

## **Can newspapers be used to measure external economic uncertainties?**

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### **Abstract**

This article constructs a quick and intuitive indicator on external economic uncertainties embodied in newspapers from a wide range of international sources. The indicator provides a relatively cost-effective way to gauge and track economic uncertainties or sentiment alongside the existing survey-based indicators, and proxies the changes in economic performance of Hong Kong, a small and open economy under substantial influence by external factors, rather well.

### **報章資訊能否用作量度外部經濟不確定性？**

#### **摘要**

本研究札記從廣泛的國際報章來源入手，以一個便捷及直觀的做法，建構一個可反映外部經濟不確定性的指標。與現有基於統計調查所編製的指標一樣，該指標能衡量和追蹤經濟不確定性或情緒，且相對地具成本效益。我們發現指標亦能大致追蹤香港（一個極受外部因素影響的小型開放經濟體）經濟表現的變化。

<p>The views and analysis expressed in this article are those of the authors and do not necessarily represent the views of the Office of the Government Economist.</p>
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## I. INTRODUCTION

1. Newspapers, published with high frequency, contain vast and timely information on the latest economic development and trends as well as the underlying uncertainties. Given the increased availability of online news databases and the advance of text extraction and analytics techniques, it has become more practical for researchers to quantify newspaper content, traditionally regarded as ‘soft’ information, as a new data source for more current and in-depth understanding and monitoring of the fast-changing economic landscape.

2. This article aims to construct a quick and intuitive indicator on external economic uncertainties, namely the External Economic Uncertainty Index (EEUI), based on news content from wide international sources. Given the highly external nature of our economy, relationships of the EEUI with key macroeconomic indicators of Hong Kong are also examined to check if the index can be used as a ‘litmus indicator’ for surveillance of Hong Kong’s macroeconomic performance.

## II. DATA AND METHODOLOGY

3. A recent paper jointly published by the Hong Kong Baptist University and Hong Kong Monetary Authority (Luk et al., 2020<sup>1</sup>) compiles an index to gauge and track economic policy uncertainty for Hong Kong and studies the extent of spillovers of relevant uncertainties from major economies to Hong Kong by parsing local newspapers. It is based on the method proposed in Baker et al. (2016)<sup>2</sup> which counts and analyses news articles containing a pre-defined set of related keywords.

4. Inspired by the work of Luk et al. (2020), this article largely adopts their methodology with modest simplification to compile a shortcut index on external uncertainties. The methodology mainly operates by: (i) expanding the coverage of newspapers to global news agencies instead of local sources; and (ii) fine-tuning the search words for parsing the news articles with a focus on global economic uncertainties instead of ‘policy uncertainty’.

5. Accessing an online digital news portal with archives of multi-national news sources that stretch back decades, we counted the frequency of news articles and

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<sup>1</sup> Luk, P., M. Cheng, P. Ng and K. Wong (2020), “Economic Policy Uncertainty Spillovers in Small Open Economies: The Case of Hong Kong”. *Pacific Economic Review*, Volume 25, Issue 1, Page 21-46.

<sup>2</sup> Baker, S., N. Bloom and S. Davis (2016), “Measuring Economic Policy Uncertainty”. *Quarterly Journal of Economics*, 131(4), pp. 1593-1636.

editorials that contained terms related to external economic uncertainties for an extended period from January 1998 to July 2019. Making reference to the selection of search terms prescribed in Luk et al. (2020), **Table 1** lists the set of pre-defined terms for this analysis in three categories, namely (A) External; (B) Economic; and (C) Uncertainty<sup>3</sup>.

**Table 1: Pre-defined terms for searching relevant news articles and editorials**

Category	Search terms
A: External	world / global
B: Economic	economy / financial / economic / growth / GDP
C: Uncertainty	uncertainty / uncertain / risk / crisis / recession / downside

6. As for the construction of the index, the *individual EEUI* at time  $t$  from one newspaper source  $i$  is the number of news articles and editorials containing the terms in all three categories (i.e. A, B and C), divided by those only containing the terms in categories A and B. Then, the individual indices across all  $n$  selected news sources, standardised by their respective standard deviations  $\sigma_i$ , are averaged into an *overall EEUI*<sup>4</sup> with the following formula:

$$Overall\ EEUI_t = \frac{\sum(Individual\ EEUI_{it} / \sigma_i)}{n}$$

7. Extracting basic search results from the online digital news portal, the procedure identified around 5.5 million (5 525 971) news articles and editorials from 309 global news agencies containing terms in categories A and B (i.e. denominator of the individual index which is the **base group** of news content which are external- and economic-related). The number of news articles and editorials containing terms in all the three categories (i.e. the numerator which is the **uncertainty group**, i.e. with external- and economic-related content containing the ‘uncertainty’ elements) was notably smaller, but still amounted to nearly two million (1 955 684), about 35% of the base group of 5.5 million news and editorials.

