0.182	0.285	0.140	0.419	0.078	0.649
$\ln\sigma_{t-6}$	0.150	0.363	0.142	0.406	0.158	0.363	0.111	0.514
$\ln\sigma_{t-7}$	-0.035	0.832	-0.044	0.804	-0.056	0.746	-0.073	0.664
$\ln\sigma_{t-8}$	-0.045	0.772	-0.027	0.872	-0.044	0.778	0.064	0.693
$\ln\sigma_{t-9}$	-0.153	0.300	-0.183	0.244	-0.200	0.210	-0.067	0.662
DMR			0.004	0.810				
DMR(-1)			0.013	0.474				
DLF					0.043	0.393		
DLF(-1)					0.018	0.709		
DHSI							-0.005	0.253
DHSI(-1)							-0.006	0.174
DHSI(-2)							-0.008	0.073
Constant	1.708	0.108	1.702	0.115	1.545	0.157	1.683	0.107
R^2	0.227		0.236		0.239		0.301	
Obs	61		61		61		61	

Notes: $\ln\sigma_{t-k}$ denotes the logarithm of the current and lagged values of Lilien index.
DMR refers to unanticipated monetary shocks.
DLF refers to the labor force growth rate.
DHSI refers to the growth rate of Hang Seng Index.

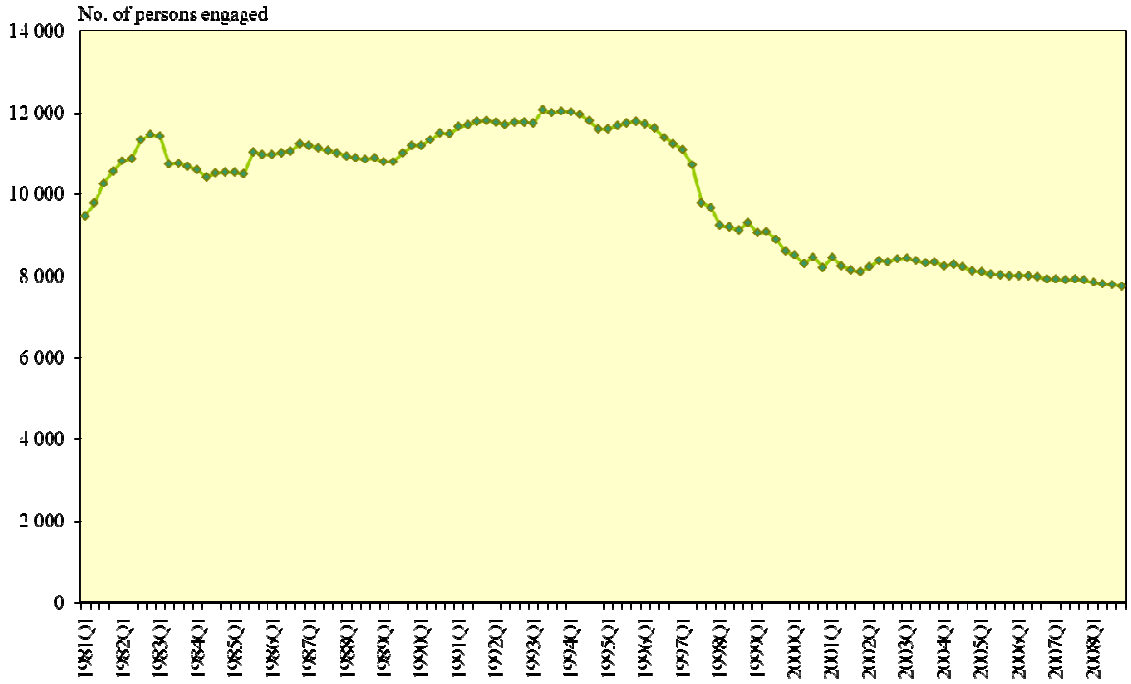
Appendix Figure 1. Employment in Mining & Quarrying (1981Q1 to 2008Q4)



