TESTING UNCOVERED EQUITY RETURN PARITY: CASE FOR ASIA AND THE PACIFIC

by

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Abstract

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This thesis tests the dynamic equilibrium relation occurring between exchange rates and the expected returns on risky securities. The future differentials in pay-offs on assets are assumed to equalize due to uncovered equity return parity and the no arbitrage condition. The logic implies that if the country's stock exchange is expected to produce lower pay-offs relatively to another country, its currency is expected to appreciate in time relatively to country which stock exchange yields higher returns. The sample countries used for this reason are the Asian Tigers, Australia, New Zealand and Japan – ones of the most open economies in the world with minimal regulation of international capital flows and high currency turnover.

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GLOSSARY

UIRP. Uncovered interest rate parity. It is a no-arbitrage parity condition in international finance which implies that investors are indifferent between allocating their funds on interest-rate deposits in two countries when the exchange rates of those countries freely fluctuate.

CIRP. Covered interest rate parity. It is a no-arbitrage condition implying that investors are indifferent between allocating funds on interest-rate deposits in two countries even when the future exchange rate risk is hedged by the future contract.

PPP. Purchasing power parity. It is an international parity telling that the price of the goods is equalized worldwide by the fluctuations in the country specific-exchange rates.

UERP. Uncovered equity return parity. It is a no-arbitrage condition telling that the investor will be indifferent between allocating her funds between two national financial markets since the differential in the exchange rates between the two countries will eliminate the potential difference in their returns.

Risk premium. The minimum expected excess return on investment which investor is ready to bear in exchange for taking additional risk.

TWD. New Taiwan dollar.

KRW. South Korea won

SGD. Singapore dollar

HKD. Hong Kong dollar

AUD. Australian dollar

NZD. New Zealand dollar

JPY. Japanese yen

Chapter 1

INTRODUCTION

Many economists have tried to model the exchange rate's dynamic equilibrium using a varied spectrum of approaches. Nowadays the theory of international finance is dominated by two major parities in the floating exchange rate systems (see Shapiro 2009). One of the most famous is purchasing power parity (PPP) which by exploiting the Law of One Price states that the differentials in prices among countries theoretically should be eliminated by properly established exchange rates. A massive load of literature has been devoted to investigating the validity of PPP and the empirical researches came to mixed results. Because of the whole bulk of unrealistic assumptions PPP often becomes the subject of substantial criticism. Among others, it fails to explain the key drivers of supply and demand for international currency, utilizes price indices full of drawbacks in themselves (e.g., quality of goods is neglected, existence of non-tradable goods, different composition of indices, etc) and falsely assumes no barriers in international trade and an absence of transportation costs. Even though in some works PPP is proven to hold globally, its validity is often the matter of a hot debate (Zheng 2009). In addition, some PPP paradoxes were noted. Specifically, the exchange rate speed of adjustment toward the equilibrium appeared to be too slow (Huizinga 1987), which reasonably questions the validity of PPP.

Another widely applicable theoretical finding in the field of international finance is the international Fisher effect better known as uncovered interest rate parity (UIRP). It makes use of no arbitrage condition and the assumption that the nominal interest rate of a country is nothing but the sum of real rate and the level of inflation. Its extension derived based on the unbiasedness hypothesis is covered interest rate parity (CIRP) in which instead of the expected future spot exchange rate the forward exchange rate is used. Both relations were heavily tested in practice and similarly to PPP, assessments led to ambivalent results. Specifically, an uncovered interest return puzzle has been detected. Numerous studies confirmed the anomaly when the currency of a country with a higher interest rate tends to appreciate (Lewis 1995, Engel 1996, Froot and Thaler 1990), and this only proves the failure of the approach. UIRP has been found to hold from time to time in long-run perspective, but in short-run it is almost universally rejected (Meredith and Chinn 1999).

All these uncertain results motivate to invent and scrutinize new dynamic equilibrium parities with the purpose of forecasting and understanding long-time macroeconomic dynamics. In this paper recently developed alternative version to exchange rate parities, called uncovered equity return parity (UERP), will be introduced and tested.

The first interesting dissimilarity from the UIRP and CIRP, which occurs when looking at UERP, is its usage of the expected future rather than current values of determinants of exchange rates. Returns here are assumed to be included ex-ante as opposed to interest rate parities or PPP in which the information on risk-free rates and prices is utilized ex-post.

Another distinctive feature is an inclusion of returns on risky assets into the equation as the substitutable approximation for the interest rate. To a greater extent, this is largely a modified adaptation of UIRP based on the idea that investors cannot yield arbitrage profits tomorrow by the mere allocation of financial resources on different stock exchanges today.

Given little previous empirical research, the key purpose of this paper is to check whether the UERP is consistent with the real data or, more precisely, to check whether the returns on stocks possess a strong enough explanatory power to describe the exchange rate dynamics. Two researches held by Cappiello and De Santis (2005, 2007) could not give an unambiguous answer estimating the parity for the Western developed nations which currencies are the world's most traded. Up to date, these stay to be the only comprehensive studies of the UERP. In 2005, euro, the Japanese yen, the pound sterling, the Swiss franc, the Canadian dollar, the French franc and the Deutsche mark were all tested against the U.S. dollar, and based on the results of five out of seven equations it appeared possible to deduce that there is some evidence of the UERP on a macro-level. Nevertheless, in 2007, the authors could not find the empirical support to UERP when testing the pound sterling, the Deutsche mark and the Swiss franc against the U.S. dollar, extending the time horizon to 25 years and applying the parity to the equity market. More thorough description of the works by Cappiello and De Santis (2005, 2007) will be presented in the next section.

In this thesis, the sample under consideration is the Asian Tigers (highly developed economies composed of Hong Kong, Singapore, South Korea and Taiwan), Australia, New Zealand and Japan. For testing dynamic equilibrium conditions such as international parities, researchers agree on that theoretically necessary assumption of perfect capital mobility should apply. Therefore, the choice of countries is motivated by finding the best trade-off between the country openness and the country's currency turnover. According to 2011 Index of Economic Freedom by the Heritage Foundation, based on a composite assessment of ten economic freedoms (business, trade, fiscal, monetary, investment, financial, etc), the above-mentioned countries are ones of the world's most open. To start with, Hong Kong, Singapore, Australia and New Zealand go as the freest economies on the global scale ranked as 1st, 2nd, 3rd and 4th respectively. These countries are categorized as *free*, and according to the Index, there are only five such economies in the world (the fifth is Switzerland). Japan ranks 22nd and Taiwan goes 25th (they are defined in study as *mostly free*). Finally, South Korea is 35th (though described as *moderately free,* it still ranks high among 179 countries investigated) and lacks only 0.2 points to be in the higher division.