8. As a practical matter, data cleansing efforts were conducted and several filtering rules were applied to the search results of news sources in compiling the aggregate

<sup>3</sup> In Luk et al. (2020), the set of pre-defined terms are divided into 4 categories, namely (i) Region; (ii) Economic; (iii) Uncertainty; and (iv) Policy terms. To suit the purpose of this investigation, our terms in category (A) incorporate the external elements (we label this category as ‘External’ instead of ‘Region’). We have no focus on economic policy influence in this study, so we discard the policy terms (i.e. category (iv)) in Luk et al. (2020). Besides, the interest of our tracking is more inclined to focus on the ‘negativity’ of economic uncertainties or sentiment, and hence negative terms such as ‘crisis’, ‘recession’ and ‘downside’ are added to category (C).

<sup>4</sup> The aggregate index is also seasonally adjusted following standard X-13 ARIMA procedures.

EEUI. *Firstly*, news agencies were taken out when the data series were found to be either incomplete or truncated (e.g. frequent incidence of missing values, more recent data not available) or undesirably short (e.g. less than five years). *Secondly*, individual indices that showed less distinct variation over time were also omitted. *Thirdly*, key sources (in terms of the amount of news content available) were preferred to ensure the representativeness of the data.

9. As a result, the first twenty news agencies (ranked by the number of news articles available) were selected for the EEUI compilation as summarised in **Table 2**, with around 2.5 million and 0.93 million news articles and editorials containing the terms in the base group and the uncertainty group respectively, which already represent nearly 50% of the respective news content from all the sources in the search. While the selection is essentially limited by the availability of newspapers in the electronic news portal, the selected major news sources already cover newspapers from a wide range of geographical origins.

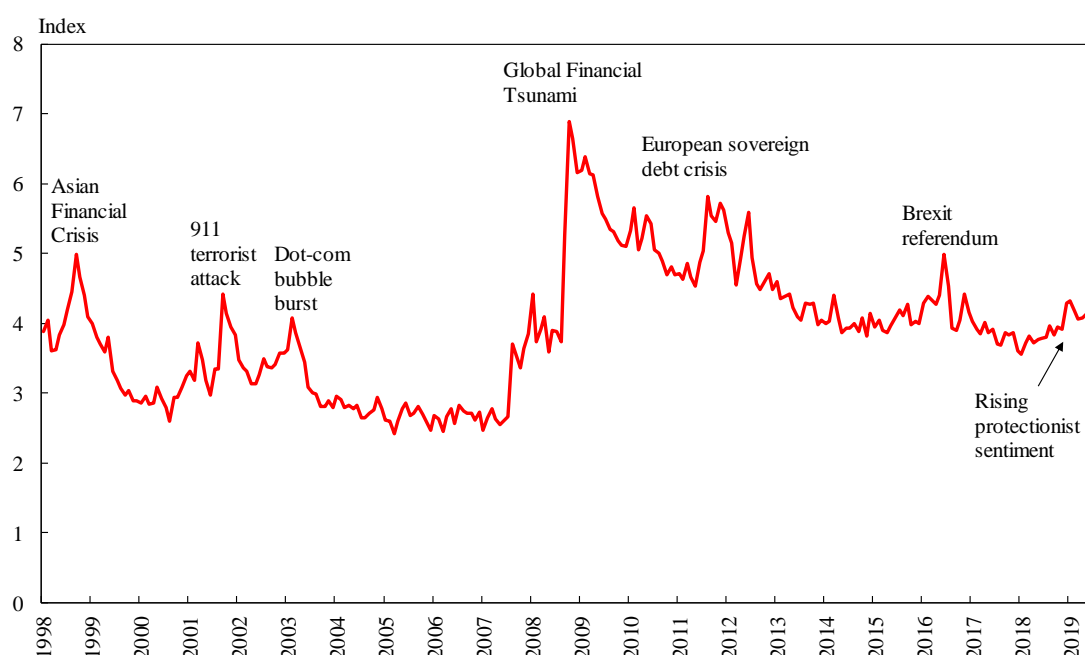
**Table 2: Selected global newspaper sources and number of news articles and editorials for compiling the EEUI, January 1998 – July 2019**

