



UNIVERSITI PUTRA MALAYSIA

**INTERNATIONAL PARITIES AND BUSINESS CYCLE
SYNCHRONIZATION IN THE ASIA PACIFIC REGION**

CHAN TZE-HAW

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**INTERNATIONAL PARITIES AND BUSINESS CYCLE SYNCHRONIZATION
IN THE ASIA PACIFIC REGION**

By

CHAN TZE-HAW

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in
Fulfillment of the Requirements for the Degree of Doctor of Philosophy**

April 2009



To

Father, Family and God

I keep in mind:

Given the choice between Bob Solow and an econometric model to make forecasts, I'd choose Bob Solow; but I'd rather have Bob Solow with an econometric model, than Bob Solow without one.

-Paul Samuelson



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in the fulfillment of the requirement for the degree of Doctor of Philosophy.

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April 2009

Chairman : Professor Ahmad Zubaidi Baharumshah, PhD

Faculty : Faculty of Economics and Management

The 1997 financial turmoil, in conjunction with the escalating global uncertainties and exchange rate volatilities, has revealed the need of APEs (especially East Asian) to formulate new development path towards sustainable growth. Yet, no ideal solution has been proposed and major concerns are now centered at finding an equilibrium position within macroeconomic trilemma: the incompatibility between capital mobility, monetary policy independence and a fixed (stable) exchange rate regime. The present thesis tries to tackle the issue from two standpoints. First, the extent of economic integration: (i) goods (and services) versus financial market integration; (ii) regional (within ASEAN+3+2+1) versus global (US, Japan, China) integration, and (iii) over time, for the pre- and post-liberalization period as well as the pre- and post-crisis period. Second, the choice of optimal exchange rate regime underneath the tendency towards regional integration. Two major analyses are being conducted. The first engaged with the international parities that include the PPP, UIP and RIP conditions



(1976M1-2007M1). The latter then deals with the feasibility of OCA, which focus on the Business Cycle Synchronization assessment (1960-2004) among the selected APEs vis-à-vis the US, Japan and China. To accomplish the analyses on international parities, both univariate and panel-based unit root tests are adopted. Endogenous breaks and the half-life estimation are conducted to capture the shocks adjustments towards the equilibrium, overtime. As for the OCA analyses, the band-pass filtering is used to construct business cycles. The ARDL modeling and UECM are further utilized to assess the long-and short-run co-movement of aggregate economic behavior as justification of common cycles and shocks synchronization.

Several important findings are worth noting. First, the support for PPP is time-specific and time-dependent. Supports for PPP and goods markets integration were found when the data was extended to include the post-crisis period. PPP failure prior to 1997 is confirmed by the exchange rate misalignment of APEs. The evident that regional currencies were overvalued prior to the 1997 speculative attacks was more apparent for Taiwan, South Korea, Singapore, Thailand and the Philippines. However, regional authorities have shown some form of PPP-oriented rule as a basis for their exchange rate policy in the aftermath of Asian crisis, in order to maintain international competitiveness and to stabilize domestic income. In addition, supports for UIP are neither concrete, most probably due to the existence of time-varying risk premium as well as possible effects of central bank interventions especially among the developing East Asian. Hence, the commencement of monetary expansion to defend currency remains as policy debate. Then, RIP holds for all of APEs regardless of numeraire used, except South Korea-China. The finding coincides with the increased regional financial integration prompted by financial liberalization, technological breakthroughs, and



growth in the capitalization among APEs. However, the variety of endogenous breaks occurred throughout the 1980s and 1990s suggests that financial markets are more vulnerable than the foreign exchange and goods markets. Empirically, APEs financial markets are still dominated by the US market though there is an increased of Japanese and Chinese influence in the post-liberalization era. Lastly, the co-movements of ASEAN-US-Japan-China cycles are confirmed but more evident when the post-crisis period is included. Nevertheless, both the long- and short-run modeling indicates that the idiosyncratic and common shocks of ASEAN economies are more identical to the Japanese experience rather than the US whereas the Chinese influences are on the rise. Hence, the formation of OCA will be more beneficial and less risky if Japan is included.

In brief, the findings imply an improved integration process among the APEs. Empirical evidences, when putting together, have shown partial fulfilment of the three (out of five) fundamental criteria for OCA. Yet, macroeconomic disparities are still persisting especially among the emerging-developed markets. And, there is no evidence to support recent proposal of decoupling from the global markets. In other words, sub-group financial deepening, currency arrangements and early warning system construction are more feasible and open regionalism should be promoted. Moreover, the sequencing problem of trade and financial liberalization should be corrected in the process of building sustainable development.



