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European Financial Integration: Measurement Bond and Stock Markets

A Master's Thesis

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European Financial Integration: Measurement Bond and Stock Markets

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To my parents and loving sister,

Without their patience, understanding, support, and most

of all love, the completion of this work would not have

been possible.

I know the price of success: dedication, hard work, and an

unremitting devotion to the things you want to see happen.

Frank Lloyd Wright

I certify that I have read this thesis and have found that is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Economics.

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ABSTRACT

European Financial Integration: Measurement Bond and Stock Markets

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The emergence of **European Economic and Monetary Union (EMU)** has given a large momentum to financial integration in Europe. After the introduction of the Euro(€) on 1 January 1999, all of the remaining exchange rate risk among EMU participants were removed and this was a milestone for the beginning of a single monetary policy for the euro area. This paper tries to identify the degree of improvement in European financial integration by presenting the theoretical point of view that tries to monitor the level of integration in the Eurozone. It starts by defining what financial market integration is and its benefits. Then it introduces the measurement methods for financial integration in both bond market and stock market. Last of all, this paper tries to distinguish the remaining barriers for full financial integration. The paper concludes analyzing aforementioned theoretical literature and further steps that are necessary to consolidate financial integration.

Keywords: One-price rule, interest parity, price-based measures, quantity-based measures, financial integration, home-equity bias.

ÖZET

Avrupa Finansal Piyasalarında Entegrasyon: Bono ve Hisse Senedi Piyasaları Ölçümleri

Erden,Burak

Yükseklisans, Ekonomi Bölümü

Tez Yöneticisi: Yrd.Prof. Taner Yiğit

Temmuz 2009

Avrupa Para Birliği'nin(EMU) ortaya çıkışı Avrupa'daki finansal entegrasyonu hızlandırmıştır. Euro(€)'nun 1 Ocak 1999'da tek para birimi olarak kabul edilmesiyle EMU ülkeleri arasındaki döviz kuru farkına bağlı ortaya çıkan risk ortadan kaldırılmış ve bu tarih Euro'yu kabul eden ülkelerin mali anlamda tek elden yönetilmesi adına bir kilometre taşı olarak kabul edilmiştir. Bu çalışma EMU ülkeleri arasındaki finansal entegrasyondaki değişimi teorik bir bakış açısıyla ele almayı hedeflemektedir. Başlangıç olarak, finansal entegrasyonun ne olduğu açıklanmış ve faydaları belirtilmiştir. Daha sonra, bu bölgedeki gerek bono gerekse hisse senedi piyasalarındaki finansal entegrasyonu ölçümlemek adına kullanılan metodlar belirtilmiştir. Son olarak ta tam bir finansal entegrasyon sağlamaya engel olan diğer faktörler açıklanmış ve ilerisi için alınması gereken adımlara dair öneriler sunulmuştur.

Anahtar: Tek fiyat kuralı, faiz pariteleri, fiyat bazlı ölçüler, oran bazlı ölçüler, finansal entegrasyon.

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CHAPTER I

INTRODUCTION

The emergence of **European Economic and Monetary Union (EMU)** has given a large momentum to financial integration in Europe. After the introduction of the Euro(€) on 1 January 1999, all of the remaining exchange rate risk among EMU participants were removed and this was a milestone for the beginning of a single monetary policy for the euro area. This is why EMU is accounted for being a vital driver for change in the euro area for the growing **financial integration**. Before the foundation of EMU, identical financial tools denominated in different euro-area countries were imperfect substitutes but were being traded at different prices. Thus, by eliminating **exchange rate risk** and hence eliminating the aforementioned source of market segmentation in the euro-area, EMU has eliminated a crucial obstacle to financial integration. However, these financial market developments in Europe are part of a global phenomenon. Financial integration has been spurred on a global scale by advances in information technology, the world-

wide liberization of cross-border financial flows, financial innovation as well as growing economic integration due to intensifying international trade relations and the internalization of production through foreign direct investment (Berben and Jansen 2005). When we look at the last two decades, we see a sharp growth in the importance of financial markets especially in industrialized economies, whereas asset returns tend to display a more synchronized manner. The same finding applies for stock and bond markets. Thus, national economies are more commonly influenced by interferences originating in foreign financial markets, and these interferences also tend to have more far-reaching results.

Single currency might be a **necessary condition** for a full integrated European capital market but it is not a *sufficient* one by its own. It is almost impossible to come up with an absolute terms to measure financial market integration. There are varying forms for barriers that segment national markets, differentiating from basic legal obstacles to deceptive cultural differences that requite very different amounts of time and effort to be dismantled. Even after eliminating exchange rate risk, there will be other frictions in national level that may still hinder full integration. Such frictions can be listed such as different tax treatment, persistent differences in

regulations applying to financial intermediaries, issuance policy, security trading systems, availability and disclosure of information, and judicial enforcement. Even if there are no exchange rate fluctuations, transaction costs for currency conversion will induce a deviation from international arbitrage. In addition to that, differential taxes and subsidies will be other barriers to integration which drive a wedge between *after-tax* cost of capital in different countries. Then, differences in regulation and enforcement can prevent financial intermediaries from competing across borders on the same basis. For example, regulation can create more solid entry barriers for foreign intermediaries; similarly, incorporated efficiency can differ across countries, requiring intermediaries to charge higher interest rates in inefficient authorities to compensate for expected recovery costs in case of default. Last, entry barriers may arise due to asymmetric information among potential foreign entrants and domestic investors.

The single most important policy-induced innovation in the international financial system since the collapse of the *Bretton Woods*'[1] era is the institution of EMU. After the end of Bretton Woods' era, international capital markets have became more integrated, especially among the

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[1] For more information see Appendix A.

industrialized countries. This implied the flexibility for domestic investors of a country to buy foreign assets and foreign investors was able to buy domestic assets. Therefore, assets having the same risk with the identical liquidity should be yielding the same expected return, regardless of its publisher. This idea is the starting point of **real interest parity** (RIP) which implies:

$$r_d^e = r_d^f \qquad (1)$$

where r_d^e and r_d^f are the *ex ante* real interest rate in home and foreign countries, respectively.