If we look at the particular region from which those countries were selected, we would observe that they are the freest economies in Asia and the Pacific. Only Macau is ranked 6th (that is, above Japan, Taiwan and South Korea) but its currency is pegged to Hong Kong dollar. Moreover, those countries are ranked the highest in the region in the investment freedom (which includes both freedom in domestic and international capital mobility) and significantly higher than the region's averages. Thus, for example, in our sample Japan is ranked the lowest in investment freedom with the score 60, but it is still the better result than the world's mean 50.7 and the region's 38.

The currencies of the countries in the sample were also the most traded currencies in Asia and the Pacific in 2010 according to the Bank of International Settlements. Thus, JPY, AUD, HKD, NZD, KRW and SGD are six the most traded currencies in the region as measured by currency turnover, and only TWD is ranked 9th.

If there is empirical evidence of any international parity, it should be tested for such countries as Hong Kong and Singapore in the first place, and then if true, for countries less open or free. Hence, this is reasonable to check whether the UERP is true for the freest economies which possess minimal barriers in trade and investment. In addition, having countries from 2nd tier (Taiwan, Japan) and 3rd tier (South Korea) according to 2011 Index of Economic Freedom offers not a bad chance to assess how true the parity is between the countries of lower openness, and between the free and moderately free (say, Singapore vs. South Korea). Countries in the sample are renowned for the freely convertible currencies, floating exchange rate regimes (except for Hong Kong which currency is pegged to USD) and ones of the world's most developed financial markets.

In addition, this seems to be tempting to test out whether the geographic location (West studied in previous researches vs. East studied now) and the size of economies (small, heavily relied on imports, such as the Asian Tigers vs. large, such as Australia) matter for the UERP. Apart of JPY, AUD, HKD and NZD which are in the world's top 10 most traded currencies, other currencies seem to be not specifically popular among the traders, at least not as dramatically as the currencies of the Western developed world (say, USD or GBP). Consequently, it also becomes interesting to scrutinize how the parity performs given not the most popular currency pairs.

Even though the UERP implies any assets yielding returns in future periods (they could be bonds, deposits, stocks etc), in this work the parity is tested on monthly stock returns for 12-year period which are generated with means of indices of local stock exchanges.

The remaining part of the work is partitioned into the following sub-sections. Chapter 2 offers a literature review covering what has been done before and why the ERP can be a plausible theoretical replacement of the IRPs. Chapter 3 is devoted to the methodology and econometric assessment of the model. Chapter 4 presents the data, its descriptive statistics and sources. Chapter 5 describes the estimation results and propositions for possible further research. Finally, Chapter 6 presents the concluding remarks.

Chapter 2

LITERATURE REVIEW

This literature review will be subdivided into three parts. The first part will describe the documented failure of the UIRP and CIRP, the parities which rational extension the UERP is. The second part will shed light on some studies concerning interconnections between exchange rates and returns in economic literature, as well as works-predecessors of the UERP. Finally, the last conclusive part will describe the major research published in the field of EURP itself and explain how this work will contribute to the existent pool.

2.1 Failure of the UIRP and CIRP

To start with, the practitioners on FOREX market and economists in academia have constantly been trying to explain the logic of dynamics of exchange rates other than supply and demand at every given time. Exchange rates dynamics has also paramount policy implications for monetary authorities in charge of stability of the national currency as well as for world governments concerned about trade balance. Nevertheless, miscellaneous approaches to recording the underlying equilibrium once and for all have constantly failed, and this is not surprising. In the end, all the literature on exchange rate parities is rather academically conceptual having little to do with the real world.

The practical failure of interest rate parity (IRP) was exhibited in a series of surveys. E.g. Froot and Thaler (1990) reviewed 75 published estimates and found that mostly all of them disagreed with theoretical prospects. Flood and Rose (2002) tried to divide countries by categories (developed, developing, encountering crisis times) but the conclusions derived stated that no particular dissimilarity between them existed. Although in general the authors observed a slight improvement in terms of coefficient sign for their study of 1990s, they agreed that the uncovered interest rate parity puzzle is a widespread phenomenon, and this only supported the results of studies covering the 1970s (Meese and Rogoff 1983) and the 1980s (Froot and Thaler 1990). These results seemed pretty impressive given the previous studies' success in capturing the positive relationship between the exchange rates and the risk-free rates. CIRP also was documented not to hold empirically even for freely tradable currencies and the assumptions of capital mobility and little or no capital flight control (Frenkel and Levich 1981, Clinton, 1988, Abeysekera and Turtle 1995).

Finally, despite the fact that the UIRP was frequently found to deviate the most from its equilibrium condition in ultra short-run (Lyons and Rose 1995, Claboud and Wright 2005), the exchange and interest rates somewhat tend to mutually converge to equilibrium in the ultra long run (Lothian and Wu 2003).

2.2 Exchange Rates and Capital Markets

As Stavarek (2005) wrote, "there is theoretical consensus on neither existence of relationship between stock prices and exchange rates nor on the direction of the relationship". Indeed, plenty of literature shows that there is a strong positive relationship between the stock returns and the exchange rates (Rol 1992); some studies, on the contrary, find a significant negative relationship (Soenen and Hennigar 1988); and there are also such works which do not detect any relationship between the two at all (Solnik 1987).

The earliest fundamental attempts to bind the risky asset portfolios with exchange rates date back to the beginning of 2000s. Using VAR procedures Brooks at al. (2001) were successful at empirically documenting the high dependence of exchange rate movements with respect to capital inflows-outflows. Their major contribution relevant to this research was to observe the negative correlation between the USD/GBP pair and the extra returns in the UK equities over the USA. However, they treated this discovery as counter-intuitive presuming that this finding contradicts the initial expectation that currencies should strengthen thanks to an increase in home returns. Later on this result was repeated by Siourounis (2003).

Pavlova and Rigobon (2003) tried to find a link between exchange rates and stock market using international CAPM approach and Lucas' two-country, two-good economy. They constructed the simplified replica of the world where returns on assets signify the entitlements on output produced, cross-border lending/borrowing is allowed through bonds and international trade delivers shocks to home and abroad markets. This work was innovative in two ways. Firstly, employing the risk premium into interest rate parity condition they realistically allowed for deviation from the strict equivalence spoken about in the theory. Secondly, they somewhat expanded the meaning of the IRP allowing multiple goods to be traded instead of a singular product.