Abstrak tesis yang di kemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah.

**PARITI-PARITI ANTARABANGSA DAN SINKRONISASI KITARAN
PERNIAGAAN DI RANTAU ASIA PASIFIK**

Oleh

CHAN TZE-HAW

April 2009

Pengerusi : Profesor Ahmad Zubaidi Baharumshah, PhD

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Krisis Kewangan 1997, diiringi ketidakstabilan global dan pertukaran asing yang mendadak, menandakan keperluan APEs (terutamanya Asia Timur) untuk merangka sistem pembangunan baru yang berkekalan. Antaranya, sasaran utama tertumpu pada pencapaian keseimbangan dalam trilemma makroekonomi antara mobiliti modal, kebebasan polisi monetari dan kestabilan pertukaran asing. Tesis ini cuba menangani isu tersebut melalui dua arah penyiasatan. Yang pertama, dari segi integrasi ekonomi, (i) antara pasaran barangan dengan kewangan; (ii) antara rantau (ASEAN+3+2+1) dengan global; (iii) mengikut masa, iaitu pra- dan lepas-liberalisasi serta pra- dan lepas-krisis. Keduanya, rejim pertukaran asing optima yang sesuai dengan integrasi serantau. Selanjutnya, dua analisis utama dilaksanakan. Pariti-pariti antarabangsa yang merangkumi PPP, UIP dan RIP (1976M1-2007M1) dikaji khas untuk menyiasat tahap integrasi ekonomi. Sinkronasi Kitaran Perniagaan (1960-2004) pula dikaji untuk menyiasat kesesuaian kawasan mata wang optima (OCA) di rantau Asia Pasifik.



Siasatan Pariti antarabangsa melibatkan ujian-ujian kepegunan, gangguan endogen dan paroh-hidup yang mampu menangkapi pembetulan ketidakseimbangan, seiring waktu. Bagi analisis OCA pula, kaedah penapisan band-pass, pemodelan ARDL dan UECM diguna untuk menilai kewujudan keluk-keluk perniagaan umum dan kejutan berpautan di serantau Asia Pasifik dari segi jangka panjang dan jangka pendek.

Beberapa dapatan kajian yang penting perlu ditekankan. Pertamanya, sokongan PPP didapati bersandar pada perubahan masa. Integrasi pasaran barangan dan PPP disokong khasnya pada tempoh lepas-krisis. Kegagalan PPP dalam tempoh pra-krisis disebabkan penyelewengan pertukaran asing. Lebihan nilai mata wang adalah ketara bagi Taiwan, Korea Selatan, Singapura, Thailand dan Filipina sebelum serangan spekulasi 1997. Sebaliknya, pihak berkuasa serantau seolah-olah memegang pada pendekatan mata wang asing yang berorientasikan PPP pada lepas-krisis, demi mengukuh persaingan antarabangsa dan menstabilkan pendapatan domestik. Selain itu, sokongan UIP juga kurang kukuh. Keadaan ini kemungkinan besar disebabkan risiko premium yang berubah mengikut masa serta campur tangan bank-bank negara serantau (khasnya negara Asia Timur yang membangun) di pasaran kewangan. Justeru, keberkesanan pengembangan monetari untuk mempertahankan nilai matawang masih diragui. Selanjutnya, RIP diiktiraf bagi semua APEs (kecuali Korea Selatan-China) termasuk kes-kes pembolehkan monetari US, Jepun atau China digunakan. Penemuan ini sejajar dengan peningkatan integrasi kewangan serantau yang dipercepatkan oleh dasar liberalisasi, kemajuan teknologi dan pertumbuhan permodalan antara APEs. Numun, gangguan endogen yang tidak konsisten sepanjang 1980an dan 1990an mencadang bahawa pasaran kewangan adalah kurang stabil berbanding dengan pasaran barangan dan pasaran pertukaran asing. Bukti empirik juga menunjukkan bahawa

pasaran kewangan APEs masih didominasi oleh pasaran US, selain pembangkitan pengaruh dari Jepun dan China pada era lepas-liberalisasi. Akhirnya, dapatan kajian turut menunjukkan bahawa kitaran-kitaran perniagaan ASEAN-US-Jepun-China saling berpaut terutamanya apabila tempoh ujian dilanjut sehingga lepas-krisis. Sedangkan pengaruh China membangkit, ujian ekonometrik mencadang bahawa kejutan spesifik dan umum kitaran perniagaan ASEAN adalah lebih seiras dengan pengalaman Jepun berbanding US. Maka, pembentukan OCA yang merangkumi Jepun adalah lebih menguntungkan dan kurang risiko.