Since the end of Bretton Woods' era, we see that the world economy has become increasingly integrated in terms of investment, trade and degree of the financial flows among countries. During this integration, trade barriers were significantly reduced. Addition to that, foreign direct investment (FDI) barriers have been reduced which attracted an important amount of foreign investment. As a result of this there has been a huge increase in the volume of financial flows across countries. At this point it is vital to point out the implications of this rapid growth in *international capital mobility*. The most important one among them is that it forces a greater degree of interest rate parity across countries and causes each country to rely on other country's

interest rate. In other words it reduces the focus for independent domestic interest rate policy in individual countries. For instance, an interest rate in a country that is lower than the world markets would cause large outflows of international capital, which will raise the domestic interest rates eventually (and vice versa). Moreover, in a world where the exchange rate regimes are flexible the capital outflows will depend on exchange rate expectations and this will cause the exchange rate to adjust. These changes and the linkage between interest rates and exchange rates within countries are the scope of two interest rate parities: a) **Uncovered Interest Rate Parity (UIP)** and b) **Covered Interest Rate Parity (CIP)**. Both of them have been used by many authors who have tried to measure the degree of integration in financial markets. Therefore, it is vital to broaden up our discussion on these parities too by introducing what they suggest about exchange rate adjustments.

"Europe's single capital market: time to tackle the toughest challenges"[2] entitled President of the ECB, Jean-Claude Trichet in 2005. When we look at the progress that have been present in the integrating Europe, we see that they have already succeeded to advance on the financial market integration and Europe itself provides a good field for Bank Merger

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[2] Retrieved on 26.09.2007 from ECB Home Page http://www.ecb.int/home/html/index.en.html

and Acquisitions, new bank opening, reform and global financial integration research[3].

Under the scope of this statement and the claim form Jean-Claude Trichet, this paper tries to introduce you the instruments that are used to measure the level of integration in financial markets. The organization of the rest of the paper is as follow: The second part is introducing a definition for what financial integration is and then will list the benefits of a financial integration in an area. Then the third section is discussing the financial market integration in the bond markets which will introduce three parities that are used to distinguish the level of financial integration within a region. *Interest Rate Parity* is the ground of this section while discussing the integration of the bond market, which is the basic parity that relates interest rates and exchange rates. This parity is theoretical which is based on many assumptions imposed in economic models. There is varying evidence that rejects or supports this parity, but those evidences are out of scope of this paper. The types of IRP that this paper is covering are: a) Uncovered Interest Parity (UIP), b) Covered Interest Parity (CIP) and c) Real Interest Parity

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[3] Yin Wei, Min Huang. 2006. ''Lessons for the Opening and Reform of the Chinese Banking System,'' paper presented in International Conference on European Financial Integration and China, Fudan University, Shanghai, China, 12-23 May 2006, p1.

(RIP). While explaining those parities, a brief explanation on **Relative Purchasing Power Parity (RPPP)** will also be made, which is more based on the integration of goods market. The underlying assumptions within each theory are also underlined, while evaluating those measures. Nevertheless, as evidence part is out of scope of this paper, the discussion of those assumptions will be narrowed with the validity and reliability of the assumptions of the related theories. The next section is introducing the stock market together with the measures that are being used to measure the level of financial integration in those markets. The three types of methods that are used for measuring the financial integration in the stock markets are: 1) price-based, 2) news-based and 3) quantity-based measures. It is vital to underline that the financial integration of the stock and bond markets cannot be thought separately as they are joined in a way that one cannot talk about a full financial integration in the bond markets without sustaining a full financial integration in the stock markets, or vice versa. Thus, the measures that are market specific have an indirect effect on the other market.

Last section is introducing the other aspects and remaining barriers that are still present in stock and bond markets. In this part, "**natural barriers**" and "**home equity bias**" will be the ground of the discussion. I will

briefly explain what they are and their importance in the financial integration of the Europe. This section will conclude with the switch of *individual home equity bias* to become a **European** home equity bias.

Lastly, this paper is concluding about what each of the aforementioned theories suggest about integration of the European Financial Market.

CHAPTER II

FINANCIAL MARKET INTEGRATION: DEFINITION AND BENEFITS

This chapter covers a clear definition of financial integration that will be helpful in our understanding of its features. Then, the generally accepted benefits of a perfect financial integration are introduced.

2.1 Definition of a Financial Integration

In order to talk about a financial integration in a market, there are three features that have to be fulfilled[4]. First, all of the participants should be facing the same set of rules and procedures while they are investing in the financial instruments that are within that market. In other words, the variability in the financial structures within the region should not have an effect on the participants' decision to deal with those financial instruments.

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[4] The definition for financial integration that will be used within this paper is based on the adapted definition that is presented in Baele at al. (2004).

Second, all of the participants should have equal access to these financial instruments which imply that any friction that is present within the market should have symmetric effects. Within this definition, we are not arguing that a financial integration would imply a removal of frictions to the access of investment of capital through markets. Rather, we argue that financial integration should eliminate the asymmetric effects of those frictions by giving an equal access to the financial instruments to each participant. Therefore, in an integrated financial market the borders that prevent a participant to access a financial instrument should have symmetric effects on the other participants in that area. Third, after a full financial integration there should be no discrimination among any potential market participants based on their location of origin. In other words, all of the participants should be treated in the same way while they are dealing with those financial instruments.

When we look at the literature that deals with financial integration, we see that most of the papers used the law of one price as their definition. Under the law of one price, the assets should be priced the same if they have the same risks and returns. Therefore, when this law does not hold, there will be arbitrage opportunities. Furthermore, in addition to financial markets the

law of one price should also hold in goods market. Nevertheless, due to present transportation costs and frictions[5] within the goods market that are almost impossible to remove, it is unlikely that the law of one price will hold in the goods market as well as it does in the financial markets.

2.2 Benefits of a Financial Integration

An increased financial integration will have a direct impact on the capital allocation. By removing the barriers to trade, one can allow a better capital allocation within the region. In other words, in a region where the financial markets are more integrated, the capital allocation will be more efficient. The investors will be allowed to invest in wherever they think their investment will yield more productive returns which will in return increase the productivity of their investment.

Then, as a result of a better capital allocation the investments within the region will be more efficient which means the productive investment opportunities will increase. This will have a direct impact on economic growth. Therefore, by increasing the degree of integration in financial markets in an area, one can reach an increase in income productivity which

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[5] The frictions within the goods market involve the impossibility of storability of the goods and non replacibility in terms of payment.

will yield economic growth. This will naturally imply an increase in financial development too.

Before introducing the measurements that are being used to find out the degree of financial integration in the Euro area, it is vital to mention the importance of complete markets. In order to financial integration to yield the abovementioned outcomes, it has to result in complete markets where an individual can hedge his risks perfectly. In other words, for a risk-averse investor, financial integration can only lead to higher welfare as soon as he can share his risk perfectly within the region. Therefore, throughout this paper the mentioned outcomes that increase the welfare within the region, assume that the markets are complete.