News sources	Origin	Number of news articles and editorials	
		Uncertainty Group (containing terms in categories A, B and C)	Base Group (containing terms in categories A and B)
Financial Times, The Times, The Daily Telegraph, Daily Mail, The Guardian, Sunday Times, The Herald, Evening Standard	UK	932 655	2 479 923
Wall Street Journal	US		
The Australian, Sydney Morning Herald, The Age, The Courier - Mail	Australia		
The Economic Times, Financial Express, The Hindustan Times	India		
South China Morning Post	Hong Kong		
Irish Times	Ireland		
Asia News Monitor	Thailand		
New Straits Times	Malaysia		

### III. RESULTS

10. The constructed EEUI on a monthly basis is plotted in *Chart 1*<sup>5</sup>. An examination of its trend suggests that the index is clearly capable of capturing the change in external uncertainty amidst major global economic events. Specifically, the index rose more abruptly in reaction to the economically tumultuous periods of the Asian Financial Crisis in 1998 and the Global Financial Tsunami in 2008-2009, alongside spikes at the 9/11 terrorist attack in 2001, the dot-com bubble burst in the early 2000s, events of the European sovereign debt crisis during 2010-12, and the Brexit referendum in 2016. More recently, the EEUI also has risen since 2018 amidst rising trade protectionist sentiment and growing trade tension between the US and Mainland China. Furthermore, the external uncertainties as measured by the EEUI seem to fluctuate consistently at more elevated levels in the period after the Global Financial Tsunami, broadly in line with the common perception that the world has entered an era of greater uncertainties ever since.

**Chart 1: Monthly EEUI, January 1998 – July 2019**



11. Hong Kong is a small and open economy and its economic performance is substantially influenced by the developments in and the transmission of uncertainties from the external economic environment. Hence, the EEUI constructed based on global news content may be used to quantify the extent and track the movement of such

<sup>5</sup> Theoretically, the EEUI could be constructed on a daily basis given updates of international newspaper sources within the online news portal should be available from day to day. But the data processing efforts are expected to be much more time consuming, and the index being so compiled would likely be subject to more notable fluctuations, thereby making the daily EEUI less useful for monitoring. Hence, we stick to the monthly and quarterly EEUIs in this paper.

external uncertainties and serve as a quick and intuitive indicator for macroeconomic monitoring of the Hong Kong economy. To examine its performance in this regard, the monthly EEUI is translated into a quarterly series and compared with key macroeconomic variables of Hong Kong by computing the correlation coefficients (from lead-0 to lead-2 quarters of EEUI series) as summarised in *Table 3*.

**Table 3: Cross-correlation of the quarterly EEUI with selected macroeconomic variables, Q1 2014 to Q2 2019**

Selected economic indicators of Hong Kong		2014-2019 (recent 5 years)			2004-2019 (15 years)		
		No lead / lag	EEUI leads by		No lead / lag	EEUI leads by	
			1Q	2Q		1Q	2Q
i.	Real GDP <sup>^</sup>	-0.626	-0.368	0.043	-0.673	-0.653	-0.521
	A. Total exports of goods <sup>^</sup>	-0.457	-0.151	0.042	-0.479	-0.461	-0.337
	B. Total exports of services <sup>^</sup>	-0.723	-0.653	-0.344	-0.415	-0.415	-0.361
	C. Private consumption expenditure <sup>^</sup>	-0.773	-0.668	-0.290	-0.375	-0.347	-0.212
	D. Private machinery and equipment acquisition <sup>^</sup>	-0.516	-0.469	-0.385	-0.291	-0.222	-0.190
ii.	Underlying CCPI inflation rate <sup>^</sup>	0.192	-0.058	-0.043	0.447	0.332	0.249
iii.	Unemployment rate <sup>@</sup>	0.461	0.558	0.639	-0.341	-0.309	-0.310
iv.	Hang Seng Index (HSI) <sup>#</sup>	-0.718	-0.644	-0.631	0.197	0.229	0.287

Notes: (^) Expressed in year-on-year rates of changes.

