



***THE UNEMPLOYMENT RATE OF HONG KONG: THE EFFECTS OF AGGREGATE
AND SECTORAL CHANNELS***

Key points:

- Amid weak inbound tourism, the tourism-related sector (i.e. the retail, accommodation and food services sector) has seen more visible uptick in its unemployment rate since mid-2015. Meanwhile, the overall unemployment rate has continued to stay at low levels of 3.3 – 3.4%. This raises the question of why the rise in the unemployment rate of the tourism-related sector has not lead to an overall increase in the unemployment rate, and whether this situation would be sustained.*
- We first investigate whether the weakness in the tourism-related sector represented mainly a sectoral phenomenon or part of an aggregate phenomenon facing all sectors. Our statistical factor analysis confirms that the retail and wholesale sector has been more affected by sector-specific disturbances, rather than economy-wide shocks, since mid-2015. Thus, the recent weakness in this sector represented more of a sectoral phenomenon.*
- We then examine to what extent a sectoral phenomenon could also affect the overall unemployment rate in Hong Kong, given that the reallocation of labour from one sector to another may not happen in an instantaneous manner (sectoral shifts). Our analysis using a vector auto-regression model also indicates that historically, sharp changes in the overall unemployment rate were mainly driven by aggregate shocks (i.e. the aggregate channel) instead of sectoral shifts. It may be due to the fact that the mobility of labour can help alleviate the impact of sectoral shifts on the overall unemployment rate.*

- . *Our research therefore helps explain why the recent weakness in the retail and wholesale sector has not worsened the overall unemployment rate much. Going forward, if the broader economy weakens further, the overall unemployment rate would face stronger upward pressure due to the aggregate effect.*

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The views and analysis expressed in this paper are those of the authors, and do not necessarily represent the views of the Hong Kong Monetary Authority.

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I. INTRODUCTION

The unemployment rate has stayed at low levels since mid-2011. Our previous analysis¹ suggested that the resilience of the labour market was due partly to restrained supply of and strengthened demand for lower-skilled labour. In particular, the booming inbound tourism over the past years played an important role in creating more jobs in the retail and other tourism-related sectors, which tended to hire more lower-skilled labour.

However, with inbound tourism experiencing a downturn since 2015, the unemployment rate for the tourism-related sector has picked up in recent months, posing headwinds to the overall labour market. Meanwhile, the overall unemployment rate has continued to stay at the low levels of 3.3–3.4%. This raises the questions of why the rise in the unemployment rate of the tourism-related sector has not lead to an overall increase in the unemployment rate, and whether this situation would be sustained. Even if the weakness in the tourism-related sectors represented mainly a sectoral phenomenon (i.e. the sectoral channel), the reallocation of labour from these sectors to other sectors may not happen in an instantaneous manner. Moreover, the weakness might also be part of an aggregate phenomenon facing all sectors (i.e. the aggregate channel). Against this backdrop, this study analyses the effects of aggregate and sectoral channels on the overall unemployment rate, with an aim to shed light on the near-term outlook for the labour market.

Our statistical factor analysis suggests that sector-specific shocks were relatively more important than aggregate shocks in driving the weakness in the retail and wholesale sector. While the reallocation of labour from these sectors to other sectors can pose headwinds to the overall unemployment rate (the sectoral shifts channel), our analysis using a vector auto-regression model indicates that historically, sharp changes in the overall unemployment rate were mainly driven by aggregate shocks (the aggregate channel).

The rest of the paper is organised as follows. Section II looks into the sectoral unemployment rates. Section III tries to investigate the role of sectoral or aggregates shocks in affecting different economic sectors. Section IV analyses an index of sectoral shifts and examines its relation with the overall unemployment rate. Section V estimates a vector auto-regression model and

