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Doctoral Dissertation

ANALYSIS OF ECONOMIC FLUCTUATION IN HONG KONG SAR AND SINGAPORE

(Summary)

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Summary

This dissertation investigates macroeconomic fluctuations in Hong Kong and Singapore, which are widely regarded as two of the most successful small open economies in Asia. Despite limited domestic markets, scarce natural resources, and high exposure to external shocks, both economies have achieved remarkable economic development and reached some of the highest levels of per capita income in the region. Their economic success raises an important question: how have these two economies sustained long-term growth and macroeconomic stability despite substantial external vulnerability?

Several common features may help explain their economic performance. Both economies have adopted outward-oriented development strategies, maintained relatively open and competitive business environments, and become major international financial and trading centers in Asia. At the same time, their small size and high degree of openness make them particularly sensitive to fluctuations in the global economy. Understanding how external shocks are transmitted to domestic economic activity and how these economies adjust to such disturbances is therefore an important issue in macroeconomic analysis.

Although Hong Kong and Singapore share many structural characteristics, they differ significantly in their institutional and policy frameworks. Hong Kong operates under a currency board system that maintains a fixed exchange rate against the U.S. dollar. In contrast, Singapore conducts monetary policy by managing the nominal effective exchange rate of the Singapore dollar. These differences provide an opportunity to examine how alternative institutional arrangements influence economic fluctuations, price adjustment, and macroeconomic stability in highly open economies.

This dissertation was undertaken as part of the graduate research program in economics and was motivated by the desire to obtain a broader understanding of macroeconomic fluctuations in small open economies. Using official macroeconomic data from

the Census and Statistics Department of Hong Kong, the Department of Statistics Singapore, the Hong Kong Monetary Authority, and the Monetary Authority of Singapore, the study employs a range of modern time-series econometric methods, including unit root tests, cointegration analysis, Vector Error Correction Models (VECM), and Structural Vector Autoregression (SVAR). Rather than focusing on a single aspect of macroeconomic performance, the dissertation aims to provide a comprehensive analysis of the domestic and external factors that influence the economic adjustment process in Hong Kong and Singapore.

The remainder of this dissertation is organized as follows. Chapter 1 examines the macroeconomic structures, institutional frameworks, and macroeconomic performance. Chapter 2 analyzes the cyclicality of real wages with real GDP. Chapter 3 tests macroeconomic variables for deterministic or stochastic trends using unit root and structural-break tests. Chapter 4 assesses purchasing power parity between Hong Kong and Mainland China via cointegration. Chapter 5 investigates how inflation shocks from the US and China transmit to Hong Kong and Singapore. Chapter 6 analyzes the link between output and prices using a structural vector autoregression to identify sources of macroeconomic fluctuations. The final chapter summarizes the main findings and suggests future research directions.

The main contents of the chapters are summarized as follows:

Chapter 1. Macroeconomics Structure and Institutional Frameworks

Chapter 1 compared the macroeconomic structures, performance, and institutional frameworks of Hong Kong and Singapore from 1975 to 2025. It found that both economies are highly open and resource constrained. Hong Kong has become increasingly specialized in financial services (approximately 25% of GDP), and Singapore has maintained a diversified economy with manufacturing contributing approximately one-fifth of GDP.

Hong Kong's currency board offers a stable nominal anchor but requires internal adjustments, such as in prices and wages. Singapore's managed float lets the exchange to

rate absorb shocks, lessening domestic pain. Evidence from past crises confirms these differences. The empirical analysis showed that Singapore consistently outperformed Hong Kong in most macroeconomic dimensions during 2008–2025: higher growth (3.95% vs. 1.81%), lower inflation (2.19% vs. 2.54%), lower unemployment (2.19% vs. 3.72%), and less volatility. Hong Kong's investment exhibited extreme volatility (CV = 11.98), indicating substantially greater fluctuations in investment activity than in Singapore. The evidence suggests a fundamental trade-off between credibility and flexibility (Gerlach & Gerlach-Kristen, 2006; Ma et al., 2007). Hong Kong's currency board provides exchange rate credibility, which is essential to its role as an international financial gateway. Although Singapore's managed float offers greater macroeconomic stability, it requires substantial reserve buffers and institutional capacity.

Chapter 2. Real Wage Cyclicality in Hong Kong and Singapore

Chapter 2 analyzed the cyclicality of real wages within Hong Kong and Singapore, with a focus on their relationship with real GDP. The analysis examined the sensitivity of this relationship to different detrending methods: the Hodrick–Prescott (HP)-filter and linear time trends (LT). In addition, the persistence of the cyclical components was assessed using autocorrelation analysis.