CHAPTER III

MEASUREMENT METHODS FOR FINANCIAL INTEGRATION

In this chapter, this paper tries to introduce the methods that are being used to measure the degree of financial integration in the Euro area. Within these measurement methods, the core of the discussion will mostly rely on the strongest feature of the aforementioned definition of integration: the law of one price. This paper discusses three measures that are based on this law: a) price-based, b) news-based and c) quantity-based measures.

The price-based measures try to indicate level of integration by measuring the differences in prices or returns on assets due to location of origin of the assets. Throughout this measure, we are able to check the presence of law of one price which must hold if the markets are financially integrated. In other words, the differences in asset returns or interest rate spreads are a measure that shows us how far away a financial market from full integration is.

Then, the news-based measures are used to find the information effect on an area. This measure helps us to distinguish the degree of integration in the Euro area by comparing the impact of local and common news on the price or returns on assets. Therefore, in a financially integrated area, the prices and returns should be mostly affected by the common news whereas the local news should have a little impact.

Lastly, the quantity-based measures help us to distinguish the effects of frictions based by demand for and supply of investment on the amount of productive investment. Therefore, by quantity-based measures, this paper tries to present cross-border statistics to show the impact of financial integration on the amount of investment in that area. This measure helps us to see the evolution of home equity bias within Europe during the process of integration.

CHAPTER IV

FINANCIAL MARKET INTEGRATION IN BOND MARKETS

Interest rate parity is a basic hypothesis that links interest rates and exchange rates. It is an arbitrage condition suggesting that the returns from borrowing in one currency, exchanging that currency for another one and investing in an interest yielding means of instrument of the second currency while buying a futures contract that says that the individual converts the second currency back at the end of investment period yields a higher return than just holding the first currency. Throughout this section, the *Uncovered Interest Parity*, *Covered Interest Parity* and *Real Interest Parity* are discussed.

4.1 Uncovered Interest Parity (UIP)

Uncovered interest parity links the bond market with the exchange rate market. It states that interest rate changes are almost equal to the ex post exchange rate change. In other words, it states that countries with low

interest rates will have its currency appreciating. The hypothesis of UIP can be expressed as:

$$(1 + R^d) = (1 + R^f) \cdot E_t(S_{t-1})/S_t \qquad (2)$$

Where R^d stands for the return on a domestic asset, R^f is the return on a foreign asset; S_t is the domestic currency price in terms of foreign currency and $E_t(S_{t-1})/S_t$ is the expectation of the exchange rate in the next period.

UIP is mostly based on the Fisher Hypothesis[6] (International Fisher Effect[7]) as the differences in interest rates are related with expected exchange rate. In other words, the UIP assumes that individuals are rational parties so that the expected future exchange rate is almost same with the real value. Besides to that uncovered interest rate parity assumes that there is no country risk for both foreign and domestic currency. The uncovered interest parity is not directly testable if the markets are not working efficiently (for instance in the absence of market expectations of future exchange rates). Moreover, this hypothesis assumes no transaction costs, perfect capital flow and no simultaneity induced by monetary authorities. The validity of these assumptions will be discussed in Part II in more detail.

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[6] Fisher, Irving. 1930. ''The Theory of Interest,'' The Macmillan Company, New York.
[7] See Appendix B for more information.

If the aforementioned assumptions hold for the uncovered interest parity, then the differences in interest rates of the foreign and domestic currencies will have a direct impact on the exchange rate of the domestic currency. For instance, if the domestic interest rate is higher than the foreign interest rate, this will cause an important amount of capital inflow to the home country. This is because of the increase in the demand for the domestic bonds. In return, it will cause the demand for the domestic currency to increase and domestic currency would appreciate to adjust this difference.

Then, when we think the Europe case, where Euro is the unique currency it will also cause the European countries who are using Euro as their currency to be dependent on the other countries too while adjusting their interest rates. Therefore, UIP makes a valid suggestion for European financial management in theory.

UIP is mainly based on rational expectations. Rationality is a very common assumption that is used in most recent theories. The individuals are assumed to have perfect foresight and capable to make rational expectations about future based on their previous experiences and their observations. Nevertheless, this assumption is not valid in reality as people are not able to realize sudden changes and shocks in the market. Markets are open to

volatility and having a perfect foresight on these shocks is almost impossible. In addition to that, UIP assumes that the country risks are same towards countries. This is a very strong assumption as it is impossible to assume that countries would respond in the same manner to volatility in their market. A country with a higher stability will have a lower country risk than an unstable country. Therefore, it is not realistic to say that a country that is at its steady state will have the same country risk with a country which is facing instability. Addition to that, UIP assumes there are no transaction costs; there is perfect capital flow and no internal or external barriers to trade. All of these assumptions are very strong ones and proved to be wrong in reality. As a result of this, one can easily claim that UIP will fail in reality but may still have some explanatory power to measure financial market integration in Europe. Quite apart from ongoing debates over the validity of the UIP assumption as an ex ante hypothesis and the usefulness of incorporating the UIP assumption into macroeconomic models, there is abundant evidence that the changes in spot exchange rates that are expected ex ante are generally dominated by unexpected changes. As Isard(2006) notes, regardless of the usefulness of UIP as an ex ante hypothesis for macroeconomic modelling, it is quite clear that UIP by itself provides a very

inaccurate framework for predicting the changes in exchange rates that are observed ex post. The working papers of Froot and Thaler (1990), Lewis (1995) and Engel (1996) also prove that the UIP does not hold in long run especially because of it is failure to model the country risk premiums explicitly.

4.2 Covered Interest Parity

Covered interest parity basically states the following:

$$(1 + R^d) = (1 + R^f) \cdot F_{t-1}/S_t \tag{3}$$

where R^d is the domestic interest rate, R^f is the foreign country's interest rate, S_t is the spot exchange rate expressed in terms of price of the domestic currency in terms of the foreign currency and F_{t-1} is the forward rate which is expressed in the same units as S. Let us organise this expression a bit by dividing both sides by $(1 + R^f)$ and then taking log of the both sides. Then we will have

$$R^d - R^f = \log[F/S] \tag{4}$$

or

$$R^d - R^f = (\% \, \Delta \text{ in price of foreign currency}^{exp}) \tag{5}$$

where $\log[F/S]$ is the percentage difference between forward rate and the spot rate. Therefore CIP states that any difference between domestic and foreign interest rates (i.e. = (R^d>R^f or vice versa) will be approximately equal to average difference between forward rate and spot rate.

Like uncovered interest parity, CIP assumes that there is no barriers of trade, no transaction costs in the market. Moreover, it still assumes that countries do have equal country risks on their assets.

To sum up, covered interest parity states that I would be able to buy from many different markets to diversify my risk if the financial markets are really integrated. Like UIP, it states that any arbitrage opportunity will have an impact on the exchange rates and therefore will cause each country to be dependent on the others where the financial markets are perfectly integrated.