The major forerunner for the UERP hypothesis was the work by Hau and Rey (2004). Although the authors did not categorize their notion as the UERP, they derived the fundamental postulate resembling the one by UERP: "higher returns in the home equity market (in local currency) relative to the foreign equity market are associated with home currency depreciation" (p. 277). They explained this fact by portfolio rebalancing and dividend repatriation. According to the first, the foreign currency depreciation is caused by the investors' willingness to reduce the quantity of appreciated foreign assets in the portfolio to maintain the same risk-return ratio prevailed ex-ante. The resulted sale of foreign securities drives down the value of the foreign exchange rate. According to the second, the better performing markets tend to pay higher dividends and cause the capital outflow to countries with less successful markets. By the same token, this depreciates the currency of the outperforming market.

In accordance with this, Hau and Rey (2004) verified three main hypotheses concerning interconnections between exchange rates, portfolio dividends and capital flows and obtained the following testimonies:

1) Given the price elasticity, equity flows affect both the demand for currencies and assets. If foreign capital streams into home economy, the foreign currency is going to appreciate and the returns on foreign asset market are going to be excessive relative to home.
2) If foreign equity market over-performs home, investor is induced to rebalance her portfolio. The result is the appreciation in home currency and capital inflows in home economy.
3) If foreign currency appreciates, the foreign equity outflows occur. This produces the reduction in foreign equity returns.

According to Cappiello and De Santis (2005), these three results served the scientific inspiration for the UERP and formed the theoretical background for further exploration.

2.3 Uncovered Equity Return Parity

In the realm of the UERP itself the two major research papers have been written (Cappiello and De Santis 2005, 2007). These two articles proposed the term "uncovered equity return parity" and described the novelty of the concept. The authors argue that for no arbitrage condition the differentials in returns on risky assets, euro-deposits and bonds on the one side should equalize with the respective exchange rates on the other. They tested the approach twice (once in 2005 and once in 2007) using monthly data and different time intervals for currencies against the U.S. dollar.

In 2005 they conducted the research on euro, the Japanese Yen, the British pound, the Swiss franc, the Canadian dollar, the French franc and the Deutsche mark (all against the U.S. dollar) taking the period from January 1991 to December 2003. The success of this method expressed in the fact that they detected an appreciation of the U.S. dollar against the currencies of the UK, Germany, France and Switzerland, when the returns on equities in latter economies were expected to rise relatively to the U.S. assets. As a matter of fact, this opposes to interest rate parity puzzle and actually dismisses it: what is puzzling under IRPs is the ideally anticipated outcome under the UERP.

In the next paper, written in 2007, their chosen currencies became the U.S. dollar, the British pound, the Deutsche mark and the Swiss franc. Although they picked fewer currencies, they increased the horizon of observation from 13 to almost 26 years: from January 1981 to October 2006. Their second research led to the two central findings. On the one hand, the examination of the U.S. dollar against the Swiss franc and the Deutsche mark gave the theoretically expected outcome given the time-horizon of almost 17 years (from January 1990 to October 2006) – the UERP hold indeed. On the other hand, the result did not prove true for the pair GBP vs. USD and for all currency pairs when they looked at the time period of 26 years. Moreover, the authors did not find the empirical support for the UERP when the test was replicated for the bond market. This rejection of the UIRP proved true for both time horizons – 17 and 26 years respectively.

In this thesis the author will add to the insignificant amount of empirical research on the UERP by testing the parity for the countries representing Asia and the Pacific. By doing so, we will have an opportunity to compare the results of previous researches on Western developed countries with the obtained from analyzing the East. Asia and the Pacific represent the special interest to the researchers as here the word's freest economies are located, as well as countries which are in the world's top ten in currency turnover.

Apart from the different geographical location, presence of both small and large economies in the sample will bring a chance to differentiate between the effects of returns on exchange rates within the small economies and within the large. In addition, it might be useful to witness how accurate the UERP would be in assessing large countries against the small.

Chapter 3

METHODOLOGY

In this section the methodological aspects of testing UERP are to be expounded. Firstly, I will present the model itself and then will discuss the issues linked to testing procedures.

To start with, the generalized formula for the uncovered equity return parity is given as follows (see Cappiello and De Santis 2005):

$$E\left(1 + R_{h,t+1}\right) = E\left(1 + R_{f,t+1}\right)\frac{E(S_{t+1})}{S_t} \quad (3.1)$$

where $R_{h,t+1}$ and $R_{f,t+1}$ are aggregated home and foreign market returns in the future period t+1 and S_t is the exchange rate in period t. Here returns on market indices are used as a proxy for the market returns in local currencies. They are constructed according to the formula:

$$R_t = \frac{I_t - I_{t-1}}{I_{t-1}} \quad (3.2)$$

where I_t is a corresponding market index at time t.

Taking into account that we utilize the data already available, applying log-linearization approach, the UERP for risk-free securities (such as bonds) can be rewritten as:

$$\Delta s_t = s_t - s_{t-1} = r_{h,t} - r_{f,t} + \varepsilon_t \qquad (3.3)$$

where $r_{h,t}$ and $r_{f,t}$ are logs of current returns on home and foreign stock market indices, s_t is log for current nominal exchange rate, s_{t-1} is log for past nominal exchange rate and ε_t is a disturbance term. In this case the investor involved in portfolio diversification does not require a risk premium since her operations are riskless.

Because the mathematical structure of UERP is similar to UIRP, they can be calculated in an identical manner. So, in order to test whether the UERP holds for riskless assets, the following regression can be estimated by means of usual OLS:

$$\Delta s_t = \alpha + \beta(r_{h,t} - r_{f,t}) + \varepsilon_t \qquad (3.4)$$

As have been noted before, the above model specification is similar in nature to UIRP, and therefore testing is reduced to checking whether $(\alpha, \beta) = (0, -1)$. In other words, the deterministic trend is expected to be statistically insignificant (or equal to 0) and the sign of coefficient beta will explain the differentials in future stock returns. In theory, the latter has to be -1 in order for exchange rates to adjust and prevent the possibilities for arbitrage.

However, investors willing to deposit financial resources in two markets do face risks and if they are risk averse (this is what we assume), they will require a risk premium for their endeavors. In this case, equation (3.4) becomes:

$$\Delta s_t = \alpha + \beta(r_{h,t} - r_{f,t}) + risk\ premium_t + \varepsilon_t \qquad (3.5)$$

Risk premium includes those market rewards associated with the international speculation. Thanks to the numerous previous studies, it is quite possible to identify which macroeconomic variables become the key sources for the market premium. Of course, a lot of macroeconomic variables may have an effect on the prediction of risk premia, and the great majority of literature tries to convey which variables can be taken for a risk premium. These are various variables such as the valuation ratios as suggested by Cochrane (2008), Pastor and Stambaugh (2009), consumption wealth ratio by Lettau and Ludvigson (2001) or even GDP growth as determined by Arnott and Bernstain (2002). Even though there is no a precise solution to which variables contribute to a risk premium, and it is truly a multivariate term, many studies do agree that inflation differentials and short-term interest rates (Fama and French 1989, Campbell and Vuolteenaho 2004, Chenn 1991, Ang and Bekaert 2007, Ferson and Harvey 1991) are among the most influential. The advantage of using these variables is their tight relationship with regional business cycles, high explanatory power, rich economic content and accessibility.

