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From various degrees of trade to various degrees of financial integration: What do interest rates have to say?

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NON-TECHNICAL SUMMARY

The second half of the 20th century has been characterized by the rise of regional trade agreements (RTAs) along with the worldwide trend of removing trade barriers within the General Agreement on Trade and Tariffs (GATT) negotiations. The trade creating (within the considered trade unions) and trade diverting (with the rest of the world) effects associated with regional trade agreements, have been extensively studied in the literature, relying on the well-known gravity equation.

Alongside with this literature, another strand of research emphasizes that trade integration goes along with financial integration. As stressed in Eichengreen and Park (2005), it seems indeed that "finance follows trade".

To our best knowledge however, it has never been tried to investigate the impact of this parallel integration in trade and financial flows on asset returns. This seems especially important in the sense that RTAs are characterized by various degrees of trade integration and consequently, of financial integration. These differences should be reflected in the returns of financial assets and primarily in interest rates.

In this paper, we propose a systematic study of the degree of financial integration following the degree of trade integration according to Balassa's (1961) classification, from preferential trading area to complete economic integration. To this end, we exploit all the information contained in interest rates and rely on the expectations hypothesis of the term structure of interest rates (EHTS) and real interest rate parity (RIP). These two conditions are empirically investigated on various regional trade agreements, using cointegration techniques by paying a special attention to potential breaks.

Our results show that customs unions, corresponding to step 3 of the Balassa's classification, seem to be a decisive threshold after which financial integration robustly takes place. Indeed, while EHTS and RIP are not clearly evidenced for preferential trading and free trade areas (such as ASEAN+3, LAIA, and EFTA), both conditions are verified for customs unions such as ANDEAN, CACM, MERCOSUR and the European Union. On the whole, our results are consistent with Eichengreen and Park's (2005) intuition that "finance follows trade" only after a certain degree of trade integration.

ABSTRACT

This paper proposes a systematic study of the degree of financial integration following the degree of trade integration according to Balassa's (1961) classification, from preferential trading area to complete economic integration. To this end, we exploit all the information contained in interest rates and rely on the expectations hypothesis of the term structure of interest rates and real interest rate parity. These two conditions are empirically investigated on various regional trade agreements, using cointegration techniques by paying a special attention to potential breaks. Our results show that customs unions, corresponding to step 3 of the Balassa's classification, seem to be a decisive threshold after which financial integration robustly takes place.

JEL Classification: C22, E43, F15.

Keywords: financial integration, trade integration, regional trade agreement, term structure of interest rates, real interest rate parity.

DE L'INTÉGRATION COMMERCIALE À L'INTÉGRATION FINANCIÈRE : QUE NOUS ENSEIGNENT LES TAUX D'INTÉRÊT ?

RÉSUME NON TECHNIQUE

La deuxième moitié du XXe siècle a été caractérisée par un renforcement des accords commerciaux régionaux (ACR) parallèlement à la réduction des barrières tarifaires émanant des accords du GATT. Les effets sur le commerce intra-zone et avec le reste du monde de ces accords commerciaux régionaux ont fait l'objet d'une littérature abondante, au travers notamment de l'estimation d'équations de gravité.

En parallèle à ces analyses, un deuxième pan de la littérature s'est consacré à l'étude des liens entre intégration commerciale et intégration financière. Comme le soulignent Eichengreen et Park (2005), il ressort généralement de ces travaux que "la finance suit le commerce".

Si tel est bien le cas, les différents ACR recouvrant des degrés divers d'intégration commerciale, on devrait observer une intégration financière différenciée selon le type d'ACR. En particulier, ces différences devraient se refléter dans les rendements des titres financiers et, en premier lieu, dans les taux d'intérêt.

A notre connaissance, il n'existe pas de travaux dans ce domaine. Nous proposons dans cet article une étude approfondie de l'intégration financière suivant la classification du degré d'intégration commerciale établie par Balassa (1961), allant des zones d'échanges préférentielles jusqu'à l'intégration économique complète. A cette fin, nous exploitons toute l'information contenue dans les taux d'intérêt en nous référant aux théories de la structure par terme des taux d'intérêt et de la parité des taux d'intérêt réels. Ces deux conditions sont appréhendées empiriquement sur divers accords commerciaux régionaux, en recourant aux techniques de cointégration et en accordant une attention particulière aux ruptures potentielles.

Nos résultats montrent que les unions douanières, correspondant à la troisième étape de la classification de Balassa, constituent un seuil décisif d'intégration commerciale à partir duquel l'intégration financière peut prendre place. En effet, alors que la structure par terme et la parité des taux d'intérêt réels ne semblent pas validées pour les zones d'échanges préférentielles et les zones de libre échange (ASEAN+3, LAIA, EFTA), ces deux théories sont vérifiées pour les unions douanières, comme l'ANDEAN, le CACM, le MERCOSUR et l'Union européenne. Au total, nos résultats confirment l'intuition d'Eichengreen et Park (2005) selon laquelle "la finance suit le commerce", mais uniquement après un certain degré d'intégration commerciale.