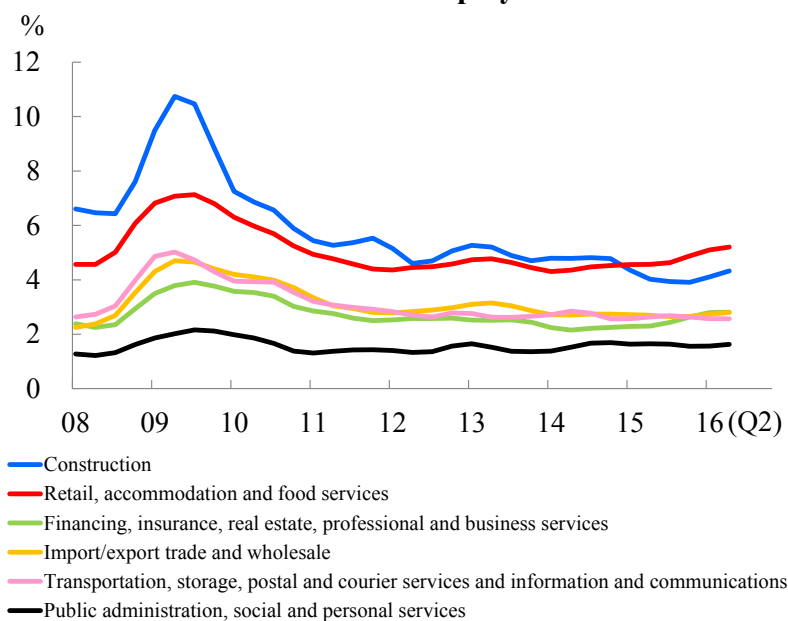
¹ See Box 2 separately in the September 2012 and March 2014 issues of the Half-yearly Monetary and Financial Stability Report by the HKMA.

compares the relative importance of the sectoral and aggregate channels to the overall unemployment rate. The final section discusses the implications for the short-term labour market outlook.

II. SECTORAL DEVELOPMENTS IN UNEMPLOYMENT RATES

Along with more moderate aggregate economic momentum, some major economic sectors have seen more visible uptick in their unemployment rates more recently (Chart 1). For example, in the retail, accommodation and food services sector, the seasonally adjusted unemployment rate started to climb in mid-2015 and has risen by a total of 0.7 percentage points in mid-2016. But partly reflecting the resilience of other major economic sectors, especially the public administration, social and personal services sector, there have been no synchronised rises in the short term trends of the sectoral unemployment rates, and the overall unemployment rate increased only marginally by around 0.1 percentage points in the first half of 2016.

Chart 1: Sectoral unemployment rates



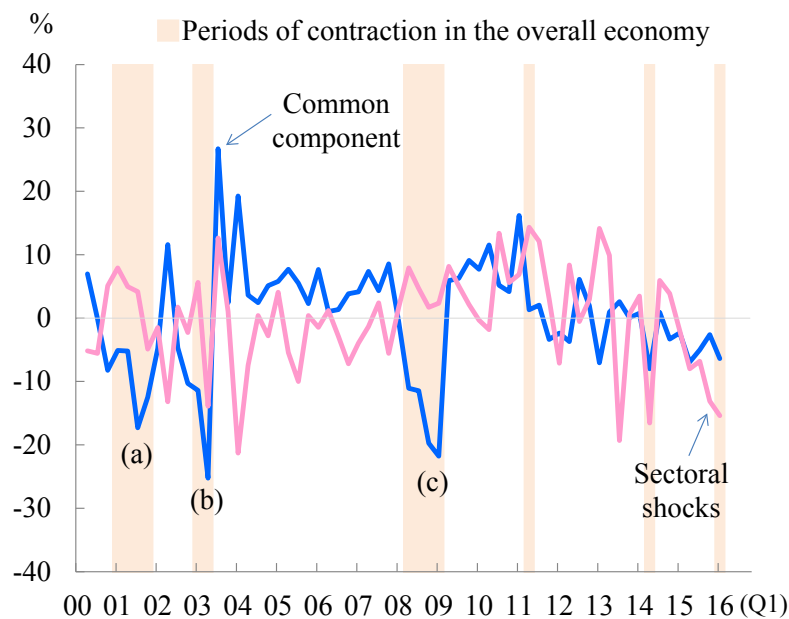
Sources: Census and Statistics Department (C&SD) and HKMA staff estimates.

III. DECOMPOSITION OF SECTORAL OUTPUT: SECTORAL VS AGGREGATE SHOCKS

Taken together, these patterns seem to suggest that some of the economic sectors may have been more affected by sector-specific disturbances,

rather than economy-wide shocks. Using a pure statistical factor model² that decomposes sectoral GDP growth rates into sectoral shocks and a common component affected by aggregate shocks, we find that the retail and wholesale sector is a case in point.³ (Annex A provides more details on the estimation.) In particular, the decomposition results indicate that negative sectoral shocks were relatively more important than aggregate shocks in driving the recent output contraction in this sector (Chart 2). The question then turns to the role of sectoral shifts in driving the overall unemployment rate.

Chart 2: Decomposing annualised growth in the value added of the retail and wholesale sector



Notes: (a) The burst of IT bubble and the downturn in the US, (b) the outbreak of severe acute respiratory syndrome and (c) the fallout of the global financial crisis.

Source: HKMA staff estimates.