(@) Seasonally adjusted unemployment rate.

(#) Expressed in logarithmic scale.

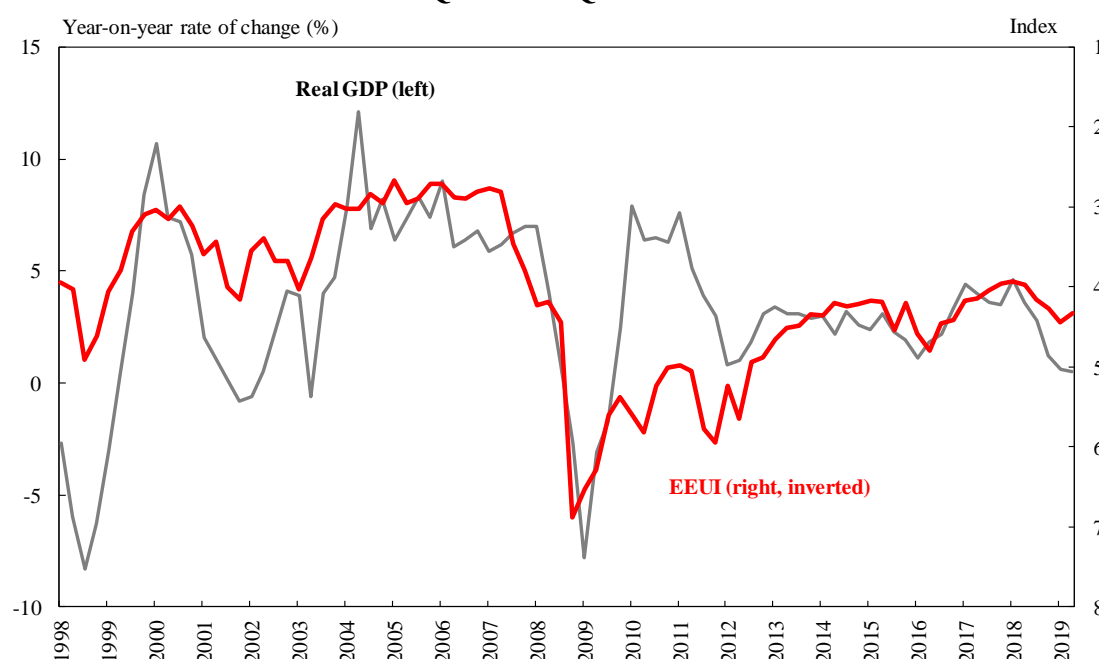
12. In the most recent 5 years (i.e. 2014-2019), the EEUI is negatively and contemporaneously correlated with the rates of change in real GDP of Hong Kong (with a strongly negative correlation of  $-0.626$ ). Besides, it is shown by the results in *Table 3* that the EEUI correlates negatively and mostly contemporaneously, with strengths from mild to strong, with the major components of GDP, including total exports (particularly exports of services), private consumption expenditure (PCE), and private machinery and equipment acquisition. On the other hand, the EEUI has a mildly positive correlation with the unemployment rate. The relationship between the EEUI and inflation is less clear.

13. Notably, the movement of PCE is more closely tracked by the EEUI as compared with other selected GDP components (even external indicators such as exports) during 2014-2019, suggesting that external uncertainties may also influence domestic consumption, conceivably via wealth channels. Indeed, the high negative correlation over the same period with the Hang Seng Index (HSI), a common market-based macro indicator and proxy of economic performance, partially reflects the usefulness and relevance of the quick EEUI compiled based on global news content.

The respective correlation of EEUI with PCE in 2004-2019 (15 years) remains negative ( $-0.375$ ), albeit appreciably weaker<sup>6</sup>. With a closer examination into the relevant trends, we found the weaker correlation was conceivably attributable to the relatively steady movement in EEUI in 2003-2004, even though at that time the Hong Kong economy and asset markets were battered by the outbreak of SARS which notably dampened local consumption and investor confidence. As the EEUI conceptually does not capture economic uncertainty caused by very local / regional events, the index stayed at relatively low levels over this period.