RÉSUMÉ COURT

Nous proposons dans cet article une étude approfondie de l'intégration financière suivant la classification du degré d'intégration commerciale établie par Balassa (1961), allant des zones d'échanges préférentielles jusqu'à l'intégration économique complète. A cette fin, nous exploitons toute l'information contenue dans les taux d'intérêt en nous référant aux théories de la structure par terme des taux d'intérêt et de la parité des taux d'intérêt réels. Ces deux conditions sont appréhendées empiriquement sur divers accords commerciaux régionaux, en recourant aux techniques de cointégration et en accordant une attention particulière aux ruptures potentielles. Nos résultats montrent que les unions douanières, correspondant à la troisième étape de la classification de Balassa, constituent un seuil décisif d'intégration commerciale à partir duquel l'intégration financière peut prendre place.

Classification JEL : C22, E43, F15.

Mots clés : intégration financière, intégration commerciale, accords commerciaux régionaux, structure par terme des taux d'intérêt, parité des taux d'intérêt.

FROM VARIOUS DEGREES OF TRADE TO VARIOUS DEGREES OF FINANCIAL INTEGRATION: WHAT DO INTEREST RATES HAVE TO SAY?[1]

Adeline Bachellerie[*], Jérôme Héricourt[†], and Valérie Mignon[‡]

1. INTRODUCTION

The second half of the 20th century has been characterized by the rise of regional trade agreements (RTAs) along with the worldwide trend of removing trade barriers within the General Agreement on Trade and Tariffs (GATT) negotiations. The trade creating (within the considered trade unions) and trade diverting (with the rest of the world) effects associated with regional trade agreements, have been extensively studied in the literature, relying on the well-known gravity equation (see, among others, Frankel, 1997; Soloaga and Winters, 2001; Carrère, 2006). All these papers largely support the existence of enhancing effects of RTAs on intra-union trade, although Carrère (2006)'s results report the existence of strong diverting effects with the rest of the world.

Alongside with this literature, another strand of research emphasizes that trade integration goes along with financial integration. As stressed by Eichengreen and Park (2005), it seems indeed that "finance follows trade" (p. 99). More specifically, they conclude that Asia seems less financially integrated than Europe because it has done less to promote the growth of intra-regional trade. Focusing on the case of European Monetary Union, Frankel and Rose (1997, 1998) show that countries with closer trade links tend to have more tightly correlated business cycles. In the case of EMU members, the implied economic integration went along with a strong process of financial integration. More recently, a new line of papers investigates the complementarity between bilateral trade in goods and bilateral financial claims. Both theoretical arguments (see Obstfeld and Rogoff, 2000; Serrat, 2001; Rose and Spiegel, 2002 and Rose, 2005) and empirical evidence (see Aviat and Coeurdacier, 2007) support that trade in goods and trade in assets are closely related.

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To our best knowledge however, it has never been tried to investigate the impact of this parallel integration in trade and financial flows on asset returns. This seems especially important since RTAs are characterized by various degrees of trade integration and, consequently, of financial integration. Pomfret (2006) highlights that the trend toward regionalism started in the late 1950s in Western Europe is characterized by an increasing degree of trade integration. Therefore, all RTAs do not imply the same degree of trade integration (see also Balassa, 1961), and, consequently, of financial integration. This should be reflected in the returns on financial assets and primarily in interest rates.

In this paper, we propose a systematic study of the degree of financial integration following the degree of trade integration according to Balassa's (1961) classification, from preferential trading area to economic and monetary integration. To this end, we exploit all the information contained in interest rates, using proper time series econometrics. On the theoretical ground, we rely on the expectations hypothesis of the term structure of interest rates (EHTS) and real interest rate parity (RIP). According to the EHTS, the yield spread between long- and short-term interest rates is an optimal predictor of future changes in short rates over the long run. Under the RIP hypothesis, domestic and foreign real interest rates are expected to converge. As recently emphasized by Bekaert *et al*. (2007), EHTS and RIP should by construction jointly hold in the long run.[2] More specifically, by relying on uncovered interest rate parity (UIP), they showed that if EHTS holds and if UIP is valid in the short run, then it should hold in the long run. UIP represents a building block of most important exchange rate determination theories such as Dornbusch's (1976) overshooting model or Krugman's (1991) target zone. Assuming both Purchasing Power Parity (PPP) and UIP, as in early versions of the monetary model of exchange rate determination introduced by Frenkel (1976) and Mussa (1976), permits to get RIP in the long run.[3] The real interest rate differential model introduced by Frankel (1979) allows for sticky prices in the short run and implies the validity of RIP in the long run when the real exchange rate reaches its equilibrium value. To that extent, the RIP also emerges as a cornerstone in international finance literature (see Fountas and Wu, 1999).

While the purpose of this paper is not to study the joint completion of the two conditions, EHTS and RIP appear definitively to be the two sides of the same coin. While RIP is a more direct tool to investigate the financial integration property, the EHTS can be viewed as a complementary tool. Indeed, if some countries belonging to a given RTA display consistent term structures while other do not, this means that their financial markets behave differently, casting some doubts about the financial integration of the considered zone. In this sense, EHTS can be viewed as a prerequisite for financial integration. Besides, EHTS and RIP seem to remain two key features of the international finance literature, with a significant number of research in

[2]Relying on cointegration techniques, Brüggeman and Lütkepohl (2005) find that both conditions hold for the US and the euro area.