When we substitute for the risk premium in equation (3.5), we obtain the final version of the regression for uncovered equity return parity:

$$\Delta s_t = \beta_0 + \beta_1(r_{h,t} - r_{f,t}) + \beta_2\,\Delta s_{t-1} + \beta_3\,\Delta(i_{h,t} - i_{f,t}) +$$

$$+\beta_4\Delta(\pi_{h,t} - \pi_{f,t}) + \varepsilon_t \qquad \textit{(3.6)}$$

where $i_{h,t+1}, i_{f,t+1}$ are home and foreign nominal short-term interest rates in period t+1 and $\pi_{h,t+1}$, $\pi_{f,t+1}$ are home and foreign inflation rates in period t+1. Now the equation (3.6) incorporates four main types of the market risk: equity, exchange rate, interest rate and commodity risk (Dorfman 1997). Notice the variable Δs_t is also included. It is needed to capture the possible autoregressive part in the response variable.

Dealing with time-series variables we need to check whether the data is stationary. To test it, we may use the Augmented Dickey-Fuller Test (ADF test) as one of the many alternatives such as a unit root test, weighted symmetric unit root test, Phillips-Perron test, KPSS tests, variance ratio tests etc. Under the null hypothesis, the data is non-stationary and to turn it into stationary data, we just need to difference it or "detrend" it. Alternative hypothesis tells us that the data is stationary and may continue with the usual estimation procedures. To double-check the presence of a unit root in the data I will use the KPSS test developed by Kwiatkowski et al (1992). The implication of non-stationarity may give rise to co-integration tests such as Engle Granger's co-integration test.

The major economic concern with estimating uncovered equity return parity is that the error terms might be exposed to a serial correlation issue in (3.6). If we disregard it, we may obtain over-estimated R^2, under-estimated variance of the slope-coefficient and, as a result, invalid test-statistics. To check whether there is a serial correlation, the Durbin-Watson and Breusch-Godfrey Lagrange Multiplier tests can be employed.

Finally, in order to deal with serial correlation the Generalized Method of Moments (GMM) will be used. GMM estimation is suggested by Chinn (2005), Bui (2010), Cappiello and De Santis (2005, 2007) and others. The reason is it allows for the "efficient estimation in the present heteroskedasticity of unknown form" (Bui 2010), "correct(s) the standard errors of the parameter estimates for MA serial correlation" (Cappiello and Mehl 2009) and "selects parameter estimates so that the correlations between the instruments and disturbances as close to zero as possible" (Levent 2010). GMM estimator also may reduce the problem of "causality vs. correlation" when a dependent variable actually affects an independent variable and vice versa. As a result, this gives rise to the non-zero correlation between the error terms and the explanatory variables. Finally, the explanatory variables and their first lags will be used as instruments for GMM.

C h a p t e r 4

DATA DESCRIPTION

For testing the UERP, the monthly data for the period from January 2000 to December 2011 will be used (exactly 12 years). For some variables the data is available even for earlier times but in order to equalize the variables in number of observations, it has been excluded from the analysis. The two primary sources of information are the US Federal Reserve System for exchange rates and Yahoo Finance for market indices. Using one source for the exchange rates and one source for the indices have its advantages since data collection was executed by the same agencies.

Such indices as TSEC weighted index for Taiwan, KOSPI composite index for South Korea, Hang Seng Index for Hong Kong, STRAITS Times Index for Singapore, Nikkei 225 for Japan, All Ordinaries for Australia and NZX All Index Gross for New Zealand were collected in national currencies from Yahoo finance and then converted in US dollars based on the daily exchange rates provided by the FED. The indices covering the largest number of listed companies in the particular markets were chosen in order to get the closest proxy for the overall market performance. Its descriptive statistics is presented in the table 1.

Table 1. Descriptive Statistics of the Market Indices

Index	*# of obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*	*Skewness*	*Kurtosis*
Hang Seng	*144*	*16557.64*	*4924.36*	*8634.45*	*31352.58*	*0.44*	*2.47*
TSEC	*144*	*6672.7*	*1504.19*	*3636.94*	*9854.95*	*0.14*	*2.1*
COSPI	*144*	*1203.97*	*495.7*	*479.68*	*2192.36*	*0.26*	*1.73*
STI	*144*	*2315.42*	*645.71*	*1267.82*	*3805.7*	*0.27*	*2*
Nikkei 225	*144*	*12183.11*	*3108.66*	*7568.42*	*20337.3*	*0.67*	*2.35*
All Ordinaries	*144*	*4186.81*	*1007.88*	*2778.4*	*6779.1*	*0.61*	*2.45*
NZX Gross	*144*	*2875.81*	*796.96*	*1616.31*	*4382.43*	*-0.11*	*1.85*

Table 2. Descriptive Statistics of Exchange Rates against USD

Currency	*# of obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*	*Skewness*	*Kurtosis*
JPY	*144*	*107.34*	*13.866*	*76.66*	*133.77*	*-0.57*	*2.53*
AUD	*144*	*0.749*	*0.159*	*0.483*	*1.097*	*0.2*	*2.19*
NZD	*144*	*0.629*	*0.126*	*0.396*	*0.874*	*-0.39*	*1.96*
TWD	*144*	*32.527*	*1.595*	*28.58*	*35.21*	*-0.45*	*2.73*
KRW	*144*	*1129.031*	*129.734*	*907*	*1570.1*	*0.19*	*2.82*
HKD	*144*	*7.783*	*0.02*	*7.731*	*7.829*	*-0.39*	*2.12*
SGD	*144*	*1.584*	*0.177*	*1.202*	*1.853*	*-0.43*	*1.99*

Second, the spot exchange rates (all per US dollar) were gathered from the FED. The corresponding currencies for each country are the Hong Kong dollar, the Taiwanese dollar, the Singapore dollar, the South Korea won, the Australian dollar, the New Zealand dollar and the Japan yen. One can see that the standard deviation of Hong Kong dollar is too small when compared to its mean. This happens because Hong Kong dollar is pegged to the US dollar but allows to fluctuate at the exchange rate corridor with the lower bound equal to 1 USD = 7.75 and the upper bound 1 USD = 7.85 HKD. Table 2 presents the descriptive statistics of exchange rates against USD and table 3 descriptive statistics of the exchange rates vis-à-vis.