Lastly, let us evaluate the underlying assumptions of covered interest parity. CIP relies on forward rates instead of expectations so it is more valid on interpreting the effect of a difference in interest rates on exchange rates. As the other assumptions are almost same, I can say that CIP seems to be more valid in reality. The empirical data[8] also shows that CIP holds better

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[8] Frankel, Jeffrey. 1992. "Measuring International Capital Mobility: A Review," *American Economic Review.*

than UIP, which implies that forward market functions properly. Therefore, we can say that if covered interest parity holds, markets are integrated (no arbitrage opportunity) and interest rate is covering the risks in the economy.

4.3 Real Interest Parity

Real interest parity mainly links the goods and financial markets with the exchange rate market. Therefore, let us first start with the equilibrium condition in the goods market as stated by the Relative Purchasing Power Parity:

$$\pi_e^d = \pi_e^f + (\% \, \Delta \text{ in price of foreign currency}^{exp}) \qquad (6)$$

or

$$\pi_e^d - \pi_e^f = (\% \, \Delta \text{ in price of foreign currency}^{exp}) \qquad (7)$$

where π_e^d is the expected inflation in the home country and π_e^f is the expected inflation in the foreign country.

Relative purchasing power parity (RPPP) states that movements in exchange rate can be explained by inflation movements. It assumes that goods traded are homogenous among all countries and all goods are traded. Moreover, it assumes no transportation costs, no tariffs, taxes and price

discrimination. Therefore, equation (7) is the equilibrium condition for the

goods market if it is integrated and all the underlying assumptions hold.

To recall we know that equation (5) summarizes the equilibrium

condition for financial markets. Then let me introduce the basic hypothesis

that RIP suggests where it links the goods and financial markets with

exchange rate by equating equations 5 and 7[9]:

$$r^d = r^f \tag{8}$$

$$R^d - R^f = \pi_e^d - \pi_e^f \tag{9}$$

or

$$R^d - \pi_e^d = R^f - \pi_e^f \tag{10}$$

add and subtract F_D and $\%\Delta S^e$, where F_D is the forward discount rate and

$\%\Delta S^e$ is the expected change in the spot rate, will give us[10]:

$$r^d - r^f = (R^d - \pi_e^d) - (R^f - \pi_e^f) + F_D - F_D + \%\Delta S^e - \%\Delta S^e \tag{11}$$

$$(r^d - r^f) = (R^d - R^f - F_D) + (\%\Delta S^e - \pi_e^d - \pi_e^f) + (F_D - \%\Delta S^e) \tag{12}$$

| 1 | | 2 | | 3 |
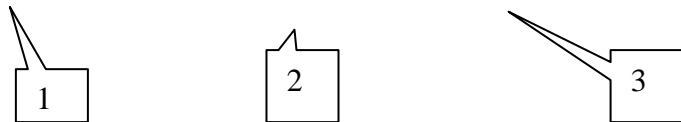
After all these adjustments, we obtain the equation 12. This equation

suggests three important aspects about the markets. The first part should be

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[9] All of the variables used within the following equations are valued in logs.
[10] See Appendix C for the full derivation.

zero if covered interest rate parity holds. The second part measures the goods market and it has to be zero too if the good market works efficiently. Lastly, third part stands for the exchange rate market; which implies that forward discount rate,F_D, should be equal to the expected percent change, $\%\Delta S^e$, as soon as the exchange rate market is integrated.

Therefore, RIR has many underlying assumptions as it relies on both relative PPP and CIP. It mainly suggests that if agents make their forecasts using rational expectations, and when there are arbitrage opportunities, then real interest rates between countries will equalise. By having the first equality condition, RIR confirms that financial markets are integrated and working efficiently so that the differences in interest rates are adjusted by the forward discount rate. The second equation holds only if the goods markets are integrated and price information is covered in the good market. Last of all, if forward discount rate (F_D) is equal to expected percent change in spot rate then it indicates that exchange rate market is integrated too. To sum up, as soon as RIR holds, I am covering the country risk (the difference between interest rates of two countries) and / or exchange rate risk.

Real interest parity is the one that is used to measure financial and good market integration. RIP assumes both financial and good markets are

integrated and working efficiently. As a result of this, RIP has stronger assumptions both about goods and financial markets. The empirical data[11] shows that both CIP and RIP holds better for industrialized countries as markets are more efficient and there is less country risk. Moosa and Bhati (1996) found out that RIP holds better for the industrialized countries in Europe, especially for Germany and Switzerland. Furthermore, Fujii and Chinn(2001) proved that RIP holds better in long horizons than at short. Addition to that the assumptions of the RIP on the goods market integration has important features. First of all, in order to have a full integration in the goods market, the law of one price has to hold. Furthermore, the goods market also relies on the labour and physical capital markets. Therefore, the structure of labour and capital markets is also vital while making an analysis on the integration of the goods market. In order to have an integrated goods market, the capital and labour markets should be complete and free of any frictions. Addition to that, when you are talking about financial integration in an area, you have to have perfect mobility for your labour and capital. Nevertheless this condition is difficult to satisfy. Therefore, the real interest

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[11] Pipatchaipoom, Onsurang and Stefan C. Norrbin. 2006. ``Reexamining Real Interest Rate Parity,'' Proceedings of the Annual Conference of the Global Economic Modeling Network (EcoMod).
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parity is based on very strong assumptions that even go further than the ones

it makes on financial markets. In order the RIP to hold, we must have perfect

integration in complete goods, financial, labour and capital markets which

are quite impossible due to standing frictions in each market.[12]

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[12] The standing transportation costs and unrecovarability of payment in goods market and the immobility of labour and capital within the eurozone are the most important ones.

CHAPTER V

FINANCIAL MARKET INTEGRATION IN STOCK MARKETS

An increase in the integration in stock markets will imply the country-specific component in the stock returns to decline. Therefore, in a financially integrated area the estimation of equity returns will rely on sector effects rather than country effects[13]. When there is full integration the returns on stocks should be directly related to the performance of the sector which it belongs and should not be determined by the performance of the country that it is listed. Throughout this chapter, the empirical evidence on the aforementioned linkage will be introduced as well.

An important implication of the increase reliance of sector effects on stock returns is the way an investor can decrease the risk of his portfolio. In other words, in an area where there is full integration, the diversification should be across sectors rather than countries as the country-specific

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[13] Heston, S. L. and K.G Rouwenhorst. 1994. "Does Industrial Structure Explain the Benefits of International Diversification?," Journal of Financial Economics 36: 3-27.

component in the stock returns has declined. As a result of this the dispersion in country returns would decrease below the dispersion in sector returns.