[3]Note that to account for long-term deviations from the EHTS, a time-varying risk premium is introduced.

recent years. In addition to Brüggeman and Lütkepohl (2005) or Bekaert *et al*. (2007), already mentioned, Lardic and Mignon (2004) find evidence of fractional cointegration between short and long-term interest rates for G7 countries, except Germany. Weber (2006) studies British interest rate convergence between the US and Europe using a recursive cointegration analysis. More recently, Bouvatier (2007) relies on the UIP to study whether interest rate differentials in Asian countries over the 1997-1998 period are driven by the risk premium. Camarero *et al*. (2008) examine the expectations hypothesis of the term structure in the euro area. Along with this renewal of interest, a growing attention has been paid to the econometric techniques, with a special focus on potential breaks in the estimated relationships.

We therefore propose to investigate empirically both conditions, EHTS and RIP, on a selection of RTAs, in order to check for differences according to the various degrees of trade integration. To our best knowledge, such a systematic investigation is the first of its type. We start by focusing on term structure of interest rates. For each country we first check the existence of consistent term structures of interest rates using cointegration tests, accounting for the small sample bias and potential breakdowns in the series. Secondly, we rely on the interest rate parity theory to test for real interest rate convergence[4] within each RTA, allowing for potential structural breaks.

The paper is structured as follows. Section 2 motivates the selection of RTAs and the underlying theoretical frameworks. Section 3 presents the data and specifies the econometric methodology. Section 4 reports the results relating to tests of the interest rate term structure for each RTA, as well as the conclusions from tests of the RIP theory. Section 5 provides concluding remarks.

2. TRADE AND FINANCIAL INTEGRATION

2.1. A selection of RTAs: Motivations around the Balassa's classification

Following Carrère (2006), the RTAs considered in this paper are: European Union (EU), ANDEAN (Andean community of nations), NAFTA (North American Free Trade Agreement), CACM (Central American Common Market), MERCOSUR (Mercado Comun del Sur), ASEAN (Association of South East Asian Nations)[5] and LAIA (Latin American Integration Association). [6] Following Frankel (1997), we also consider EFTA (European Free Trade Agreement) and CER (Closer Economic Relations). These country groupings represent the major existing RTAs; they also cover various degrees ("steps") of the Balassa (1961)'s classification of economic integration, from preferential trading area (step 1) to common market (step 4). This allows for a direct test of our intuition that degrees of financial integration may be closely related to different levels of trade integration. Consistently, we consider an additional group of

[4] In our context, "real interest rate parity" and "real interest rate convergence" are used equivalently, see Fountas and Wu (1999).

[5] Actually, we will consider the ASEAN+3, or "APT". See Table A.2 in Appendix for more details.

[6] See Table A.1 in Appendix for definitions and members of these groups of countries.

countries which can be viewed as a fifth step of the spectrum covered by the previously mentioned RTAs: the euro area. This area goes well beyond conventional RTAs, providing us with a useful benchmark to contrast with the RTAs pertaining to step 1. Table 1 depicts the selected RTAs according to Balassa's (1961) classification, along with a succinct presentation of the features of each category.[7]

2.2. Expectations hypothesis of the term structure (EHTS)

According to the expectations theory of the term structure of interest rates, the yields on financial assets of different maturities are related primarily by market expectations of future yields. The theory implies that the yield spread between long and short rates is an optimal predictor of future changes in short rates over the long run (see Cuthbertson, 1996 a&b, and Bredin and Cuthbertson, 2000).[8]

More specifically, according to the expectations theory, the k-period interest rate, $r_t(k)$, is the weighted average of the expected future m-period interest rate, $r_t(m)$, with $k > m$, plus a term premium:

$$[1 + r_t(k)]^k = \left[\prod_{i=0}^{k-1} (1 + E_t r_{t+i}(m))\right]^{1/k} (1 + E_t\theta_t(k)) \tag{1}$$

where E_t is the expectations operator conditional on information available at time t and $\theta_t(k)$ denotes the term premium which may reflect risk and liquidity premia. Note that under the pure rational expectations hypothesis, the term premium is null ($E_t\theta_t(k) = 0$), while in the modern or ordinary version, it is constant ($E_t\theta_t(k) = \theta(k)$). The constant-term premium is required by investors, because they bear the risk of holding longer-dated instruments. The constant assumption, however, is merely a technical simplification of the theory.

If $r_t(m)$ is I(1), then $r_t(k)$ is also I(1) and interest rate spreads are I(0). Consequently, if the expectations hypothesis holds, the term spread is stationary: short and long-term rates are cointegrated. The existence of a cointegration relationship between interest rates is thus a necessary condition for the expectations hypothesis to hold. The use of cointegration tests in order to assess the empirical adequacy of the expectations hypothesis seems therefore a natural way to proceed (see e.g. Lardic and Mignon, 2004).

[7] In fact, Balassa's classification entails a sixth step, when economic integration is complete: the integrated units have no or negligible control on economic policy, including full monetary union and complete or near-complete fiscal policy harmonization (e.g., the USA). For a detailed presentation and justification, see Balassa (1961).

[8] A vast literature has been published on this subject (for a survey, see Shiller, 1990, and Pagan, Hall and Martin, 1996).