In Table 4, there are the data on the aggregate stock returns generated from the market indices for the seven countries. As seen, for the past 12 years all the markets were able to produce positive profits except for Taiwan and Japan. However, both negative and positive profits for the indicated period are negligibly small in absolute terms, and this complies with the idea of perfectly competitive markets. In addition, the historical volatilities of the returns are found to be almost the same for all the markets and range from 5.4% (Australia and New Zealand) to 8.3% (South Korea).

Table 3. Descriptive Statistics of Exchange Rates vis-à-vis

Exchange (1)	*# of obs. (2)*	*Mean (3)*	*Std. Dev. (4)*	*Min (5)*	*Max (6)*	*Skewness (7)*	*Kurtosis (8)*
KRW/ HKD	*144*	*145.06*	*16.7*	*116.92*	*202.4*	*0.2*	*2.88*
KRW/ SGD	*144*	*719.62*	*101.5*	*590.78*	*1008.74*	*0.68*	*2.25*
KRW/ TWD	*144*	*34.71*	*3.55*	*27.91*	*44.59*	*-0.3*	*2.64*
KRW/ NZD	*144*	*1911.92*	*611.12*	*1172.03*	*3380.92*	*0.8*	*2.4*
KRW/ AUD	*144*	*1601.43*	*488.04*	*961.85*	*2796.19*	*0.66*	*2.24*
KRW/ JPY	*144*	*10.72*	*1.99*	*7.5*	*16.16*	*0.57*	*2.61*
SGD/ TWD	*144*	*0.05*	*0.004*	*0.041*	*0.06*	*-0.03*	*1.72*
SGD/ NZD	*144*	*2.69*	*0.87*	*1.38*	*4.55*	*0.67*	*2.29*
SGD/ AUD	*144*	*2.26*	*0.72*	*1.1*	*3.76*	*0.34*	*2.29*
SGD/ HKD	*144*	*0.2*	*0.02*	*0.15*	*0.24*	*-0.45*	*2*
SGD/ JPY	*144*	*0.01*	*0.001*	*0.01*	*0.02*	*-0.48*	*2.3*
TWD/ HKD	*144*	*4.18*	*0.2*	*3.68*	*4.54*	*-0.49*	*2.74*
TWD/ NZD	*144*	*54.51*	*14.08*	*32.94*	*85.12*	*0.74*	*2.4*
TWD/ AUD	*144*	*45.82*	*11.53*	*26.13*	*70.3*	*0.4*	*2.26*
TWD/ JPY	*144*	*0.3071*	*0.034*	*0.26*	*0.399*	*0.93*	*2.62*
HKD/ NZD	*144*	*12.97*	*3*	*8.91*	*19.71*	*0.86*	*2.4*
HKD/ AUD	*144*	*10.89*	*2.396*	*7.079*	*16.15*	*0.47*	*2.13*
HKD/ JPY	*144*	*0.074*	*0.074*	*0.058*	*0.1*	*1.05*	*3.22*

Table 3. Descriptive Statistics of Exchange Rates vis-à-vis – Continued

Exchange (1)	*# of obs. (2)*	*Mean (3)*	*Std. Dev. (4)*	*Min (5)*	*Max (6)*	*Skewness (7)*	*Kurtosis (8)*
NZD/ AUD	*144*	*0.84*	*0.054*	*0.737*	*0.95*	*0.05*	*1.91*
NZD/ JPY	*144*	*0.006*	*.0019*	*.003*	*.011*	*0.56*	*2.94*
AUD/ JPY	*144*	*0.007*	*0.0025*	*0.004*	*0.014*	*0.97*	*3.36*

Table 4. Descriptive Statistics of Market Returns (%)

Index	*# of obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*	*Skewness*	*Kurtosis*
Hong Kong	*143*	*-0.1*	*6.8*	*-28*	*14.6*	*-0.83*	*4.67*
Taiwan	*143*	*-0.5*	*7.9*	*-27.5*	*20.2*	*-0.38*	*3.81*
Singapore	*143*	*0.08*	*6.6*	*-33*	*19.7*	*-1.47*	*8.24*
South Korea	*143*	*0.1*	*8.3*	*-40.2*	*22.7*	*-1*	*6.11*
New Zealand	*143*	*0.35*	*5.4*	*-12.9*	*14.1*	*0.14*	*2.97*
Australia	*143*	*0.05*	*5.4*	*-13.5*	*19.4*	*0.25*	*3.55*
Japan	*143*	*-0.2*	*6.28*	*-21.8*	*18*	*-0.27*	*3.4*

Inflation is regarded as a percentage change in composite CPI for all countries except for New Zealand and Australia. For the latter two the monthly changes in commodity price indices were chosen as approximations for the inflation rates. This happened because neither Australia nor New Zealand measures the monthly CPI. PPI, which is the only other index apart from CPI available across all the nations, is not measured on the monthly basis in Australia and New Zealand as well, so that the prudent substitution would be needed. There is a lucid connection between CPI and commodity price indices, and as Browne and Cronin (2010) write, "generalized commodity price rises do lead consumer price inflation" and they are often "seen as a source of current inflationary pressures". Even though Garner (1985) and Durand and Blondal (1991) did not find the persistent relationship between the levels of CPI and commodity price indices, the authors did succeed in finding a strong "indication of relationship between the *changes* in the variables".

Therefore, the data for inflation rates was collected primarily from governmental sources such as Singapore Department of Statistics, Statistical Bureau of Republic of China (Taiwan), Hong Kong Census and Statistics Department, Japanese Ministry of Internal Affairs and Communications, Australian Bureau of Statistics and the national statistical office in New Zealand called Statistics NZ. South Korea is the only exception since the data on it was collected from the specialized web-site inflation.eu. The descriptive statistics of monthly inflation, retrieved for the same 12 years, is provided in table 5. Here it becomes evident that the highest mean monthly inflation during the last decade was recorded in Australia (a little more than 1%). This country experienced the highest monthly deflation for the period (prices dropped by about 7.5%) as well as monthly inflation (almost 15%).

On the other hand, Japan was characterized with the lowest mean rate equal to only -0.023%.