As mentioned before, an increase in financial integration has a direct positive impact on capital allocation. Further integration in stock market will decrease the cost of capital. Then, lower cost of capital will give more incentives for international investors to diversify their portfolios across countries hence financial integration has eliminated the country specific risk. This will increase the productivity in investments which will cause a sustainable increase in the income of the country which implies economic growth. Another benefit of integration in stock market is on behalf of the households. With full integration, they will be able to smooth their consumption relative to fluctuations in their income. Lastly, by increasing integration in the equity market, the corporations will be able to access to the international funds which implies them to reach a larger pool of funds.

5.1 Measurement of Financial Integration in Stock Markets

How can we measure the degree of financial market integration in practice? Beale et. Al (2004) propose to quantify financial integration using

three main dimensions, namely (i) price based, (ii) news-based and (iii) quantity-based measures. The first class of measures could be viewed as the direct check of the law of one price on the condition that the compared assets have similar characteristics. Price -based measures can then be quantified by means of, e.g. beta and sigma convergence. Then, the second class of measures can be used to identify the existence of market imperfections like barriers and market frictions, due to the fact that the new information that a local investor gains in a financially integrated region should have a smaller impact on particular assets than that of global news. In other words, the frictions that arise due to asymmetric information should be eliminated due to the presence of a integrated financial market. The last class of measures quantifies the impact of mainly legal and other non-price frictions and barriers from both the supply and demand sides of the investment decision-taking process.

Adem et al. (2002) argue that '' financial markets are integrated when the law of one price holds''. Given this definition, stock market integration implies convergence of returns on assets that are issued in different countries and generate identical cash flows – see (Adjouté, Danthine, 2003), (Baele et al. 2004), (Bekaert, Harvey, 1997). In a theoretical example of such perfectly

integrated stock markets, similar assets with the same risk factor and return should be priced identically by markets regardless of the particular location where the asset is denominated.

Nevertheless, the law of one price does not necessarily hold in the presence of market frictions. While the law of one price suggests a rather long-term phenomenon, an alternative argument that represents the expectation of a equalization of stock market returns in the long – to medium-run is based on the Walras law of markets as applied to the financial system: if n-1 financial markets are in equilibrium (i.e. exchange rate, money, bond markets), then the nth market (stock exchange) cannot be in disequilibrium.

The rest of the section will be presenting the measures of integration based upon the sector and country effects. The price-based, news based and quantity based measures for the degree of financial integration in stock markets in the eurozone will be the core of this chapter.

5.1.1 Price-Based Measures of Stock Market Integration

Price-based measures are mostly based on the assumption that financial markets are fully integrated if the law of one price holds in

equilibrium. In short, the law of one price indicates that the prices for a fully homogeneous product in question are the same irrespective of the geographical domicile of the seller or the buyer (Ferrando and Vesela 2005). Nevertheless, one has to take the exchange rate risk into account when measuring integration. When analyzing the euro are markets, this is no longer a problem since 1999 (Balele et al. 2004). Another assumption that the price-based measures make is that expected returns are influenced by global-specific rather than by country-specific risk factors. As Bekaert and Harvey (1995) point out ''markets are completely integrated if assets with the same risk have identical expected returns irrespective of the market''. If markets are fully integrated, investors have to cope with ''common and country-specific risk, but price (identically in all markets) only common risk factors, because country-specific risk is fully diversifiable'' (Emiris 2002). Then, in partially integrated markets, investors will have to cope with both risks and also price them both. Lastly, in segmented markets, investors have to manage and to price only country-specific risks

In order to analyze the degree of integration in European stock market, the price-based measures use the differences in returns of stocks across countries. By comparing the change differences in stock returns across

countries within time, one can distinguish the amount of integration in that time interval. The basis of this framework is to compare the convergence of the stock returns in the Euro area after the foundation of EMU.

An important study that is based on the degree of stock market integration in the Europe is done by Adjaouté and Danthine (2003). They compared the correlations among country return indices in two time intervals. Their findings confirmed that the country return correlations were significantly higher before 2002. This implies that risk diversification potential across countries have decreased within the EMU.
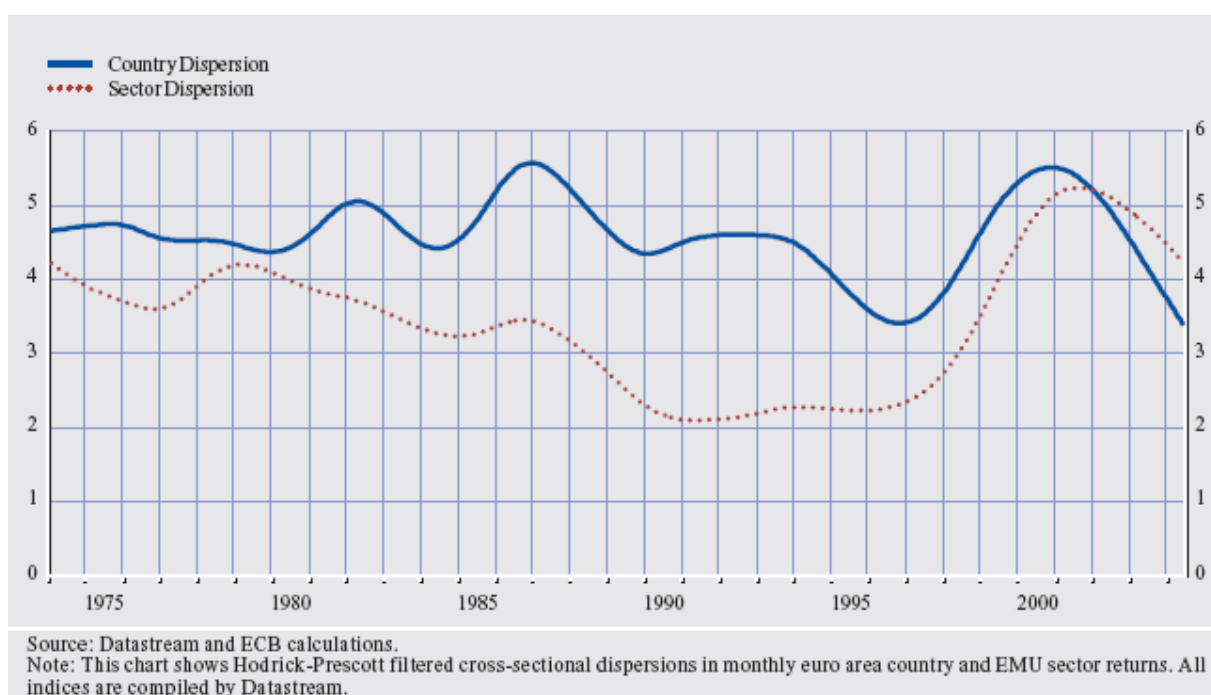
Another study that investigates the structure of cross-country and sector correlations over time is done by Baele at al. (2004). They calculated the cross-sectional dispersion in both sector and country index returns. The following graph 5.1 is retrieved from that paper which shows the evolution of Hodrick-Prescott[14] filtered country and global sector dispersions of equity returns among eurozone countries[15]. This graph shows that country dispersion has been higher than sector dispersion for most of the time. This implies that country diversification was preferred to sector diversification.