14. Still, as regards the usefulness of the index to track the overall economic performance of Hong Kong over the longer period, the negative correlation of the indicator with real GDP remains rather strong ( $-0.673$ ) between 2004-2019. This close relationship is graphically depicted in *Chart 2*.

**Chart 2: Quarterly EEUI and real GDP growth of Hong Kong, Q1 1998 – Q2 2019**



<sup>6</sup> We noted that for the longer horizon of 2004-2019, the correlation coefficients of EEUI with both the unemployment rate and the HSI also switched signs with weaker correlation as compared to the results for the more recent 5-year period. As explained in paragraph 13, this is conceivably due to the fact that the EEUI by construction is much more capable of capturing economic uncertainties arising from global events instead of local events.

#### IV. FURTHER DISCUSSION

15. In Hong Kong, there are currently several survey-based indicators available from various official and private sources to gauge the prevailing or prospective economic and business sentiment (*Table 4*). Whilst understanding that they are not strictly comparable owing to differences in compilation methodologies, the recent movements of the indices and the EEUI as juxtaposed in *Chart 3* are broadly consistent, as also suggested by the mild to strong negative correlations among them (blue brackets in *Chart 3*). This again indicates that the EEUI could serve as an additional quick reference for monitoring the economic and business sentiment in Hong Kong.

**Table 4: Selected survey-based indicators for gauging Hong Kong's economic and business sentiment and prospects**

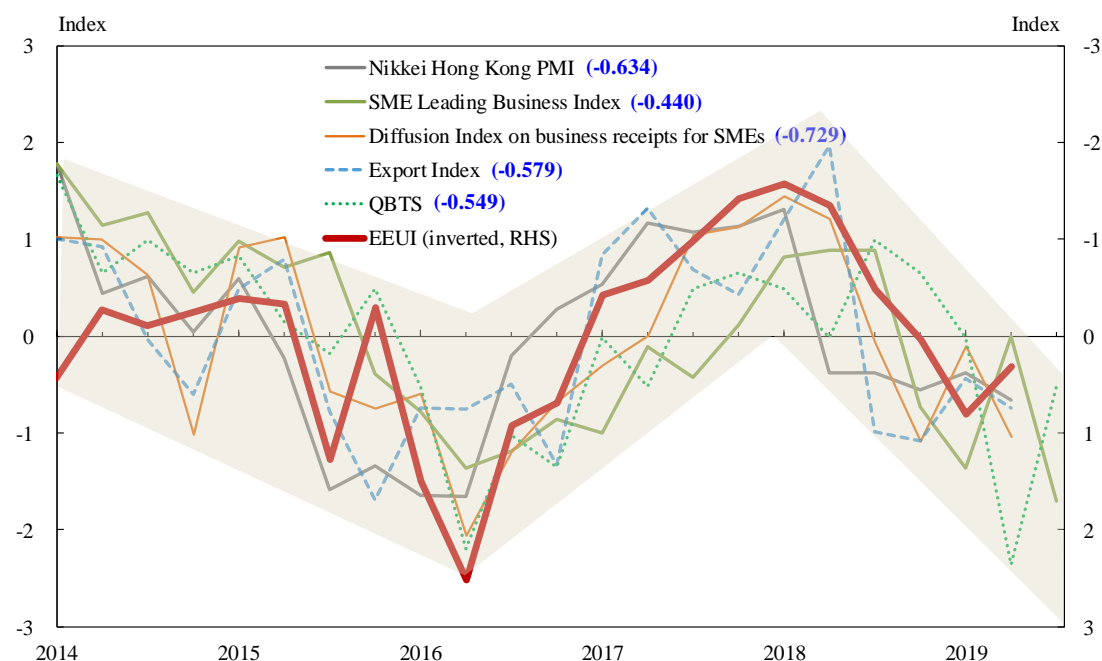
Survey-based indicators	Released by	Frequency	Reference period*	Release date
i. Quarterly Business Tendency Survey (QBTS)	Census and Statistics Department	Quarterly	Q3 2019	19 July
ii. SME Leading Business Index	Standard Chartered Hong Kong / Hong Kong Productivity Council	Quarterly	Q3 2019	25 July
iii. Export Index	Trade Development Council	Quarterly	Q2 2019	10 June
iv. Diffusion index on business receipts for SMEs	Census and Statistics Department	Monthly	July 2019	9 August
v. Nikkei Hong Kong PMI	Markit / Nikkei	Monthly	July 2019	5 August

Notes: (\*) As at position up to Q3 2019.