Table 5. Descriptive Statistics of Monthly Inflation Rates (%)

Country	*# of obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*	*Skewness*	*Kurtosis*
Hong Kong	*143*	*0.081*	*0.75*	*-2.43*	*3.06*	*0.38*	*7.63*
Taiwan	*143*	*0.094*	*0.797*	*-1.874*	*2.12*	*-0.24*	*3.03*
Singapore	*143*	*0.168*	*0.563*	*-1.632*	*2.06*	*0.34*	*3.96*
South Korea	*143*	*0.264*	*0.427*	*-0.63*	*1.75*	*0.19*	*3.32*
New Zealand	*143*	*0.311*	*3.07*	*-6.15*	*12.4*	*0.66*	*4.43*
Australia	*143*	*1.061*	*2.99*	*-7.585*	*14.95*	*0.28*	*6.44*
Japan	*143*	*-0.023*	*0.283*	*-0.87*	*0.79*	*-0.05*	*2.96*

The short-term monthly interest rates were taken as the rates from 90-day Certificates of Deposit. The sources used are the Central Bank of Republic of China (Taiwan), Hong Kong Monetary Authority, the Bank of Korea, Singapore Government Securities web-site, Reserve Bank of New Zealand, Reserve Bank of Australia and Bank of Japan. As seen in table 6, Japan has the incredibly low rate (only 0.18%), and it is opposed to Australia (5.37%) and New Zealand (5.78%), the countries which traditionally high yielding currencies became the subjects of "buy" in carry trades (see Kicklighter 2012, Darvas and Park 2012).

Table 6.Descriptive Statistics of Short-Term Interest Rates (%)

Country	*# of obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*	*Skewness*	*Kurtosis*
Hong Kong	*144*	*1.87*	*1.89*	*-0.08*	*6.64*	*0.8*	*2.48*
Taiwan	*144*	*1.72*	*1.34*	*0.16*	*5.28*	*1.28*	*3.81*
Singapore	*144*	*1.3*	*0.93*	*0.17*	*3.35*	*0.53*	*1.89*
South Korea	*144*	*4.4*	*1.26*	*2.41*	*7.28*	*0.44*	*2.68*
New Zealand	*144*	*5.78*	*1.92*	*2.65*	*8.91*	*-0.31*	*1.99*
Australia	*144*	*5.37*	*1.04*	*3.1*	*7.9*	*0.21*	*3.12*
Japan	*144*	*0.18*	*0.228*	*0.002*	*0.701*	*1.11*	*2.74*

C h a p t e r 5

ESTIMATION AND RESULTS

We start the estimation with testing for the presence of a unit root. According to Granger and Newbold (1974), estimating non-stationary stochastic processes using OLS may lead to invalid meaningless coefficients, high R-squared and t-statistics. To double-check the presence of a unit root the Augmented Dickey-Fuller and the Phillips-Perron tests are applied. A null hypothesis for both tests is "unit root is present", alternative hypothesis is that it is not. As a matter of fact, first differences in logs of exchange rates as well as in inflation and interest rate differentials for all country pairs appeared to be stationary, that is, the results of both tests produced zero P-values. These data are concluded to be integrated of order 1. The same conclusion is valid for differentials in returns: since the returns themselves are stationary, their linear combination is also stationary. Therefore, the equation (3.6) can be estimated.

The estimation of parameters is done through Newey-West heteroskedasticity and autocorrelation consistent covariance (HAC) matrix estimation. The number of lags was chosen according to Newey and West (1987), who defined a rule of thumb $T^{1/4}$ where T is the number of observations. Since in our case we have 143 observations, the appropriate number of lags is three.

So, firstly, the equation (3.6) has been estimated with means of OLS. Its results are presented in tables 7 and 8. In table 7 one can find the slope coefficients on return differentials of countries vis-à-vis, controlling for all other coefficients of equation (3.6). The coefficients of correlation of Newey-West equations are retrieved from the relevant OLS regressions and presented in squared brackets in the table 7. The respective Newey-West standard deviations of the regression coefficients are indicated in brackets.

As seen from the table 7, all the coefficients exhibit a negative correlation between the return differentials between the two countries and their respective time differences in exchange rates. This means that the next period increase in home return relative to foreign will lead to the home currency next period depreciation. It is worth to point out that the impact of such depreciation on currencies is the highest for the country pairs involving New Zealand and Australia, the biggest economies in the sample. Thus, the closest to one is the coefficient at the pair Australia vs. Japan (it is -0.577). It is followed by South Korea vs. Australia (-0.562), Singapore vs. Australia (-0.557), New Zealand vs. Japan (-0.537) and Singapore vs. New Zealand (-0.5). All other coefficients are less than $|0.5|$. Thus, the lowest magnitude of the coefficient is for the pair Singapore vs. Taiwan – as small as -0.065.

Table 7. OLS Results (Slope Coefficient at Return Differentials)

	Singapore	Taiwan	Hong Kong	New Zealand	Australia	Japan
South Korea	-0.08* (0.044) [0.057]	-0.115** (0.053) [0.086]	-0.216*** (0.071) [0.163]	-0.49*** (0.082) [0.477]	-0.562*** (0.078) [0.553]	-0.288*** (0.066) [0.309]
Singapore		-0.065*** (0.02) [0.101]	-0.133*** (0.001) [0.162]	-0.5*** (0.077) [0.535]	-0.557*** (0.061) [0.641]	-0.201*** (0.042) [0.246]
Taiwan			-0.07*** (0.018) [0.107]	-0.366*** (0.046) [0.466]	-0.394*** (0.048) [0.502]	-0.16*** (0.025) [0.246]
Hong Kong				-0.332*** (0.042) [0.326]	-0.408*** (0.036) [0.473]	-0.186*** (0.033) [0.171]
New Zealand					-0.283*** (0.043) [0.377]	-0.537*** (0.052) [0.526]
Australia						-0.577*** (0.043) [0.586]
Note: a) * statistically significant at 1%, ** at 5%, *** at 10%; b) std. errors in brackets, Rs-squared in squared brackets						

In addition, the explanatory power of the regressions measured by the respective R-squared appeared to be fairly low for the pairs involving small economies such as the Asian Tigers, and relatively high for the large such as Japan, Australia and New Zealand. Therefore, the highest explanatory power is possessed by the pair Autralia vs. Japan (it is 58.6%). It is followed by South Korea vs. Australia (55.3%), Singapore vs. New Zealand (53.5%), New Zealand vs. Japan (52.6%)

and Taiwan vs. Australia (50.2%). The lowest explanatory power is again specific to the small economies. For the pair South Korea vs. Singapore only 5.67% of variation in return differentials is able to explain the variation in exchange rate differences.

As it has been discussed, the adjustment of exchange rates in response to changes in return differentials is not one-to-one as theory would expect in a perfect world. For majority of pairs the slope coefficients on returns is considerably less than unity in absolute terms, and this means that even though return differentials do invoke the change in exchange rates, the amount by which the latter change is less than change in return differentials themselves. This fact can be explained by the risk aversion of investors who would require a risk premium for their investing efforts.

The results for other coefficients (not included in table 7) together with the constant terms, are almost all not statistically different from zero and can be found in table 8. Whereas zero constants were anticipated prior to estimation, obtaining zero coefficients on variables constituting risk premia (specifically, interest rate and inflation rate differentials) may seem somewhat surprising. However, this finding is due to a wrong choice of variables to include in a risk premium. It appears that investors pay attention to other variables rather than differentials in interest and inflation rates when choosing the market to invest.