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[14] The Hodrick-Prescott filter is a smoothing method that is used to obtain a smooth estimate of the long-term trend component of the series.
[15] Baele, L. Ferrando, A., Hördahl, P., Krylova, E. and Monnet, C. 2004. "Measuring Financial Integration in the Euro Area," *ECB Occasional Paper Series* 1-98.

Nevertheless, we see that the difference between the two dispersions has decreased in the second half of the 1990s. Moreover, after 2000 the highly integrated stock market in the EMU succeeded to make sure that sector diversification is superior to country diversification.

Figure 5.1 Hodrick-Prescott filtered country and global EMU sector dispersions of equity returns among Euro area countries.

Source: Datastream and ECB calculations.
Note: This chart shows Hodrick-Prescott filtered cross-sectional dispersions in monthly euro area country and EMU sector returns. All indices are compiled by Datastream.

Another point that the Baele at al. (2004) discusses is the importance of the distinction between diversifying across countries and sectors, and across countries or sectors. In other words, they underline the fact that diversifying across both sectors and countries will provide a portfolio with a lower risk

than diversifying across sectors or countries. To see the implication of this they added the country-sector indices over the same period. The Graph5.2 exhibits the results of this calculation[16]. The findings of this improved model proved that diversifying across both countries and sectors provided the highest risk reduction while the potential of sector diversification also increased in the second half of nineties.

Figure 5.2 Hodrick-Prescott filtered country, global EMU sector and country-sector dispersions of equity returns among Euro area countries.

Source: Datastream and ECB calculations.
Note: This chart shows Hodrick-Prescott filtered cross-sectional dispersions in monthly euro area country, EMU sector, and country-sector returns. All indices are compiled by Datastream.

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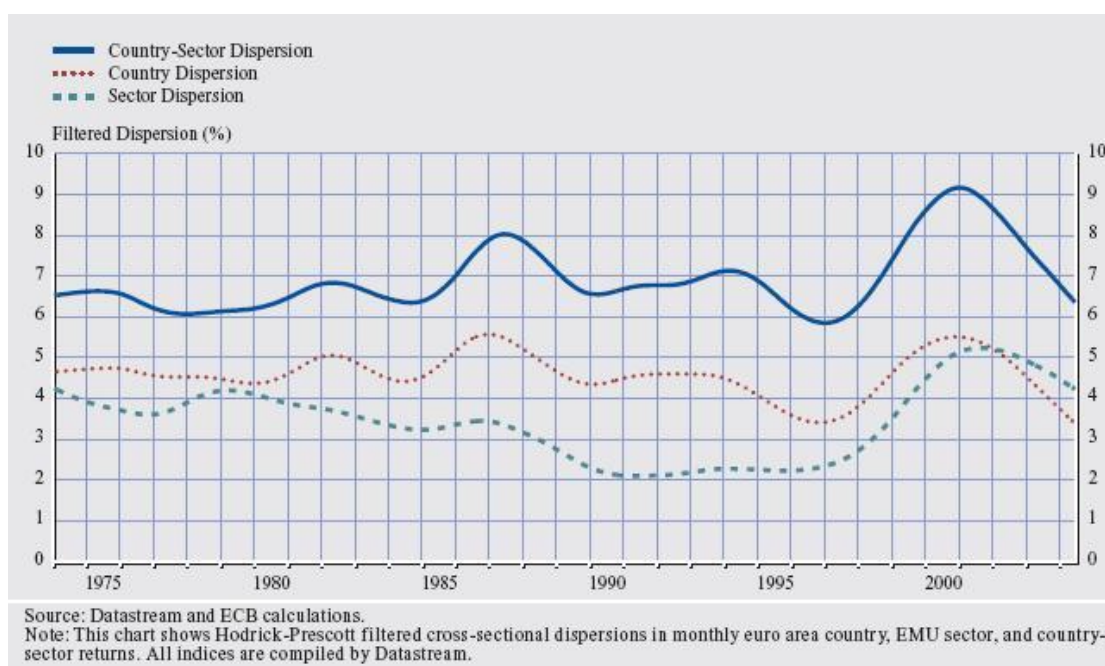
[16] Baele, L. Ferrando, A., Hördahl, P., Krylova, E. and Monnet, C. 2004. "Measuring Financial Integration in the Euro Area," *ECB Occasional Paper Series* 1-98.

5.1.2 News-Based Measures of Stock Market Integration

As investigating the law of one price does not include ''information about the dynamics of the integration process, not (...) the drivers of integration'' (Baele et al. 2004) the literature has shifted to the analysis of shock spillover intensities, or in short, how markets react to innovations in another market, in order to measure the degree of integration (Baele et al. 2004). Therefore, the objective of the news-based measures is to clear ''the effects of new information on different shocks from other market frictions'' (Ferrando and Vesala 2005). This implies that aside from common factors, returns are reacting differently to innovations. This is mainly due to what Baele et al. (2004) refers as betas of the returns: ''While returns for all countries share the same two factors, they are allowed to have different sensitivities, or ''betas'', to these common factors''. By means of these betas, one can identify the intensity of local and global shocks to equity markets. For instance, if betas are increasing, the degree of integration among stock market rises (Baele et al. 2004).

The news-based measure of the stock market integration briefly relies on the impact of the sensitivities of countries to common shocks. To model

this, we will use "betas" that will indicate the sensitivity of each local market to the shocks in the Euro area and world return shocks.

The basis of this measure is to distinguish how the betas change over time. After an increase in financial integration, a common shock should have the same impacts within countries in the EMU. Therefore, we expect the betas to increase over time.

The model that serves to this need is being introduced in the Baele at al. (2004) paper. They introduce three dummy variables that stand for different time periods that are based on the milestone changes in the Euro area from 1986 to 2003.