IV. RELATIONSHIP BETWEEN SECTORAL SHIFTS AND THE AGGREGATE UNEMPLOYMENT RATE

Theoretically, sector-specific shocks can cause fluctuations in the overall unemployment rate, as labour reallocation from contracting sectors to expanding sectors may not be instantaneous.⁴ Under such theory, the greater the

² For more details on the methodology, see Foerster, et al. (2011).

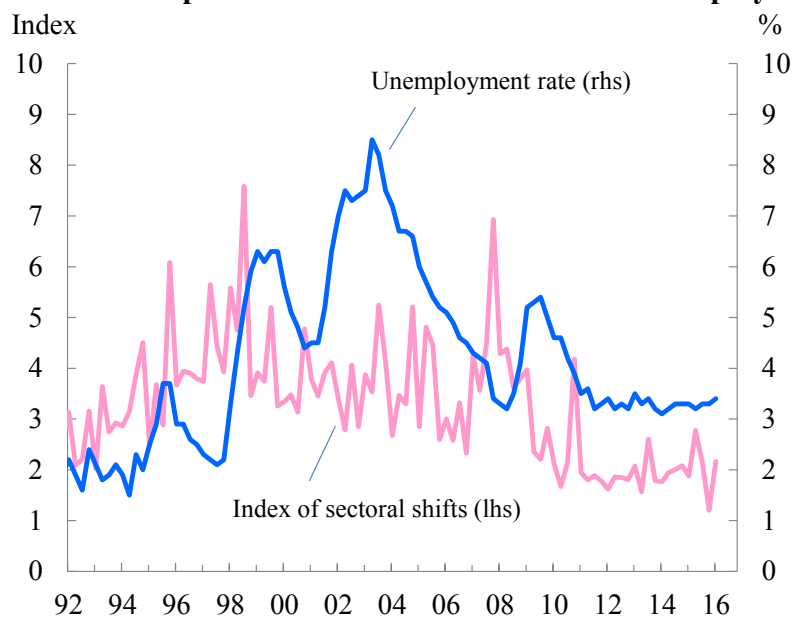
³ The estimated common component and sectoral shocks would be more precise if the input-output linkages of different economic sectors were also taken into account, as such linkages may cause some sectoral shocks to be captured as part of the common component. Data on the input-output linkages of different sectors in Hong Kong, however, are not available.

⁴ The classic reference is Lilien (1982). For a recent survey of the literature, see Gallipoli and Pelloni (2013).

dispersion of employment demand, the higher the aggregate unemployment rate will be. To measure the extent of sectoral shifts, we follow the literature⁵ and construct such an index by computing the standard deviation of sectoral employment growth rates. Since the raw sectoral employment growth rates may also reflect the impact of aggregate shocks, we use the statistical factor analysis to purge the growth rates from such aggregate influences. To compile the index, we use the data on the number of persons engaged from the Quarterly Survey of Employment and Vacancies, which provides longer data and a more detailed sectoral breakdown (over 50) than the General Household Survey. (Annex B gives more information on the calculation of the index.)

A cursory look at the data suggests that the measured index of sectoral shifts broadly co-moved with the overall unemployment rate (Chart 3). Indeed, the index of sectoral shifts coincided quite well with the ups and downs of the unemployment rate prior to 2001 and the downtrend between 2004 and 2007. The rise in the unemployment rate during the global finance crisis was also preceded by a surge in the index of sectoral shifts. After 2010, the index hovered at a low level and ran parallel to the flat-lined unemployment rate.

Chart 3: Relationship between sectoral shifts and the unemployment rate



Sources: C&SD and HKMA staff estimates.

⁵ There are a number of ways to calculate such index. Please see the survey paper cited in footnote 4. Our method is akin to the one adopted in Mehrotra and Sergeyev (2013).