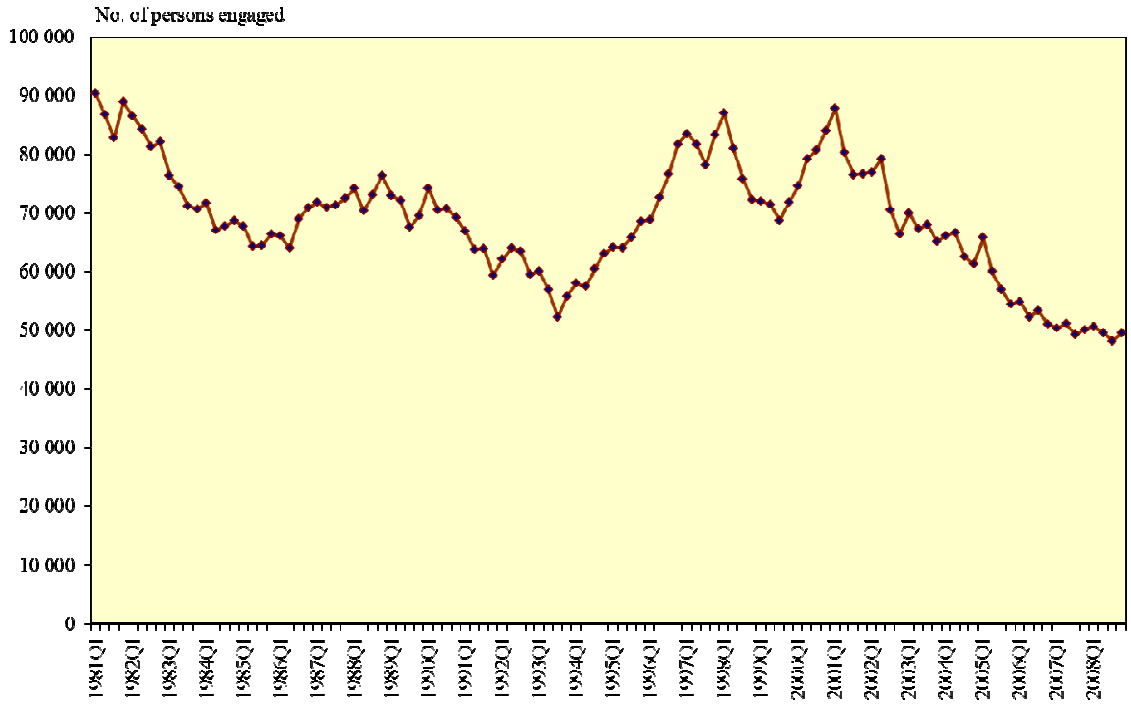
Appendix Figure 2. Employment in Manufacturing (1981Q1 to 2008Q4)



Appendix Figure 3. Employment in Electricity & Gas (1981Q1 to 2008Q4)

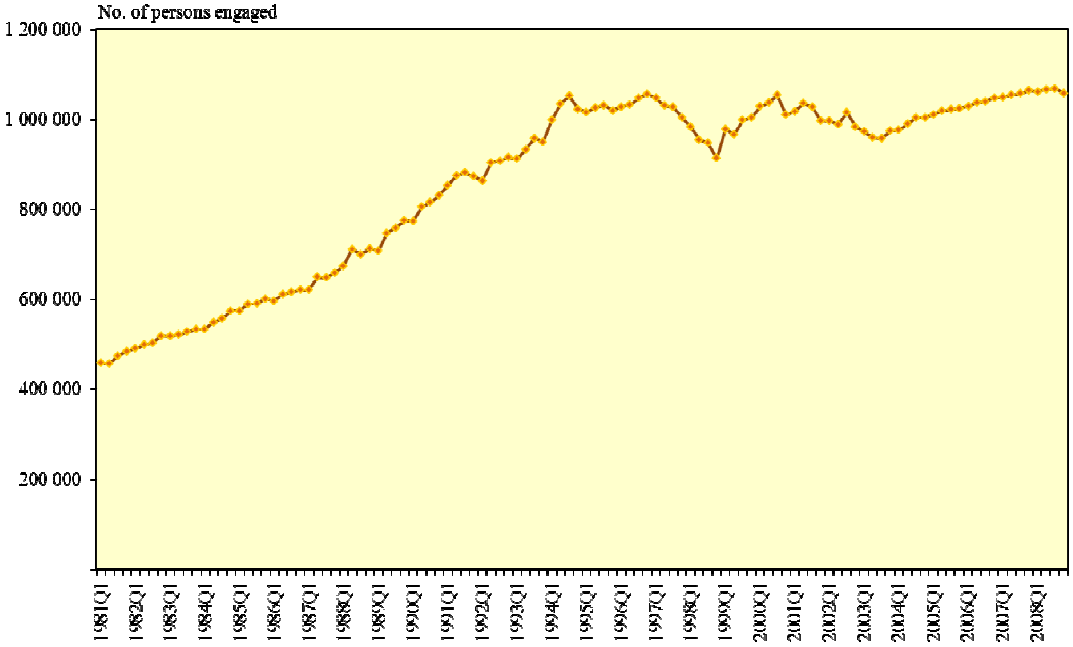


Appendix Figure 4. Employment in Construction (1981Q1 to 2008Q4)