- (i) Based on a survey collecting views from around 500-600 large establishments on their near-term business outlook.
- (ii) The index comprises five areas, including local SMEs' outlook on their "Sales amount", "Profit margin", "Investments", "Staff number", and "Global economic growth" for the next quarter.
- (iii) Designed to gauge the prospects of the near-term export performance of Hong Kong traders. The business confidence survey is conducted on a quarterly basis, with 500 participating Hong Kong traders from six major industry sectors interviewed, namely electronics, clothing, jewellery, timepieces, toys and machinery.
- (iv) Based on soliciting feedback from a panel sample of around 600 SMEs each month.
- (v) Compiled according to monthly replies to questionnaires sent to purchasing executives in around 400 companies. It is a composite index based on five individual indices: New Orders; Output; Employment; Suppliers' Delivery Times; and Stock of Purchases. Survey responses reflect the change, if any, in the prevailing month compared to the previous month.



**Chart 3: Comparison of EEUI with survey-based indicators of economic and business sentiment and prospects in Hong Kong, Q1 2014 – Q3 2019**



Notes: All data series are standardised to have a zero mean and unit standard deviation.

Figures in brackets denote the correlation coefficients between the EEUI and the respective indicators.

16. Among these indicators, the Quarterly Business Tendency Survey (QBTS), the Small and Medium-sized Enterprises (SME) Leading Business Index and the Export Index have reference periods covering the period beyond the release date (e.g. the reports released in July have reference periods of Q3 for the former two), yet only quarterly series are available. The remaining indicators are monthly diffusion indices that are released after the reference period (**Table 4**). All these survey-based measures are normally influenced by the subjectivity of opinions provided by the respondents.

17. In comparison, while the EEUI is non-forward-looking in nature, it could be conducive to high-frequency monitoring and its update (say monthly) can be made available almost immediately after the end of the period. Also, the compilation does not rely on survey results, but instead mechanically based on a sufficiently large sample pool of news content. While news content is also arguably subjective, we believe millions of news articles from different media agencies all over the world should somewhat neutralise the subjectivity bias.

18. While the EEUI constructed here is comparatively timely, cost-effective and intuitive, there are limitations in its own setting, for example:

- The compilation of the index does not take into account the quality of news articles or even credibility of news content published by the selected news sources. In particular, both the number of online news sources and the number of real-time breaking news updates increased significantly in recent years and it

is possible that some may contain noise not favourable for tracking economic performance.

- Unlike the aforementioned diffusion indices, the absolute levels of the EEUI do not have a direct economic interpretation (say pointing to expansion or contraction of business activities). It also cannot be broken down by economic sector for understanding sector-specific performance.
- News articles and editorials containing terms in the prescribed set do not necessarily intend to convey the relevant views on economic uncertainties and sentiment. It could be the case while the articles contain the listed negative economic keywords, the true meaning of the whole piece may take a much more neutral or even positive tone (e.g. ‘the economic risks *are receding*’, ‘the recession *is already over*’, etc.).

19. While some of the above limitations could be somewhat mitigated if the volume of news content analysed is sufficiently large, a better way to further improve the methodology would be to rely on more advanced machine learning techniques including natural language processing (NLP) to conduct full-text sentiment analysis. Nevertheless, such advanced approaches may involve other difficulties as full-text mass downloading is normally prohibited by common online news archives, to say nothing of the technical difficulties in working on the text database and applying suitable algorithms to fit the statistical models for analyses. We are more favourably inclined to the current simpler and resource-efficient method, as long as it can broadly and in a timely manner trace our local economic performance alongside other survey-based indicators.

## V. CONCLUDING REMARKS

20. This article constructs, by making reference to recent literature, a quick index to gauge and track external economic uncertainties, the EEUI, based on news content from global newspaper sources. It can be shown that the EEUI moves broadly contemporaneously with key macroeconomic variables in Hong Kong, such as the rates of change in real GDP, and it does proxy the changes in economic performance of Hong Kong, a small and open economy subject to substantial influence by external factors, rather well. As compared with other survey-based measures of Hong Kong’s economic conditions, the index provides a more cost-effective way to track economic uncertainties and sentiment, so the index could be used as a ‘litmus indicator’ for economic monitoring alongside traditional survey-based indicators.