Table 1 – RTAs according to Balassa's classification

Step	Description	Features	RTA
1	Preferential Trading Area (PTA)	A trading bloc which gives preferential access to certain products from certain countries. Tariffs are reduced, but do not fully disappear.	APT (=ASEAN+3), LAIA
2	Free Trade Area (FTA)	A group of countries agreeing to eliminate tariffs, quotas and preferences on most (if not all) goods between them.	CER, EFTA, NAFTA, ANDEAN*
3	Customs Union (CU)	A free trade area with a common external tariff.	ANDEAN*, CACM, MERCOSUR
4	Common Market (CM)	A customs union with common policies on product regulation, and freedom of movement of the factors of production (capital and labor) and of enterprise.	EU
5	Economic and Monetary Union (EMU)	A single market with a common currency.	Euro Area

Sources: WTO (http://www.wto.org/english/tratop_e/region_e/region_e.htm) and Vicard (2008).

* Peru entered the Andean Free Trade Area only in 1997, and did not join the Andean Customs Union until 2004.).

2.3. Real interest rate parity (RIP)

According to Christiansen and Pigott (1997) among others, there are at least three main reasons to believe that interest rates may evolve together across countries. First, real interest rates are not only influenced by domestic conditions, but also by world factors that determine the aggregate demand and supply for world savings (Barro and Sala-i-Martin, 1990). Second, due to the globalization process, individual risk premia are determined by common factors rather than by country specific risks. Three, there are important spillovers across bond markets.

But there is another motivation for real interest rates to converge, the existence of specific economic and trade relationships coming from the existence of RTAs. If "finance follows trade" as emphasized by Eichengreen and Park (2005), an increasing interest-rate convergence should be observed proportionally to the degree of trade and economic integration. Indeed, some RTAs, like the EU, imply the relaxation of capital controls and freedom of capital movements, creating additional pressure for real interest rates to converge. The study of RIP in each RTA previously defined will allow us to provide empirical support to this intuition. Besides, the distinction between short and long-term real interest rates should enlighten interesting differences, since long-term interest rates may remain mainly determined by domestic economic conditions (expectations about future inflation for instance). On the whole, studying the RIP should therefore provide complementary and consistent evidence with the study of the expectations hypothesis of the term structure.

The *ex post* version of the Fisher hypothesis according to which the nominal interest rate is equal to the real interest rate plus expected inflation can be written as:

$$r_t - r_t^* = (i_t - i_t^* - \Delta s_t) - (\pi_t - \pi_t^* - \Delta s_t) \tag{2}$$

where r is the real interest rate, i the nominal interest rate, s the log of the nominal exchange rate, π the inflation rate and an asterisk denotes foreign variables. The first bracket in the right-hand side of Equation (2) represents the deviation from the uncovered interest parity (UIP) and the second one represents the deviation from purchasing power parity (PPP). Under the RIP hypothesis, both UIP and PPP hold. In an environment of increasing integration, deviations from UIP — due to country risk premium and exchange risk premium — and PPP — due to divergence in inflation rates — are likely to diminish and, consequently, real interest rate convergence is expected.

From an empirical viewpoint, RIP can be tested using the following equation:

$$r_t = \alpha + \beta r_t^* + \varepsilon_t \tag{3}$$

where ε_t is an error term. In case the domestic and foreign interest rates have single unit roots (i.e. are I(1)), RIP holds if the error term is stationary, meaning that domestic and foreign rates are cointegrated.

3. DATA AND ECONOMETRIC METHODS

Empirical tests and estimations are performed on 58 countries divided into 10 RTAs. We use monthly data for short-term and long-term interest rates. Table A.2 in the Appendix describes, for each country, the period under study and the data sources. Short-term interest rates are generally 3-month interest rates or money market rates; and long-term interest rates are in the main cases 10-year government bond yield, depending upon data availability for each country.

As previously noticed, the use of cointegration tests in order to assess the empirical adequacy of the expectations hypothesis appears as the standard way to proceed. Provided that nominal interest rate series are I(1), the Johansen (1988) and Johansen and Juselius (1990) procedures may be implemented to test for the number of cointegrating vectors using a trace test. However, these cointegration tests could lead to an over-rejection of the no cointegration hypothesis, due to the finite sample bias and the possible cointegration rank inconstancy. Consequently, forward recursive trace tests are implemented to investigate the cointegrating rank stability. Moreover, the trace test statistic is corrected for the finite sample bias as suggested by Reimers (1991) and Reinsel and Ahn (1992).[9] Used in recent research on related topics (see e.g. Bouvatier, 2007), these modifications will hopefully give more robust results on the existence of term structure for each country of our sample. Besides, they will help us to see how the cointegration relationship (if any) evolves over time, and according to which factors.

Turning to real interest rate parity, the test is performed on both short and long-term interest rates. In accordance with the definition previously mentioned, we use the *ex post* version of the Fisher relationship as follows:

$$1 + r_t = (1 + i_t)/(1 + \frac{P_{t+12} - P_t}{P_t}) \tag{4}$$

where r_t is the real interest rate at time t from holding the investment for twelve months, i_t is the nominal interest rate and P_t is the price index. $(P_{t+12} - P_t)/P_t$ is therefore the inflation rate from time t to time $t + 12$.