Kesimpulannya, penemuan utama tesis ini menandakan peningkatan proses integrasi antara APEs. Bukti-bukti empirik menunjukkan bahawa APEs memenuhi tiga (daripada lima) pra-syarat asas OCA. Namun, ketidaksamaan makroekonomi masih wujud antara APEs yang membangun-maju. Tambahan pula, penemuan tesis ini tidak menyokong cadangan baru ‘decoupling’ dari pasaran global. Yakni, kebolehlaksanaan pendalaman kewangan, penyelarasan mata wang dan pembentukan sistem amaran awal mengikut ‘sub-group’ adalah lebih cerah, dan regionalisme terbuka perlu digalakkan. Lebih-lebih lagi, masalah ‘turutan’ antara liberalisasi perdagangan dan kewangan perlu ditangani dalam proses pembentukan strategi pembangunan yang berkekalan.

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I certify that an examination committee has met on 29th April 2009 to conduct the final examination of Chan Tze-Haw on his thesis entitled “International Parities and Business Cycle Synchronization in the Asia Pacific Region” in accordance with University and University College Act 1971 and the Constitution of the University Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the candidate be awarded the Doctor of Philosophy.

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations, which has been duly, acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

CHAN TZE-HAW

Date: 30 January 2009

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CHAPTER 1

INTRODUCTION

1.0 Introduction

Open economy macroeconomics issues are now very much at the core of major changes throughout the world. Institutional developments towards worldwide integration have taken place so rapidly that one could not have even imagined two decades ago. Deregulation, globalization and technology advancement have already transformed the global capital marketplace, and will continue to so. On one hand, proponents often stress that economic integration improves risk sharing, promotes competition and increases the efficiency of capital allocation that result in more productive investments and hence better economic growth. Opponents, on the contrary, argue that greater integration resulted in volatile market prices and contagion effects that entail with greater transmission of shocks across countries or region¹.

Policymakers' views about the net benefits of globalization may influence their stance about the aggressiveness with which form of integration should be promoted, but even the opponents are likely to favour at least some measures promoting regional integration. Nothing is firm about the outcome of the integration process but global changes are expected to cultivate at higher pace following the recent international events i.e. the

¹ In portfolio analysis, stock market integration leads to different implication. Habitually, changes in the covariance structure of cross-country stock returns affect asset prices and the return volatility of investment portfolios. Increase in these covariances due to a highly integrated world stock market would imply the similar priced of securities returns which resulted in fewer domestic risks that can be diversified internationally and benefits for cross-border diversification eventually diminishes (Stulz, 1995; Akdogan, 1996; Karolyi and Stulz, 1996). Likewise, in the corporate finance view, high stock market integration implies less opportunity to acquire capital at lower cost across borders, which further discourage the activities of foreign listings (Hooy and Goh, 2008).



launch of Euro money and the outbreaks of several contagious crises such as the 1997/98 Asia financial turmoil and the recent Subprime Mortgage crisis.

According to the definition of Asia Development Bank (ADB), regional economic integration refers to a process through which economies in a region become more interconnected, as a result of the market-led and private-sector-driven actions and/or government-led policies and collective initiatives at regional level. The collective policies and initiatives by the governments which, in turn, could be either formally embodied in an intergovernmental treaty or informally agreed upon by the participating countries are often regarded as regional cooperation. Regional integration is thus broader in scope than regional cooperation. The two could, however, be mutually reinforcing in the sense that regional cooperation can deepen regional integration and at the same time rising regional integration can prompt, and even compel, governments to cooperate collectively to internalize externalities created by integration.

Being in one of the fast-growing region, most Asia Pacific economies (APEs hereafter) have pursued the trend of wide-scale financial deregulation² and exchange rate liberalization since 1970s, in order to maximize economic efficiency and meet the global challenges. Yet, the 1997/ 98 financial turmoil, in conjunction with the escalating global

² Typically such deregulation embraces the abandonment of exchange controls, the abolition of interest rate ceilings, the liberalization of the scope of business activity (e.g. liberalization of segmentation barriers and restriction on geographical areas of operation) and finally, the liberalization of financial markets. Asia Pacific economies have pursued financial liberalization at similar stage but different timing. Central banks of Hong Kong (1973), Singapore (1975) and Malaysia (1978) were among the first to liberalize their interest rate controls. In Indonesia and Philippines, interest rates were fully deregulated in the early 1980s. Taiwan, Thailand and South Korea did not abolish their interest rate ceilings until mid to late 1980s. For South Korea, the prospect of becoming an OECD-member country was instrumental in the move towards liberalizing its financial market. In Japan, interest rate deregulation began gradually in 1979 and was only completed in 1994.