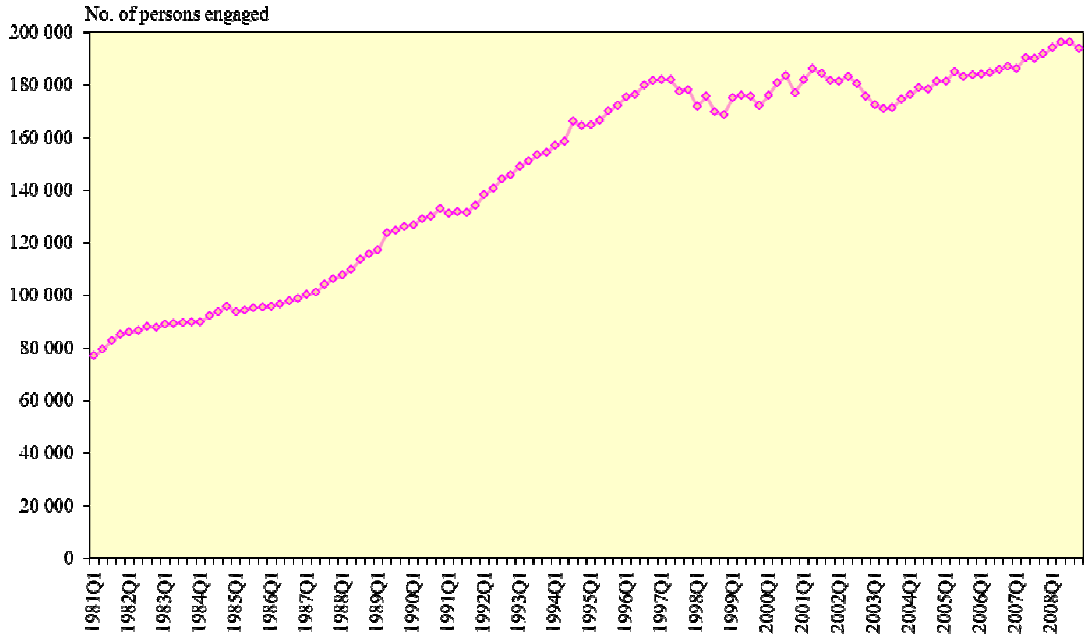


Note: Manual workers at construction sites only.

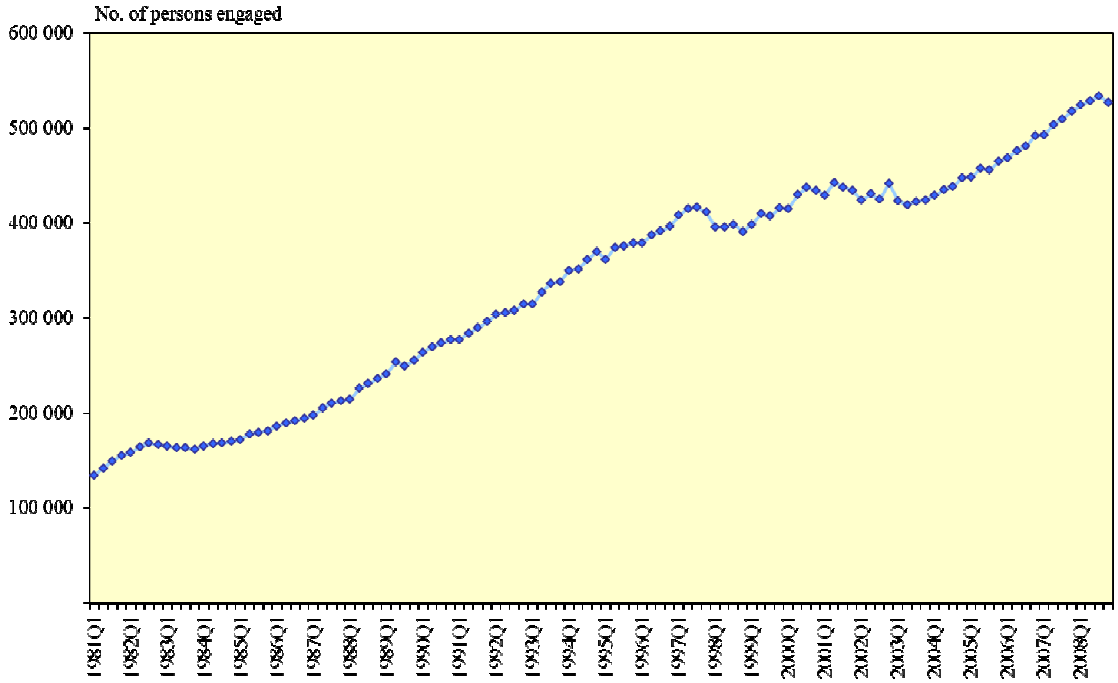
Appendix Figure 5. Employment in Wholesale, retail and import/export trades, restaurants and hotels (1981Q1 to 2008Q4)



Appendix Figure 6. Employment in Transport, storage and communications (1981Q1 to 2008Q4)



Appendix Figure 7. Employment in Financing, insurance, real estate and business services (1981Q1 to 2008Q4)



Appendix Figure 8. Employment in Community, social and personal services (1981Q1 to 2008Q4)