The specification of betas is as follow:

$$\beta_{i,t}^{EU} = \alpha_{t,0} + \alpha_{t,1} \cdot D_t^1 + \alpha_{t,2} \cdot D_t^2 + \alpha_{t,3} \cdot D_t^3 \qquad (13)$$

$$\beta_{i,t}^{US} = \gamma_{t,0} + \gamma_{t,1} \cdot D_t^1 + \gamma_{t,2} \cdot D_t^2 + \gamma_{t,3} \cdot D_t^3$$

(14)

where, D_t^1 = the period following the Single European Act (1986-1992)

D_t^2 = the period between the Treaty of Maastricht and the introduction of the single currency (1992-1998)

D_t^3 = the post-Euro period. (1998-2003)

The Balee at al (2004) paper finds out that the spillover intensities over both Euro area and US shocks have increased within this time period. This implies that the degree of integration has increased both within the eurozone and among major world stock markets.

5.1.3 Quantity-Based Measures of Stock Market Integration

As pointed out by Pagano et al (2001) ''one may expect that as capital market integration proceeds, geography becomes increasingly irrelevant to finance''. Quantity-based indicators can also be influenced by other factors. According to the theory of contestable markets, the degree of integration can be measured by analyzing cross-border establishment and acquisition of financial institutions, domestic markets' structural changes as well foreign investors' stake in the local market (Ferrando and Vesala 2005).

The basis of the quantity-based measures is to distinguish the evolution of the home-equity bias in the eurozone over time. Investors usually prefer to invest in the domestic stocks instead of international ones as they are risk-averse. Therefore, as a result of increased financial integration in the eurozone one would expect the home equity bias to decline. This is

mainly due to the fact that each investor now can easily reach to any stock within the integrated area. Moreover, as the frictions are symmetric to every investor in the area each investor has the equal access to any financial instrument. Therefore, the quantity-based measures try to find out whether the asymmetric information[17] in the integrated area is still present.

The data collected by Adam et al. (2002) shows us that the degree of home equity bias in the Euro area has declined. Moreover, the findings of Xu and Norman indicates us that due to decline in the institutional borders that have prevented investors to invest in the other countries within the Euro zone declined, the home equity bias decreases in the eurozone. Furthermore, they point out the standing behavioral reasons that cause some home equity bias still to persist which will be discussed in the part 6 in more detail.

In order to distinguish the change in degree of home equity bias within the eurozone, Baele at al. (2004) paper introduces the Graph 5.3 which plots the share of equity funds that invest in non-domestic stocks during the period 1995-2003. The findings are parallel to our estimations so that the overall investment funds' share of the non-domestic stocks increased from about 40% to almost 70% in this period. Therefore, this graph indicates the

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[17] Any information that would not be perceived by *all* of the investors within the area so that there are arbirtrage opportunities.

increase in international diversification among the investors in eurozone due

to increasing integration in the European stock market.

Figure 5.3 Asset shares of the investors in the Euro Area with non-domestic investment strategy

Source: FEFSI and ECB calculations.
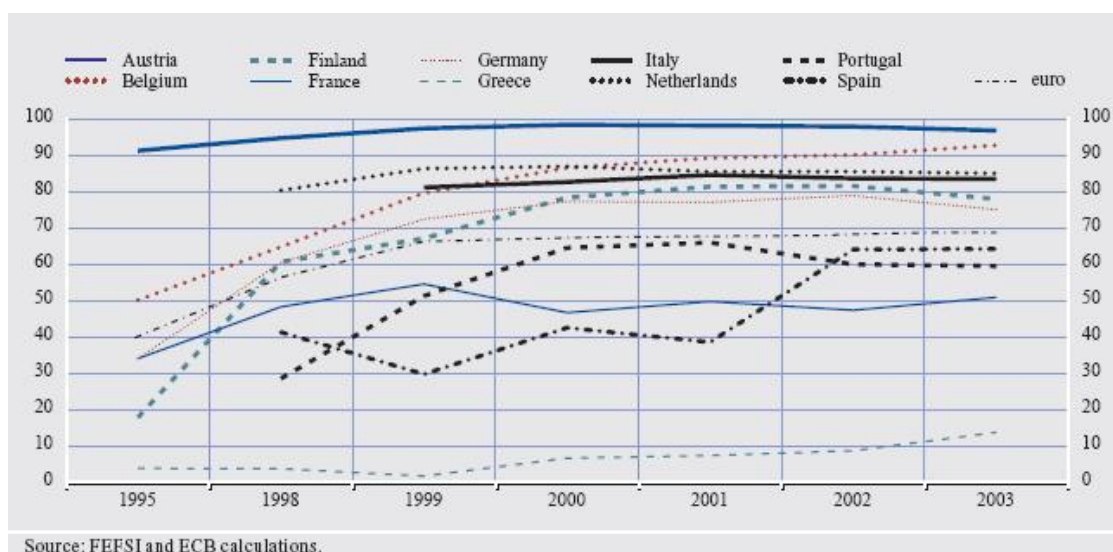
CHAPTER VI

REMAINING BARRIERS

There are still some factors that can be counted as barriers to market entry as the integration is still in progress. Culture, language and consumer preferences are still relevant natural barriers for Europe. There are still "politically induced barriers" like varying national tax-laws or different regulations.

Another important barrier is the home equity bias. Home equity bias puzzle is the condition that investors choose their home market to buy assets. Xu and Strong explained this puzzle under two topics in their paper[18] : 1) Institutional and 2) Behavioural Reasons. They claimed that institutional reasons are the ones due to the barriers that avoid domestic investors from buying abroad as a result of different transaction fees for different buyers. This is usually done by imposing taxes on foreigners to prevent them to grasp enormous amounts in a short time. The behavioural reasons, on the

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[18] Strong, Norman and Xinzhong Xu. 2003. "Understanding the equity home bias: Evidence from Survet Data," *The Review of Economics and Statistics,* MIT Press, vol. 85 (2), 317-312, 03.

other hand are about the variability in the way that investors feel about foreign assets. They suggest that investors might have a relative optimism towards foreign assets, which is mainly the condition that investors mostly think that a foreign market will do well in the long-run. Then they also suggest that investors might have an absolute optimism which is gained by looking at different markets. In other words, absolute optimism implies that an individual investor thinks that his domestic country will do better in absolute terms.

The home equity bias should decrease in integrated financial markets. So, we can say that there is a lower home equity bias in the European market due to institutional reasons. Furthermore, the paper of Xu and Norman shows us that, European investors hold 85% of their equity in their own asset market. Therefore, one can sum up that there is a European home equity bias which causes European investors still not to invest most of their capital in a foreign market. Nevertheless, you cannot come to the same conclusion on behavioural reasons.

To sum up, the behavioural barriers are still valid for the integrating financial markets of Europe.