The test of RIP relies on the existence of a bivariate cointegrating relationship between domestic and foreign interest rates. If real interest rates are actually I(1), conventional cointegration tests are confronted to a major drawback when the time period under study includes changes in the monetary and/or exchange rate regimes of the considered countries. The problem is not so far from the one previously described for the term structure hypothesis: standard cointegration methods may assimilate to a lack of cointegration what is only a deterministic break in the mean or trend of a linear combination of these variables (i.e. a shift in the cointegration vector over the sample period). Fountas and Wu (1999) present many reasons supporting the existence

[9] This correction does not consist in estimating new critical values but in multiplying the trace test statistic by the scale factor $\frac{T-pk}{T}$, where T is the number of observations, p the number of endogenous variables, and k the number of lags.

of this kind of shifts in real interest rate convergence in the case of the European Monetary System (EMS): dismantlement of capital controls, different and variable degrees of credibility for monetary and exchange rate policies, changes in the stance of fiscal or monetary policy... The same kind of phenomena should hold strongly for many countries of our sample, especially the emerging ones (Asian and Latin-American), which endured many monetary and exchange rate regime switches during the eighties and the nineties. Besides, many of them led restrictive fiscal policies in the context of IMF stabilization plans.

This is why we use, extending Fountas and Wu (1999)'s approach, the Gregory and Hansen (1996) procedure for testing real interest rate convergence within each considered RTA. Indeed, the Gregory and Hansen (1996) methodology is a residual-based cointegration test where the timing of the regime shift is not known *ex ante* but is determined endogenously by appealing to the data. Three models of an endogenous one-time regime shift reflecting three different alternative hypotheses are considered:

$$r_t = a_1 + a_2 D_t + b r_t^* + u_t, t = 1, ..., T \tag{5}$$

$$r_t = a_1 + a_2 D_t + b r_t^* + ct + u_t, t = 1, ..., T \tag{6}$$

$$r_t = a_1 + a_2 D_t + b_1 r_t^* + b_2 r_t^* D_t + u_t, t = 1, ..., T \tag{7}$$

where

$$\begin{cases} D_t = 0 \text{ if } t \leq [T\tau] \\ D_t = 1 \text{ if } t > [T\tau] \end{cases}$$

and $\tau \epsilon [0, 1]$ is an unknown parameter denoting the relative timing of the change point and $[x]$ denotes integer part of x. The use of the dummy variable D_t allows one to test for a structural change or regime shift. Equations (5), (6) and (7) reflect different possibilities for the characteristics of the level shift in the cointegrating relationship, which can either concern only the intercept (Equation (5)) or both the intercept and the slope (Equation (7)). Equation (6) controls for the presence of a linear time trend. The null hypothesis in all three models is that u_t is non-stationary (I(1)), i.e. r_t and r_t^* are not cointegrated. Conversely, cointegration with structural change implies that u_t is stationary (I(0)). Gregory and Hansen (1996) suggest the use of three non-stationarity tests of u_t, which are modifications of the test statistics Z_α and Z_t (Phillips, 1987) and the Augmented Dickey-Fuller (ADF) statistic, defined as:

$$\begin{cases} Z_\alpha^* = \inf_{\tau \epsilon T} Z_\alpha(\tau) \\ Z_t^* = \inf_{\tau \epsilon T} Z_{t(\tau)} \\ ADF^* = \inf_{\tau \epsilon T} ADF(\tau) \end{cases}$$

where Z_α, Z_t and $ADF(\tau)$ correspond to the change point τ.[10]

4. THE EFFECTS OF REGIONAL TRADE AGREEMENTS ON FINANCIAL INTEGRATION

4.1. Test of the EHTS

As previously mentioned, testing the EHTS allows us to have a first idea concerning financial integration across countries. Indeed, if countries belonging to a given RTA are not characterized by a similar term structure of interest rates, this casts doubts about the financial integration of the zone. So, EHTS may be viewed as a prerequisite for financial integration.

The first natural step is to check for time series persistence using unit root tests. To this end, standard ADF, Phillips-Perron and KPSS tests are used and show that most nominal interest rate series are integrated of order one.[11] We thus proceed to the application of cointegration tests, by implementing the Johansen trace recursive test. The test is applied by assuming the presence of a linear trend in the data, but not in the cointegrating relationship[12] and by selecting the number of lags according to standard information criteria, with a preference given to Akaike criterion and likelihood ratios tests.[13] We test the two standard null hypotheses for a bivariate relationship, that is the null of no cointegration, then the null that at most one cointegrating relationship exists.

Figures A.1 to A.10 in Appendix plot the recursive computations for both trace statistics and their finite sample corrected versions. Figures are ordered according to the classification presented in Table 1, starting with preferential trading areas and ending with the Economic and Monetary Union.

Starting with preferential trading areas, the APT displays two distinct profiles of countries. The members of the ASEAN[14] do not seem to verify the EHTS, except Laos (but the trace exhibits a

[10]Table 1 in Gregory and Hansen (1996) lists the asymptotical critical values for alternative models. For more details on the procedure, see Gregory and Hansen (1996) and Fountas and Wu (1999).

[11]More details of these results available upon request to the authors.