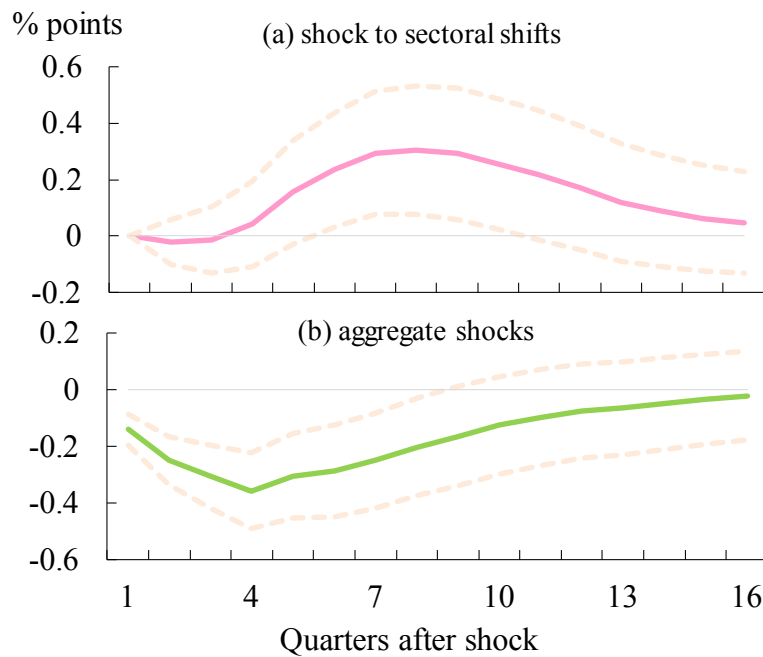
V. EMPIRICAL RESULTS AND THE RELATIVE IMPORTANCE OF AGGREGATE AND SECTORAL SHOCKS

To further understand the impact of sectoral shifts and aggregate shocks, a vector auto-regression (VAR) model is constructed with the following five variables: real GDP growth, the unemployment rate, the inflation rate, 3-month Hong Kong Interbank Offered Rate and the index of sectoral shifts. The real GDP growth helps identify the impact of aggregate shocks and is expected to be negatively correlated with the overall unemployment rate. The inclusion of inflation rate may allow for a Phillips curve relationship. The interest rate is intended to capture the effect from monetary conditions. Finally, the index of sectoral shifts proxies for the sectoral shock channel and is expected to be positively correlated with the aggregate unemployment rate.

The sample period runs from the third quarter of 1992 to the first quarter of 2016 and a lag length of five is chosen based on log-likelihood criterion. The VAR system is identified following the standard recursive ordering procedure. The sectoral shifts index is placed last in the estimation ordering. Hence, the sectoral shifts index can respond contemporaneously to innovations to real GDP growth, the unemployment rate, etc, while these variables respond to innovations to sectoral shifts index only with a lag.

In line with expectation, impulse response functions generated from the estimated VAR model suggest that an unexpected increase in the real GDP growth – interpreted as an aggregate shock – would decrease the overall unemployment rate while the rise in the index of sectoral shifts would increase it (Chart 4). A generalised impulse response analysis, which is invariant to the ordering of the variables, is also conducted and similar estimation results are obtained.

Chart 4: Response of the unemployment rate to aggregate and sectoral shifts shocks



Notes: The shock to sectoral shifts pertains to a one-standard-deviation increase in the index and the aggregate shock is a one-percentage-point rise in GDP growth. The solid lines refer to the response functions and the dashed lines the standard error bands.

Source: HKMA staff estimates.

To further gauge the relative importance of aggregate and sectoral shocks, we carry out a forecast error variance decomposition of the overall unemployment rate. The decomposition exercise reveals that the impact of aggregate shocks was more important relative to the sectoral shifts disturbances at all selected horizons (Table 1). In fact, more than 50% of the forecast error variance was accounted for by aggregate shocks at or below the two-year horizon. The effect of the sectoral shifts only became more significant beyond the one-year horizon, contributing around 7–25% of the forecast error variance.

Table 1: Forecast error variance decomposition of the unemployment rate

Forecast horizon (quarters)	Forecast error variance decomposition (percentage points)		
	Sectoral shifts	Aggregate shocks	Unemployment rate
4	0.4	61	34
6	7	62	26
8	18	58	20
16	25	46	16

Note: For ease of exposition, other variables' contribution is not shown here.
Source: HKMA staff estimates.

VI. IMPLICATIONS FOR THE CURRENT LABOUR MARKET SITUATION

This study analyses the role of sectoral shifts and aggregate shocks in driving the overall unemployment rate. We find that historically, sharp changes in the overall unemployment rate were mainly driven by aggregate shocks instead of sectoral shifts over the past 24 years. It may be due to the fact that the mobility of labour can help alleviate the impact of sectoral shifts on the overall unemployment rate.

The retail and wholesale sector has lost steam amid weak inbound tourism. Our estimation results suggest that sector-specific shocks were relatively more important than aggregate shocks in driving the weakness in this sector. Our results also explain why such weakness has not worsened the overall unemployment rate much.⁶ Going forward, if the broader economy weakens further, the overall unemployment rate would face stronger upward pressure due to the aggregate effect.