This chapter's findings showed that the cyclical behavior of real wages relative to real GDP depended heavily on the detrending technique. When the HP filter was applied, real wages in Hong Kong showed virtually no cyclical relationship with real GDP, as the coefficients were small and lacked statistical significance. In contrast, when a linear trend was used, the relationship between real GDP and real wages was countercyclical in Singapore and Hong Kong. These contrasting outcomes confirmed the sensitivity of real wage cyclicality to methodological choices, as emphasized by Abraham and Haltiwanger (1995).

Our findings broadly align with those of Abraham and Haltiwanger (1995), who reported that real wages do not exhibit a systematic procyclical or countercyclical pattern once measurement and detrending issues are addressed. However, this chapter revealed

a notable difference between the two economies: Singapore displayed some evidence of procyclicality, whereas Hong Kong showed no clear cyclical relationship. This contrast may reflect the differing exchange rate regimes and labor market structures of the two economies.

Chapter 3. Trends and Random Walk in Macroeconomic Time Series

Chapter 3 conducted four types of analysis—sample autocorrelation, the Augmented Dickey-Fuller (ADF) test, the F-test, and the Zivot-Andrews (ZA) test—to examine the stationarity of key macroeconomic variables in Hong Kong and Singapore.

The autocorrelation analysis provides preliminary insights into the time-series properties of the variables. The autocorrelations of the natural logarithms remain close to unity and decay slowly across all lags for most series, suggesting the presence of a unit root. When the first differences are examined, the autocorrelations decline substantially, supporting the view that most series are difference-stationary. However, the detrended series still exhibit high persistence for real GDP, nominal GDP, and prices, while the persistence of real wages is markedly lower, especially in Singapore.

The ADF test results indicated that most macroeconomic variables in both economies are DS. However, notable exceptions emerged: the unemployment rate (UR) in Singapore appeared to be trend-stationary (TS). The F-test results provided evidence against the random walk hypothesis. Real GDP and nominal GDP in both Hong Kong and Singapore strongly reject the random walk specification, while employment and real wages generally failed to reject the null hypothesis. For the UR, the evidence differed across economies: the null hypothesis could not be rejected for Hong Kong, whereas it was strongly rejected for Singapore. Overall, nominal variables exhibited stronger departures from a random walk process than labor market variables. The ZA test confirms the ADF findings for most variables, allowing for a one-time structural break. In Hong Kong, nominal GDP showed stationarity around a break. In Singapore, nominal GDP and CPI rejected the unit root when a break was allowed. All other variables remained difference-stationary (DS) even after accounting for a structural break.

Overall, our findings are broadly consistent with those of Nelson and Plosser (1982), who argued that most macroeconomic variables in the United States (US) are DS. For Hong Kong and Singapore, the evidence strongly supported the DS representation of macroeconomic time series, except for Singapore's UR, which appeared to be TS.

Chapter 4. Testing Purchasing Power Parity between Hong Kong and Mainland China: Cointegration Test Evidence

Chapter 4 provided mixed evidence regarding the long-run price relationship between Hong Kong and Mainland China. The VECM estimation results reveal that adjustment toward long-run equilibrium occurs primarily through the Hong Kong–US exchange rate. In contrast, price levels in Hong Kong and Mainland China exhibit little response to deviations from equilibrium. This outcome reflects Hong Kong's currency board system, where the HK dollar–US dollar rate primarily burden of adjustment. The chapter's findings reveal that some price transmission from Mainland China to Hong Kong; however, strict PPP does not hold. These results highlight the role of exchange rate arrangements in shaping the adjustment process and suggest that further research incorporating structural breaks, alternative price indices, and robustness checks would be valuable for a more comprehensive assessment of the long-run validity of PPP between Hong Kong and Mainland China.

Chapter 5. Effects of US–China Inflation on Hong Kong and Singapore

Chapter 5 estimated an SVAR model with short-run restrictions for the consumer price inflation rates of China–Hong Kong, China–Singapore, the US–Hong Kong, and the US–Singapore. Compared with Singapore, Hong Kong's inflation rate is more responsive to US price shocks (Cheung & Yuen, 2002). The findings of this study contradict Cheung and Yuen's conclusion: the present results suggest that Singapore's inflation is more responsive to external price shocks than Hong Kong's. The findings differ from those reported in previous studies, possibly due to differences in empirical methodology and sample period.