After conducting some post-estimation tests, several conclusions were made. First of all, variance inflator factor and tolerance level did not detect the presence of multicollinearity issue in all the regressions. In addition, in all the regressions the goodness of fit test, link test, did not find the evidence of model misspecification, that is, it is highly unlikely to find such an independent variable which would be statistically significant in equation (3.6) (except by chance). Nevertheless, Shapiro-Wilk W test for normality indicated that in 11 out of 21 equations the distribution of errors is not normal. These are for the pairs South Korea vs. Hong Kong, Taiwan, Singapore and Japan; Singapore vs. Hong Kong, Australia and Japan; Hong Kong vs. Australia, New Zealand and Japan; Taiwan vs. New Zealand. Normal quantile plots and standardized normal probability plots supported the discovery. Hence, the former (normal quintile plot) proves that plotting randomly generated independent standard data (y-axis) against standard normal population (x-axis) we obtain the non-linearity in the 11 above-mentioned pairs. That is, points deviate from the 45-degree line meaning that the data is non-normal. On the latter (standardized normal probability plot) we have detected the same pattern of departure from the straight line lying on which would indicate the normally distributed data.

Table 8. OLS Results (Constant and Risk Premium)

	Constant (1)	*Interest Rate Differentials (2)*	*Inflation Rate Differentials (3)*
South Korea/Hong Kong	0.0006 (0.003)	0.0002 (0.007)	-0.0001 (0.003)
South Korea/Taiwan	0.001 (0.002)	-0.018 (0.01)	0.001 (0.002)
South Korea/Singapore	-0.002 (0.002)	0.001 (0.007)	**0.004**** **(0.002)**
South Korea/Australia	-0.003 (0.004)	-0.011 (0.019)	-0.0003 (0.001)
South Korea/New Zealand	-0.005 (0.004)	0.018 (0.02)	-0.0008 (0.001)
South Korea/Japan	0.002 (0.003)	**-0.027*** **(0.016)**	0.046 (0.005)
Singapore/Taiwan	-0.001 (0.001)	-0.0004 (0.016)	0.0007 (0.0008)
Singapore/Hong Kong	-0.002 (0.001)	-0.0004 (0.004)	-0.001 (0.001)
Singapore/Australia	**-0.00513**** **(0.00211)**	0.00742 (0.0123)	-0.0004 (0.00126)
Singapore/New Zealand	**-0.007***** **(0.003)**	0.019 (0.018)	0.0005 (0.0009)
Singapore/Japan	0.0007 (0.002)	**-0.018**** **(0.008)**	-0.0006 (0.002)
Taiwan/Hong Kong	-0.0007 (0.001)	-0.0002 (0.002)	-0.0005 (0.0008)

Table 8. OLS Results (Constant and Risk Premium) – Continued

	Constant (1)	*Interest Rate Differentials (2)*	*Inflation Rate Differentials (3)*
Taiwan/Australia	**-0.006**** **(0.003)**	**0.036**** **(0.016)**	0.0005 (0.001)
Taiwan/New Zealand	**-0.007**** **(0.003)**	**0.057**** **(0.027)**	-0.001 (0.001)
Taiwan/Japan	-0.0001 (0.002)	**-0.045**** **(0.02)**	-0.0007 (0.002)
Hong Kong/Australia	**-0.005**** **(0.002)**	0.003 (0.007)	0.0001 (0.0009)
Hong Kong/New Zealand	**-0.005**** **(0.003)**	0.003 (0.008)	-0.0001 (0.0007)
Hong Kong/Japan	0.002 (0.002)	0.0002 (0.004)	0.001 (0.002)
New Zealand/Australia	0.001 (0.001)	**0.04***** **(0.009)**	0.0002 (0.003)
New Zealand/Japan	**0.009***** **(0.003)**	**0.029**** **(0.013)**	**0.001**** **(0.0006)**
Australia/Japan	**0.007***** **(0.003)**	0.02 (0.01)	-0.0005 (0.0008)
Note: a) *** statistically significant at 1%, ** at 5%, * at 10%; b) std. errors in brackets			

Additionally to the already mentioned, the evidence of non-normality motivates to use GMM which is applicable in cases when the complete shape of distribution function is unknown and therefore the maximum likelihood estimation is not possible. The GMM estimation was carried out with HAC weight matrix using the Barlett/Newey-West kernel (Cappiello and De Santis 2005). The lag order was selected using Newey and West's (1994) optimal lag-selection algorithm since it is proven to be superior to the scheme proposed by Andrew (1991), the one employed by Cappiello and De Santis (2005, 2007) in their works (for more details refer to Andersen and Sorensen 1996).

The results of GMM estimation are presented in tables 9 and 10 with HAC standard errors being in brackets. The instruments used were the set of all explanatory variables of the equation (3.6) and their first lags. Having more moment conditions than the number of parameters to estimate, we tested for over-identifying restrictions with Hansen J statistic (Hansen 1982) and found that the instruments are valid for all the pairs without exception (high P-values meaning that we cannot reject the null "instruments are valid").

When we refer to the table 9, we see that the coefficient at South Korea vs. Singapore becomes statistically significant at 1% level (instead of 10%). Nonetheless, as a whole, the values of coefficients on return differentials are very close to those estimated with OLS.

Again we may speak about the home currency depreciations when their economies perform well, and appreciations when the opposite happens. Hau and Rey (2004) find these facts not puzzling due the following two reasons. First of all, superior economic performance abroad leads to the higher dividends paid in that foreign economy, and the dividends repatriation to home economy entails the increased capital outflow from the abroad. Thus, the home currency appreciates.

Table 9. GMM Results (Slope Coefficient at Return Differentials)

	Singapore	*Taiwan*	*Hong Kong*	*New Zealand*	*Australia*	*Japan*
South Korea	-0.073*** (0.029)	-0.092** (0.041)	-0.219*** (0.066)	-0.479*** (0.095)	-0.457*** (0.104)	-0.27*** (0.07)
Singapore		-0.06*** (0.017)	-0.137*** (0.05)	-0.55*** (0.055)	-0.593*** (0.043)	-0.196*** (0.053)
Taiwan			-0.056*** (0.018)	-0.35*** (0.04)	-0.382*** (0.07)	-0.173*** (0.02)
Hong Kong				-0.333*** (0.029)	-0.405*** (0.021)	-0.189*** (0.025)
New Zealand					-0.286*** (0.043)	-0.54*** (0.033)
Australia						-0.56*** (0.028)
Note: a) *** statistically significant at 1%, ** at 5%, * at 10%; b) std. errors in brackets						

Second, when the foreign economy again is doing well, the exposure to the exchange rate risk of a home investor increases, thus, overshadowing the opportunity to benefit from investing abroad. It induces her to rebalance the portfolio in favor of home equities which would not happen in the case of complete markets and the opportunity to hedge the risks in full (she would just hold the global portfolio). As an example, assume the investor holds the shares in foreign and home equity. When the foreign equity appreciates, the proportion of its value in the portfolio rises, and the investor tries to eliminate this shift by reducing her foreign holdings in favor of home. “The total risk is far more important than return” (Muhtaseb and Philippatos 1997), and “the optimal portfolio composition is considerably more sensitive to risk than to return of its component assets” (Evstigneev 1998).