uncertainties and exchange rates volatilities, has revealed the need of APEs (especially among the East Asian) to formulate new development path towards sustainable growth. Inspired by the success of European Union and the now defunct Euro dollar, growing efforts have been made to promote regional economic integration, monetary collaboration and trading blocs among the APEs, which to some extent, leading to the resurgence of interest in justifying regionalism versus multilateralism³.

The integration process among the East Asian, India and Oceania members towards East Asian Community has been enthused by the initiatives of ASEAN (Association of Southeast Asia Nations). Despite the proposal of Asian Monetary Fund by Japan during the late 1990s, ASEAN expanded itself into ASEAN+3 in 1999. In 2001, ASEAN+3 (Japan, China, South Korea) launched Chiang Mai Initiative (CMI) and currency swap agreement to ensure exchange rate stability among members and as regional liquidity facility for crisis prevention and management⁴. The Asian Bond Markets Initiative (ABMI, 2002) was also launched to develop well-functioning, local-currency bond markets in Asia that can reduce incentives to rely too heavily on domestic bank financing and external short-term borrowing. In 2003, the Asian Bond Fund (ABF) was introduced.

³ Today, ASEAN including Malaysia has faced not only challenges of increasing trade liberalization but also modalities towards freer trade, especially with greater institutionalization of Regional Trade Agreements (RTAs) in European countries and the Americas. The usual debates concern of whether the RTAs are truly beneficial to the region's economies and, whether the regionalism has been a building bloc or stumbling bloc to Multilateral Trading Arrangements (MTAs) required by the WTO.

⁴ The 1997/98 Asian crisis reveals the importance of regional cooperation to prevent from currency crisis. The total amounts which IMF agreed to support to Thailand, Indonesia and Korea were only US\$ 35.2 billion, while total amounts of foreign exchange reserves held by the East Asian central banks including Japan, China, Taiwan, Hong Kong and Singapore at that time were more than US\$ 600 billion. However, none can be utilized for preventing the occurrence of the currency crisis since there was no concrete agreement for monetary cooperation in the region.



During the 9th ASEAN Summit (7-8 Oct 2003, Bali, Indonesia), leaders from ASEAN, China, India, Japan and South Korea have expressed their strong support for the Bali Concord II as a solid platform to achieve an ASEAN Community by 2020 based on political-security, economic and socio-cultural cooperation. In 2006, ADB tried to launch Asian Currency Unit (ACU) to further accelerate cooperation within Asia, hoping that one day the ACU will grow to become the region's legal currency. During the East Asia Summit in 2005, the ASEAN10+3+2+1 framework was further proposed to include Australia, New Zealand and India. Ideally, a single market and production base will be established by 2015. And, on November 20, 2007 during the 13th Summit in Singapore, ASEAN Leaders signed the ASEAN Charter and the ASEAN Economic Community (AEC) Blueprint for further cooperation within the ASEAN+3+2+1 framework⁵.

Another important change of the trading strategy in the aftermath of Asia crisis is the growing of Free Trade Areas (FTAs) and Preferential Trade Agreements (PTAs)⁶ among the APes. PTAs in the region are relatively advanced and have served as vehicles for fostering regional cooperation in other economic and non-economic issues, though they have been less active than PTAs in other regions in altering tariffs. ASEAN has realized the ASEAN Free Trade Area (AFTA) whereas Australia and New Zealand have deepened the Closer Economic Relations Trade Agreement (CER) and, extended the preferential trade to their Pacific island neighbors via the South Pacific Regional Trade and Economic Cooperation Agreement (SPARTECA). Also, the Japan-Singapore and US-Singapore trade

⁵ Members included the ASEAN 10 + Japan, China, South Korea + Australia, New Zealand + India.

⁶ There are several types of PTAs, in terms of their level of trade and economic integration. The most modest form of PTA involves preferential tariffs—but not eliminated tariffs—between two or more countries on certain goods. This contrasts with most-favored nation (MFN) trade liberalization, which occurs when each country lowers its trade barriers for all of its trading partners, regardless of the other countries' trade policies.



agreement were signed in January 2002 and May 2003 respectively. There are other PTAs on the agenda. For example, the East Asian Free Trade Agreement, the expansion of ASEAN, and further bilateral agreements between Japan-South Korea, US-Thailand and US-Australia are all currently being discussed.