[12]These assumptions are quite standard. Nevertheless, we performed robustness checks supposing the data displayed no trend, as in Brüggeman and Lütkepohl (2005). Results are qualitatively unchanged. Moreover, note that, since cointegration is tested between series belonging to the same country, we do not include structural breaks in the test.

[13]Schwarz criterion tends to predict systematically a very low number of lags (generally 1 or 2), which can create serious problems with residuals properties, especially serial correlation.

[14]Long-term interest rate series were not available for Cambodia (see Table A.2 in Appendix).

very instable profile) and Philippines. For the other four countries, the null of no cointegration cannot be rejected at the 5% level. Conversely, China, Japan and Korea show an increasing trend for the trace. The EHTS cannot be rejected at the 1% level in Japan over almost all the sample period. For China and Korea, the EHTS seems to be validated after 2002-2003. In Korea, the upward trend of the trace is sharply interrupted twice during the nineties: financial and currency crises, especially in 1997, caused massive and extremely rapid short-term rates increase, reversing the term structure and temporarily invalidating the EHTS. Turning to the LAIA member countries, the EHTS is validated for most of them, at least on recent years; the null of no cointegration cannot be clearly rejected only for Chile, Ecuador and Uruguay. However, LAIA actually mixes two customs unions, ANDEAN and MERCOSUR (except Mexico). Consequently, it is likely that LAIA just captures the effects of these two distinct unions (see *infra*).

We now move to step 2 of Balassa's classification, i.e. free trade agreements. Started in 1983, the CER does not seem to create any synchronism between Australia and New Zealand. Whereas the trace test rejects the null of no cointegration during the nineties (at the 5% level) and since 1999-2000 (at the 1% level) for New Zealand, Australia does not verify the EHTS before 2002. EFTA graphs draw a similar picture for the current members (Iceland, Norway and Switzerland), where the EHTS is systematically rejected at the 1% level. Interestingly, Iceland and Norway's term structures do not appear to benefit from their membership to the European Economic Area[15], which is supposed to strengthen trade integration between these EFTA members and EU countries. Conversely, Switzerland — which does not belong to the EEA — seems to display a consistent term structure after 1995, but only at the 5% level, and the trace graph is quite unstable. Besides, the EHTS is not corroborated for the former EFTA members (which all joined EU), except for Denmark and Finland only over the very recent period.

Turning to NAFTA, Canada and the US display a common profile over the sample period: the EHTS cannot be rejected most of the time, and the trace statistic exhibits a clear increasing trend. It is especially the case after 1992, when the NAFTA was created: the null of no cointegration is firmly rejected for both countries, mostly at the 1% level. Our sample is unfortunately much shorter for Mexico. However, the graph clearly shows the contagion effect of Argentinian currency crisis over the years 2001-2002: the EHTS is obviously rejected. Afterwards, the trace statistic starts to increase and since the end of 2004, the cointegration between short and long-term interest rates cannot be rejected at the 5% level.

We now switch to customs unions (step 3 of Balassa's classification). Starting with ANDEAN, only Ecuador cannot reject the null of no cointegration at any conventional confidence level,

[15]The European Economic Area (EEA) came into being on 1 January 1994 following an agreement between Liechtenstein, Norway, Sweden and all member states of the European Union (EU). It allows these EFTA countries to participate in the European single market without joining the EU.

even if the trace displays a clear upward trend at the beginning of the 21st century and seems to hit the 5% threshold at the very end of the period. Bolivia validates the EHTS since the very beginning of 2000, except during the instability period caused by the collapse of Argentinian currency board, in early 2002. The same kind of picture arises for Venezuela, except that the null of no cointegration can always be rejected at the 1% level, but the increasing trend of the trace is clearly stopped over the 2001-2002 period. Over a longer sample period, the recursive trace test shows that the EHTS cannot be rejected for Bolivia after 1992, but the graph is strongly unstable until 2001. Once again, this reflects the contagion effect of various currency crises in Latin America, such as the Mexican crisis in 1994-1995 and the Argentinian crisis in 2001-2002. Last but not least, Peru's graph offers interesting specificities. The trace statistic is below the 5% level over all the second half of the nineties, in spite of its integration in the ANDEAN free trade area in 1997. However, after the collapse of the Argentinian currency board, the trace displays an almost continuous upward trend, and the EHTS cannot be rejected any more after 2004, when Peru joined the Andean customs union.

Not much can be said on the CACM. Results could not be reported for Guatemala and Honduras, due to the lack of long-term interest rates data. Regarding Costa Rica and El Salvador, the sample is too small (around 30 observations) to draw any significant conclusion. For the only country left (Nicaragua), the trace statistic displays an overall upward profile, and the EHTS cannot be rejected after the beginning of 2004.

Over the five members belonging to MERCOSUR, four recursive trace tests validate the EHTS over almost all the sample period. For Argentina, the collapse of the currency board pegging the peso to the US dollar translated clearly on the interest rate term structure. Whereas the null of no cointegration is strongly rejected in 2000, the trace statistic rapidly decreases afterwards, and the EHTS is not anymore validated in 2001 and 2002. Afterwards, the trace graph gets back to a stable increasing trend, and the null of no cointegration is again rejected at the 1% level. Brazil, Paraguay and Venezuela also validate strongly the EHTS, with more or less upward trends. For Uruguay, the EHTS is irregularly validated until 2001-2002; afterwards, it is strongly rejected. It seems that this country never recovered fully from the crisis which hits its first trade partner, namely Argentina.