Lastly, turning our attention to the table 10, we see that the number of statistically significant intercept terms has increased from 8 to 12 (but still the values are pretty close to zeros). The number of statistically significant slope coefficients at interest and inflation rate differentials has also increased – from 7 to 8 and from 2 to 3 respectively, – but their values are close to zeros too, and they never exceed $|0.05|$. The only pair for which all the coefficients enter the regression is, as before, New Zealand vs. Japan. Moreover, there are five regressions in which none of the coefficients (except for return differentials) are statistically significant. This upshot points out that inflation and interest rate differentials do not play well a designated role of a risk premium, and some other variables might be used as proxies for excess returns. The reasons for this can possibly be the same as for IRPs (in case of interest) and PPP failures (in case of inflation). This a pretty straightforward conjecture, together with more comprehensive study of investors’ preferences when composing an investment portfolio, can be the implications for the further research.

Table 10. GMM Results (Constant and Risk Premium)

	Constant (1)	*Interest Rate Differentials (2)*	*Inflation Rate Differentials (3)*
South Korea/Hong Kong	0.001 (0.002)	0.001 (0.006)	-0.0005 (0.002)
South Korea/Taiwan	-0.0007 (0.002)	-0.002 (0.005)	0.0007 (0.002)
South Korea/Singapore	-0.001 (0.002)	0.003 (0.003)	**0.003***** **(0.001)**
South Korea/Australia	**-0.005***** **(0.002)**	0.013 (0.02)	-0.0008 (0.001)
South Korea/New Zealand	**-0.005**** **(0.003)**	0.02 (0.019)	0.0001 (0.001)
South Korea/Japan	0.0017 (0.002)	-0.02 (0.014)	0.006 (0.005)
Singapore/Taiwan	**-0.001*** **(0.0007)**	-0.003 (0.003)	-0.0002 (0.0005)
Singapore/Hong Kong	**-0.002**** **(0.0008)**	-0.0006 (0.002)	**-0.009**** **(0.0005)**
Singapore/Australia	**-0.005***** **(0.001)**	0.008 (0.01)	-0.0008 (0.001)
Singapore/New Zealand	**-0.007***** **(0.002)**	**0.021*** **(0.01)**	-0.0001 (0.001)
Singapore/Japan	-0.0001 (0.002)	**-0.018***** **(0.005)**	-0.0004 (0.002)
Taiwan/Hong Kong	-0.0003 (0.001)	0.0003 (0.002)	-0.001 (0.0006)

Table 10. GMM Results (Constant and Risk Premium) – Continued

	Constant (1)	*Interest Rate Differentials (2)*	*Inflation Rate Differentials (3)*
Taiwan/Australia	**-0.006*** (0.002)**	**0.035*** (0.01)**	0.0001 (0.001)
Taiwan/New Zealand	**-0.007*** (0.002)**	**0.049** (0.02)**	-0.001 (0.001)
Taiwan/Japan	0.0003 (0.001)	**-0.045** (0.019)**	-0.001 (0.002)
Hong Kong/Australia	**-0.005*** (0.001)**	0.001 (0.005)	-0.002 (0.001)
Hong Kong/New Zealand	**-0.0066*** (0.002)**	0.001 (0.008)	-0.0004 (0.0006)
Hong Kong/Japan	0.001 (0.002)	-0.002 (0.003)	0.002 (0.001)
New Zealand/Australia	0.001 (0.001)	**0.043*** (0.008)**	-0.00001 (0.0002)
New Zealand/Japan	**0.008*** (0.002)**	**0.027*** (0.01)**	**0.001** (0.0004)**
Australia/Japan	**0.007*** (0.001)**	**0.024*** (0.007)**	-0.0008 (0.0005)
Note: a) *** statistically significant at 1%, ** at 5%, * at 10%; b) std. errors in brackets			

Chapter 6

CONCLUSION

The estimation of the uncovered equity return parity with the two approaches, OLS and GMM, produced the coefficients as expected – the negative slope and zero intercept. Nonetheless, those slope coefficients are noticeably less than one in absolute terms meaning that the inverse relationship between the exchange rates and returns is not one-to-one and, as a consequence, investors would require a risk premia for their risk bearing. Moreover, whereas the estimation by Cappiello and De Santis (2005) resulted in not all the coefficients on returns being statistically significant, the situation is cardinally different for the scenario with the countries of Asia and the Pacific – almost all of them are statistically significant at as high confidence level as 1%.

The next finding worth mentioning concerns a risk premium. We may infer that interest and inflation rate differentials largely appear to be not suitable as risk premia – investors seem to look at other variables when choosing the appropriate fund allocation between two states. The same conclusion was derived in the work by Cappiello and De Santis (2005) who found the analogous – coefficients at interest and inflation differentials statistically insignificant and close to zero for almost all their currency pairs tested. The further research might investigate whether the reasons of those statistical insignificances are the same as for IRPs and PPP failures.

Even though Hong Kong and Singapore are considered to be the freest economies, this does not affect the magnitude of the coefficient when they are tested vis-à-vis (neither currency's turnover is decisive). The status of less open economies such as Taiwan and Singapore does not deteriorate the coefficient too. Therefore, while the countries' openness does not play much role, the countries' size does indeed. The slope coefficient at return differentials is found to be higher for the pairs with such economies as New Zealand, Australia and Japan, and it is lower for the Asian Tigers. In addition, as indicated by the coefficient of correlation, the UERP possesses better explanatory power when it comes to large economies.

Comparing the results with the GMM estimation proposed by Cappiello and De Santis (2005), it can be concluded that the coefficients on returns for all the Asian Tigers' pairs are lower in absolute terms than those obtained in testing the developed Western countries. As a matter of fact, this outcome reflects the stronger need of the Asian investors for a risk premium and, therefore, motivates to investigate further which variables do constitute the risk premium itself. Nonetheless, for large economies of Asia (Japan) and the Pacific (Australia and

New Zealand) this coefficient is largely testified to be around $|0.5|$, and it is in line with the study by Cappiello and De Santis (2005).

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