⁶ With all that said, it may be the case that sectoral shifts in the past happened mainly among sectors hiring similar type of labour (i.e. either skilled or unskilled), and hence the mobility of labour across sectors would limit the impact of such shift on the overall unemployment rate. If sectoral shifts, however, were to occur among sectors hiring different type of labour with limited substitutability, then the impact of such shift on the overall unemployment rate may be bigger.

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ANNEX A: THE DECOMPOSITION OF SECTORAL OUTPUT

Quarterly data on real GDP by economic activity (i.e. sectoral GDP) are taken from the C&SD. The 15 economic sectors are listed in Table A.1.⁷ Our focus is the annualised growth rate of the sectoral GDP, which is calculated as $400 \times \ln (Y_{i,t} / Y_{i,t-1})$ where $Y_{i,t}$ is the seasonally adjusted real GDP of sector i at time t .

Table A.1: List of economic sectors

1.	Agriculture, Fishing, Mining and Quarrying
2.	Manufacturing
3.	Electricity, Gas & Water Supply and Waste Management
4.	Construction
5.	Import and Export Trade
6.	Wholesale and Retail Trades
7.	Accommodation and Food Services
8.	Transportation and Storage
9.	Postal and Courier Services
10.	Information and Communications
11.	Financing and Insurance
12.	Real Estate
13.	Professional and Business Services
14.	Public Administration, Social and Personal Services
15.	Ownership of Premises

Source: C&SD.

The growth rate data are transformed by: (1) removing a small number of outliers; (2) removing the low-frequency trend of each series using a biweight filter following Stock and Watson (2016); (3) standardising the series to have zero mean and unit standard deviation. The transformed data are then decomposed using a statistical factor model:

$$X_t = \Lambda F_t + e_t$$

where

$X_t = N \times 1$ vector of transformed sectoral growth rates

⁷ Note that for completeness we treat “ownership of premises” as a sector. Ownership of premises includes (1) leasing services provided to tenants by owners of premises in their individual capacity and (2) leasing services which owners of premises like households, government and private non-profit institutions, provided to themselves.

$\Lambda = N \times k$ matrix of factor loadings

$F_t = k \times 1$ vector of latent factors

$e_t = N \times 1$ vector of sector-specific idiosyncratic disturbances

$N =$ the number of sectors (equals to 15 in this case)

$k =$ the number of factors.

Penalised least-squares criteria suggested by Bai and Ng (2002) are employed to determine the number of factors, which is estimated to be three in our case. Principal components are then used to estimate the factors F_t , which can be interpreted as aggregate shocks, and ΛF_t is the common component affected by these aggregate disturbances. The estimated e_t is interpreted as sectoral shocks.

ANNEX B: THE INDEX OF SECTORAL SHIFTS

The numbers of persons engaged from the Quarterly Survey of Employment and Vacancies (QSEV) are used to compile the sectoral shift index. There are a total of 73 sectors⁸ based on the Hong Kong Standard Industrial Classification Version 2.0 (HSIC v2.0) but this set of data starts from 2004 only. In order to obtain longer time series, we also utilise the older QSEV, which has employment figures from 58 sectors based on the HSIC v1.1 for the period between 1991 and 2008.⁹

We use the similar procedure as detailed in Annex A to calculate the transformed sectoral employment growth rates and extract their sector-specific components $e_{i,t}$. The aim is to purge the sectoral employment growth rates from the influence of aggregate shocks. We then follow Mehrotra and Sergeyev (2013) and construct the index of sectoral shifts using the following formula:

$$\text{Index of sectoral shifts at time } t = \frac{1}{N} \left(\sum_{i=1}^N e_{i,t}^2 \right)^{1/2}$$

where N is the number of sectors. As the variances of $e_{i,t}$ were normalised to unity beforehand, the sector-specific employment shocks need not be weighted by their employment shares.

Two such indexes are computed based on the two datasets we described above, one spanning from 2004 to 2016 while another from 1991 to 2008. We then extend the former index backward using the growth rate of the latter index on the ground that the two indexes follow broadly similar trends in the overlapping period between 2004 and 2008. Chart 3 in the main text plots the resultant index.

⁸ In fact, one sector – “Remediation and Other Waste Management Services” – was removed in our calculation so that there were only 72 sectors in our sample. This was because the employment growth rate of that sector was too erratic, due perhaps to sampling uncertainty. Anyway, the sector is insignificant in terms of its employment size (ranging from 4 – 100 persons during 2004 – 2015).

⁹ The General Household Survey (GHS) also has employment figures by sector based on the HSIC v2.0, but they are available only from 2008 onwards.