The Johansen cointegration test was applied to two pairs to analyze a three-country framework: US–China–Hong Kong and US–China–Singapore. A key difference was noted: only US–China–Hong Kong showed a single cointegrating vector, indicating a stable long-term relationship; no cointegration was found for Singapore. Given cointegration among the US–China–Hong Kong, a VECM was estimated for this framework. The error-correction terms for the US and China are statistically significant, indicating that both are converging toward, rather than diverging from, the long-run equilibrium. In Hong Kong, the coefficient is statistically insignificant, indicating weak adjustment dynamics. Inflation in a small country (not a large one) adjusts to deviations from the cointegration relationship between the CPIs (Cheung & Yuen, 2002). Our estimates have shown contradictory results.

To further examine the relative importance of shocks, we now turn to impulse response functions (IRF) and forecast error variance decompositions (FEVD). The IRF and FEVD results show that inflation is primarily driven by domestic factors, accounting for more than 90% of its forecast error variance over the long run. China exerts the strongest and most persistent influence on Hong Kong's CPI, reflecting the close economic integration between Hong Kong and Mainland China. Conversely, the contribution of US inflation shocks remain relatively limited. Consequently, while Hong Kong is exposed to external inflationary pressures, the transmission of inflation from China is considerably more important than that from the US. Overall, the evidence from the bivariate SVAR models indicates that external inflation spillovers to Hong Kong are relatively limited compared with Singapore. Hong Kong's inflation remains predominantly driven by domestic factors, China has become the dominant external source of inflation transmission over the long run.

Chapter 6. Analysis of Fluctuation of Real Output and Price

Chapter 6 analyzed macroeconomic fluctuations and shock transmission in Hong Kong and Singapore from 1975–2025, using advanced econometric models like VECM and SVAR, under short- and long-run restrictions. Hong Kong's VECM confirms a

long-term link among macroeconomic variables. The Error Correction Term of -0.007 for real GDP indicates a very slow adjustment process toward equilibrium. Consequently, deviations from the long-run relationship between output and prices are corrected only gradually, suggesting persistent effects of shocks on the macroeconomic adjustment process. In contrast, the SVAR results for Singapore indicate that price shocks have a slight effect on real output, supporting the long-run neutrality of money. Output shocks slowly raise inflation from 18.26% in the short run to 20.61% in the long run, inflation shocks have only a limited impact on output. The similarity of the results obtained under both short- and long-run identification schemes indicates that real output shocks overwhelmingly explain output fluctuations, whereas price shocks exert only a negligible influence on output. This pattern is broadly consistent with the classical view that real factors dominate economic fluctuations and that monetary disturbances have limited effects on real activity.

Compared with Singapore, price shocks could explain a larger proportion of output fluctuations in Hong Kong. Accordingly, price disturbances may play a more significant role in transmitting external shocks to the real economy. As a highly open economy, Hong Kong may be more vulnerable to external price movements, subsequently influencing domestic output fluctuations. The findings indicate that the interaction between output and prices differs between Hong Kong and Singapore. However, this finding should not be interpreted as evidence that monetary policy is irrelevant. Given that the present model includes only real GDP and the GDP deflator, it cannot directly evaluate the effectiveness of Singapore's monetary policy based on the exchange rate.

Compared to Singapore, a larger portion of fluctuations in Hong Kong's real GDP can be attributed to shocks to the GDP deflator. If fluctuations in Hong Kong's GDP deflator are driven by foreign price shocks, Hong Kong may be more susceptible to foreign price fluctuations than Singapore, which contradicts the findings presented in Chapter 5.

Final chapter

Unresolved Issues and Future Research

Although this study is comprehensive, several issues remain open for future research. First, structural breaks and regime changes could be further examined using the Bai–Perron multiple structural break test to determine if macroeconomic relationships have changed over time. Second, the output–price framework could be expanded by incorporating external variables such as U.S. output, interest rates, and oil prices within a multivariate VAR framework. Third, it would be beneficial to include asset prices and financial variables to analyze their roles in macroeconomic fluctuations, particularly in Hong Kong, where financial market dynamics are closely linked to business cycles. Fourth, the transmission of China's inflation to Hong Kong and Singapore could be explored further by investigating the roles of trade linkages, financial integration, and exchange rate dynamics. Fifth, labor market flexibility could be studied by focusing on institutional factors such as wage-setting mechanisms, employment protection, and government intervention in Hong Kong and Singapore. Finally, the effectiveness of different exchange rate regimes could be investigated by quantifying Singapore's insulation from external shocks and assessing whether greater integration with Mainland China could enhance the long-term sustainability of Hong Kong's currency board.