CHAPTER VII

CONCLUSION

"The ECB has demonstrated since the first days of its existence that it is a credible and solid anchor for monetary stability. Financial institutions and market participants know also that they can count on the ECB to be in the domain of financial integration a very strong pillar to sustain their efforts and to facilitate the success of this important European endeavour[19]" concluded President of the ECB, Jean-Claude Trichet in 2005. The European economy has become increasingly integrated till today. The purpose of this paper was to introduce the measures that are used to distinguish the level of financial integration aforementioned in bond and stock markets. Thus, this paper should be useful for everyone to understand why European financial markets should be more integrated due to higher dependence of countries in their interest rate decisions and should give an idea about what the most common theories that are used to measure market integration suggest about

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[19] Retrieved on 26.09.2007 from ECB Home Page http://www.ecb.int/home/html/index.en.html

the degree of integration. It is vital to recall again that the specific measures that are used to calculate the financial integration in bond and stock markets are somehow joined in such a way that as Walras rule of markets suggests (if n-1 financial markets are in equilibrium (i.e. exchange rate, money, bond markets), then the nth market (stock exchange) cannot be in disequilibrium.)

The paper has also briefly explained the importance of other barriers that might be effective on financial integration like home equity bias, natural bias and politically induced barriers. After all these, I have also evaluated the validity of all three parities according to the underlying assumptions that are introduced within each theory. The covered interest parity seems to be more realistic than both RIP and UIP as the underlying assumptions of CIP are more valid. RIP, on the other hand is proved by empirical data to hold better in industrialized countries as those countries have more efficient markets with less country risk.

Last of all I have introduced the methods that can be used to evaluate the evolution of integration within the stock market in the eurozone. The price-based measurements showed us that the dispersions in the sector index has increased while diversifying risk which is a natural result of increased integration in the asset market. The news-based measures also proved that

the common information is more important for the investors in the more integrated European asset market. Last of all, the quantity based measures also pointed out that the home-equity bias within the eurozone has declined.

In contrast to quantity-based measures, price-based measures can be interpreted clearly, as they are founded on the law-of-one price (Adam et al. 2002). A possible drawback is that the ''law may fail to hold true because of factors such as transport and transaction costs, consumer switching costs or barriers to entry, maintaining market segmentation'' (Cabral et al. 2002). Furthermore, Adam et al. (2002) suggests that these indicators are based on price data which is better accessible and more precise. On the other hand, in order to use price-based measures, complicated methodologies are needed. According to Kiehlborn and Mietzner (2005), price-based measures are particularly effective when analysing long-term integration processes. In addition, they are more responsive to new integration measures. With the help of quantitative indicators, the presence of foreign investors in domestic markets can be assessed easily. Adam et al. Suggests that indicators based on quantities have the main advantage that their implementation is less difficult. The major disadvantage of all quantity-based measures, on the other hand, is that they cannot certainly prove the existence of integration.

It is not clear, which indicator serves the best results. On the one hand, Ferrando and Vesala (2005) argues that price-based indicators are considers as being more accurate for capital market integration measurement. On the other hand, as Adam et al (2002) point out ''given that quantity data based on stocks of assets (...) can be given clear economic interpretation, they should be preferred to flow data''.

As a result of this framework, one can conclude that these parities may help investors to have an idea about the increasing degree of integration in European financial markets, where countries are more dependent to each other about their interest rate parities as they are mostly attached to a unique monetary union.

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APPENDIX A

BRETTON WOODS SYSTEM

The Bretton Woods20 system of international monetary management stated the conditions for financial and commercial relations for the world's major industrial states. It is the first system where there was a full negotiation over the monetary relations among independent parties.

This system set a bundle of rules and organized institutions to govern the international monetary system. International Bank of Reconstruction and Development (IRBD), which is formed after the World War II and International Monetary Fund are established by Bretton Woods.

The basic feature of Bretton Woods system was the obligation for every country to adopt a fixed exchange rate policy in terms of gold. This caused gold standard to be emerge such that each currency is linked and fixed to gold. Nevertheless, after United States failed to convert dollars to gold the system collapsed.

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[20] Retrieved on 30.09.2007 from the official web site of Yale University http://www.yale.edu/

APPENDIX B

Irving Fisher (1867-1947) is an American economist who contributed mostly to the money, inflation and interest rates. Purchasing Power Parity is based on his ideas about Rational Expectations. He suggested that it is the rational expectations that help us to understand the relationship of inflation to interest rates. He argued that, the developments in the financial markets will bring the economy to the expected inflation rate. This theory is almost the same thing to say that the financial markets were correctly predicting the future inflation rates as the agents-individuals- have rational expectations.

The Fisher hypothesis is the proposition that the real interest rate is independent of monetary measures, especially the nominal interest rate. The Fisher equation is

$$r_r = r_n - \pi_e$$

where, r_r is the real interest rate, r_n is the nominal interest rate and π_e is the expected rate of inflation.

According to the **International Fisher effect**, the movement of the nominal exchange rate between two countries' currencies is determined by the difference in the nominal interest rates between those two countries, with

the value of the currency of the country with the lower nominal interest rate increasing. This is also known as the assumption of Uncovered Interest Parity.

The generalized Fisher effect holds that real interest rates must be the same across borders. However, in order for the generalized Fisher theorem to hold, capital markets must be integrated. That is, capital must be allowed to flow freely across borders.

APPENDIX C

We know that the equilibrium condition in the goods market

according to the RPPP is:

$$R^d - R^f = (\% \ \Delta \text{ in price of foreign currency}^{exp}) \qquad (5)$$

and furthermore CIP argues that:

$$\pi_e^d - \pi_e^f = (\% \ \Delta \text{ in price of foreign currency}^{exp}) \qquad (7)$$

When we combine these two equations we get the following equality:

$$r^d = r^f \qquad (8)$$

$$R^d - R^f = \pi_e^d - \pi_e^f \qquad (9)$$

or

$$R^d - \pi_e^d = R^f - \pi_e^f \qquad (10)$$

then if we add and subtract F_D and $\%\Delta S^e$, where F_D is the forward discount

rate and $\%\Delta S^e$ is the expected change in the spot rate, that will give us:

$$r^d - r^f = (R^d - \pi_e^d) - (R^f - \pi_e^f) + F_D - F_D + \%\Delta S^e - \%\Delta S^e \qquad (11)$$

After we arrange the equation such that we can analyze the equation

under three dimensions (CIP, goods market and exchange rate market

respectively), the following equality holds:

$$(r^d - r^f) = (R^d - R^f - F_D) + (\%\Delta S^e - \pi_e^d - \pi_e^f) + (F_D - \%\Delta S^e) \qquad (12)$$