Taking the EU as a whole (steps 4 and 5 of Balassa's classification), a clear and unsurprising break arises between the Euro-12 and the 13 remaining countries of the EU. On the euro area side, almost all trace statistics display an upward trend after 1995, reflecting the pre-euro convergence. After 2002, all 12 countries validate the EHTS. This is especially striking for Austria, Finland and Portugal, for whom we restricted the sample after 1995, the year of EU entry for the first two countries. Whereas over longer sample periods these countries did not validate the EHTS (see the analysis of EFTA *supra*), the restriction on the sample after 1995 reflects the specific efforts made by these countries to enter the euro. This is especially true for Portugal, and the same kind of profile can be observed for Greece. For all other countries, the null of

Table 2 – Countries validating the EHTS within each RTA

RTA	Agreement according to Balassa's Classification	Number of member countries in the agreement	Number of countries validating the EHTS on most of the sample period, or since their entry in the agreement
APT			
ASEAN	PTA (1)	6	2
3	Informal meetings	3	1
LAIA	PTA (1)	11	7
CER	FTA (2)	2	1
EFTA	FTA (2)	9 (1960)/3 (2008)	2 (1960)/1(2008)
NAFTA	FTA (2)	3	2
ANDEAN	CU (3)	5	4
MERCOSUR	CU (3)	5	4
EU	CM (4)	25	20
EURO12	EMU (5)	12	11

Note: CACM is not presented in the Table due to the lack of data and the very short samples involved.

no cointegration was strongly rejected before 1999, but it is worth noting that the trace follows a clear upward trend in the years preceding and after the introduction of the euro. Finally, the breaks stated in 1992-1993 are obviously the consequences of the ERM crisis.

The situation of the 13 remaining EU members is more heterogenous. To make things more clear, we discriminate between Denmark, Sweden and UK on the one hand, and 2004/2007 EU newcomers on the other hand. For Sweden, we restricted the sample to the date of entry in the EU (1995). Contrary to the analysis on the whole sample, the recursive trace test tends to reject the null of no cointegration at the 5% level. For comparison purposes, we also performed a sensitivity check by restricting the sample for Denmark and UK.[16] Results are qualitatively similar to those obtained on the whole sample: Denmark still validates strongly the EHTS, with a clear upward trend for the trace, and UK still rejects the EHTS strongly. Turning to Central and Eastern Europe Countries (CEECs), Bulgaria, Czech Republic and Estonia have been rejecting the null of no cointegration for several years, with a more or less upward trend for the trace statistic. For Poland and Slovenia, the EHTS is rejected on most of the sample period, but the trace follows an upward trend after 2003-2004, allowing the EHTS to be validated at the end of the sample period. Finally, for Hungary, Latvia, Lithuania and Romania, the trace is unstable and below the 5% critical value at the end of period. These differences reflect disparities in development (and therefore, trade integration in the Single Market), currency regimes and monetary policy frameworks among the CEECs.

[16]Graphs available upon request to the authors.

Table 2 summarizes our results. There seems to be no strong evidence that countries pertaining to PTAs (Preferential Trading Area) of FTAs (Free Trade Area) converge to validate the EHTS. Conversely, customs unions display a much stronger homogeneity for the behavior of interest rates. This is also the case for our single example of common market, EU, with only 20% of countries not validating the EHTS. Among the other ones, we find unsurprisingly that the twelve first euro area members all validate the EHTS. In short, it seems that the customs union (step 3 of the Balassa's (1961) classification) represents a decisive threshold after which there is clear trend for cointegration between short and long-term interest rates for a huge majority of member countries. In that sense, the intuition by Eichengreen and Park (2005) that "finance follows trade" only after a certain degree of trade integration is verified.

4.2. Tests of the RIP

As for EHTS test, standard unit root tests have been implemented and show that most real interest rate series are integrated of order one. In Table 3 we report the test statistics for the three models described in Section 3, as well as the estimated break point (in parentheses).[17] Results focus on short-term interest rates since (i) these series are frequently available on a longer period than long-term ones and (ii) if RIP and EHTS hold in the short term, convergence of long-term interest rates should be satisfied. [18] We propose a first set of results where the convergence is measured relatively to a leader country in the considered area, generally the one with the biggest GDP and/or the leading currency. More specifically, we consider the following leading countries: Japan for ASEAN+3, UK for EFTA, US for NAFTA, Argentina and Brazil for MERCOSUR, Venezuela for ANDEAN, Costa Rica for CACM, and Germany for the European Union. As a sensitivity analysis, a second set of results is presented for ASEAN, ANDEAN, CACM and MERCOSUR, where the leading country becomes the US (Table 4). Such a robustness study should allow us to check if there is more interest rate convergence with the US short-term interest rate, due to the presence of more or less fixed exchange rate systems for many countries of these areas at a moment of their history.

[17]It should be noted that the Gregory-Hansen (1996) test allows for only one break point. However, since the timing of the regime shift is determined endogenously, the test statistic is computed for each possible break point and takes the smallest value (the largest negative value) across all possible break points. So, the selected break date corresponds to the most important regime shift in the series among the set of all possible break points.