Increasing trade integration and macroeconomic interdependence among the East Asian and Oceania economies (ASEAN+3+2+1) has far-reaching implications for the region and for the global economy. Despite economic expansion, the issue of monetary cooperation is nowadays emerging as a serious and important task of how regional economies can survive amid the increasing tide of financial globalization and international financial instability. Indeed, one of the major issue raised among regional dialogs and conventions (e.g. the 2008 EAEA Annual Convention, Philippines) is that the increased regional integration may help the region 'decouple' from the global uncertainties (e.g. the US' Subprime Mortgage crisis) and better sustain fast growth, in consideration of the huge demand market and production base in China, India and Japan. Asia's fast-rising share of global trade and finance has also been linked with the region's rising political influence in the global community.

Among these recent developments, two intimately interrelated macro issues are of major concern. First, the extent of economic integration: (i) goods (and services) versus financial market integration; (ii) regional (within ASEAN+3+2+1) versus global (with the rest of the world) integration, and (iii) over time, for the pre- and post-liberalization period as well as the pre- and post-crisis period. Second, the choice of optimal exchange rate regime and exchange arrangement underneath the tendency towards regional integration.



Should it be free floats, fixed peg, soft peg, or common currency basket? And if the latter is preferred, should it be an internal basket or external basket? ⁷

In broader aspect, both macro issues are related to the stainless Mundell-Fleming model, previously christened the impossible or unholy trinity (macroeconomic trilemma): the incompatibility between capital mobility, monetary policy independence and a fixed exchange rate regime. The study of both issues leads to vital implications on the regional monetary cooperation, currency arrangement and defence mechanism among the APEs. The formal issue can be assessed by international parity conditions, namely the Purchasing Power Parity (PPP) and the Interest Parity (e.g. Unconverted Interest Parity, Real Interest Parity). The second issue then involves the assessment of an Optimal Currency Area (OCA) advocated by [Mundell \(1961\)](#), among others.

Based on the surveys done by [Tavlas \(1993\)](#) and [De Grauwe \(2005\)](#), the OCA criterion consist of (i) the openness and goods market integration; (ii) factor market integration; (iii) similarity in economic structure and symmetry in (real) shocks; (iv) financial market integration; and (v) policy coordination. Among the OCA criterion, most studies focus on the symmetric nature of fundamental (real) shocks and business cycle synchronization. Specifically, when forming an OCA, the member countries need to renounce the monetary policy autonomy. If shocks to respective economies are symmetric across member nations with synchronized cycles, the cost of relinquishing the discretionary

⁷ When countries adopt an internal basket, which is what the Europeans did when setting up the EMS, they constrain the bilateral exchange rates of the member countries but let them float collectively *vis-à-vis* the dollar and other 'outside' currencies. If, by contrast, they adopt an external basket, they will still constrain their bilateral exchange rates but will also constrain the exchange rates between their own national currencies and those that they have put into the basket.



monetary policy is likely to be outweighed by the benefits of establishing a common currency. In contrast, if shocks are asymmetric, it will be more costly to give up the autonomous monetary policy and, hence, to establish a monetary union.

The issue of economic integration is a subject of perennial interest to academics and policymakers due to its applied implication on policy construction. The extent of integration, whether measured by price differences or co-movements, by responses to information arrivals, by the expansion of trading, or by the fit of models of capital flows and portfolio allocations, provides clues about the realism of models and about the role of barriers and frictions in market outcomes. The last twenty years have witnessed a massive increase in the degree of international economic integration in both industrialized and developing countries prompted by technological breakthroughs, financial liberalization, and growth in the volume of trade ([Obstfeld, 1998](#)). A notable example is the increasing integration among EU countries during the 1990s that culminated in the launch of the euro, the common currency circulating in 12 European countries that joined the euro zone on 1 January 2002⁸.

Increasing financial liberalization in Asia Pacific region (typically East Asian) in the last three decades has fuelled a lively debate regarding the optimum exchange rate regime for the region. Some economists (for instance, [Mundell, 2003](#)) have advocated the use of a common currency preceded by anchoring to an existing currency or a group of currencies. It is anticipated that more financial integration will facilitate nominal interest rate convergence and, depending on the exchange rate regime, may lead to inflation convergence. In these

⁸ In the run up to the single currency, EMU member countries lost a large part of their monetary independence as their monetary policy stance was dictated by Germany's anchor role in the system.