[18]See Bekaert *et al.* (2007) among others. Detailed results concerning tests of the RIP on long-term interest rates are available upon request to the authors.

Table 3 – Tests of the RIP hypothesis

	ADF*	Z*(t)	Z*(α)
ASEAN + 3			
Indonesia			
Model 1	-5.56*** (0.85)	-3.5 (0.82)	-23.74 (0.82)
Model 2	-5.94*** (0.6)	-3.83 (0.61)	-28.3 (0.61)
Model 3	-5.57*** (0.85)	-3.8 (0.58)	-27.73 (0.63)
Malaysia			
Model 1	-4.77** (0.33)	-4.93** (0.33)	-44.43** (0.33)
Model 2	-4.86* (0.33)	-5** (0.33)	-45.64* (0.33)
Model 3	-4.68* (0.33)	-4.9* (0.33)	-43.98* (0.33)
Philippines			
Model 1	-5.13*** (0.27)	-5.52*** (0.24)	-54.33*** (0.24)
Model 2	-5.17** (0.27)	-5.65*** (0.25)	-56.5** (0.24)
Model 3	-5.15** (0.27)	-5.58*** (0.24)	-55.32** (0.24)
Singapore			
Model 1	-5.86*** (0.39)	-4.25 (0.38)	-34.19 (0.37)
Model 2	-6.6*** (0.65)	-4.82* (0.65)	-43.42* (0.65)
Model 3	-6.52*** (0.41)	-4.61 (0.4)	-40.99 (0.4)
Thailand			
Model 1	-4 (0.18)	-3.87 (0.73)	-27.88 (0.16)
Model 2	-4.35 (0.17)	-4.1 (0.61)	-31.13 (0.73)
Model 3	-4.35 (0.28)	-4.01 (0.47)	-30.47 (0.47)
Vietnam			
Model 1	-3.85 (0.33)	-3.02 (0.29)	-18 (0.29)
Model 2	-4.24 (0.33)	-2.63 (0.36)	-14.45 (0.36)
Model 3	-4.03 (0.33)	-2.79 (0.29)	-16.01 (0.29)
Laos			
Model 1	-3.25 (0.48)	-2.23 (0.39)	-9.77 (0.39)
Model 2	-3.19 (0.48)	-2.56 (0.36)	-12.53 (0.39)
Model 3	-3.33 (0.44)	-2.27 (0.39)	-9.85 (0.39)
Cambodia			
Model 1	-3.09 (0.37)	-2.7 (0.28)	-16.39 (0.28)
Model 2	-4.2 (0.3)	-4.25 (0.31)	-33.51 (0.31)
Model 3	-3.22 (0.37)	-3.18 (0.29)	-21.07 (0.29)
China			
Model 1	-3.94 (0.47)	-2.56 (0.78)	-12.58 (0.78)
Model 2	-4.11 (0.45)	-2.71 (0.16)	-14.17 (0.44)
Model 3	-3.98 (0.47)	-2.59 (0.77)	-13 (0.27)
Korea			
Model 1	-4.57* (0.15)	-4.39* (0.15)	-34.85 (0.15)
Model 2	-5.11** (0.74)	-4.92* (0.74)	-44.22* (0.74)
Model 3	-4.57 (0.15)	-4.39 (0.15)	-35.1 (0.15)
Australia / New Zealand			
Model 1	-7.42*** (0.28)	-4.34* (0.29)	-36.63* (0.29)
Model 2	-7.63*** (0.28)	-4.44 (0.29)	-38.31 (0.29)
Model 3	-7.03*** (0.28)	-4.45 (0.29)	-38.34 (0.29)

Note : *, **, ***: rejection of the null hypothesis of no cointegration at the 10%, 5%, 1% significance level respectively.

Following the same presentation as for the EHTS tests, we start with the preferential trading areas. Only three members of the ASEAN plus Korea validate the RIP hypothesis with Japan: Malaysia, Philippines and Singapore. The break points are as follows: 1979:08 for Malaysia, 1984:04 for Philippines, 1988:06 for Singapore and 1999:04 for Korea. All those countries experienced high inflation levels in the 1980s following oil prices surge. This decade may also be regarded as a financial liberalization period in many developing countries. The break date corresponds to (i) high twin deficits in Malaysia which led to strong economic adjustment in the 1980s; (ii) low interest rates in Philippines due to authorities' operation aiming at finance the increasing fiscal deficit after the financial crisis in 1980; (iii) economic boom and lower inflation rate for Singapore after the economic crisis in 1985. For these three countries, these events seem to have caused a more larger regime shift in the series than the Asian crisis. Turning to Korea, the break date follows the Asian crisis. Less developed ASEAN countries — namely Indonesia, Vietnam, Laos and Cambodia — do not exhibit interest parity with Japan. The same conclusion holds for China, the most important trade neighbour in the area. Despite heterogeneous economies, the area ASEAN + 3 records one of the most important growth rates among the world (above 5% over 1997-2007). Alongside to trade integration, initiatives have been taken to promote financial integration. The annual meeting of the Asian Development Bank held in May 2000, the "Chiang Mai Agreement", aims at strenthening cooperation among East Asian countries by promoting currency swaps arrangements.[19]

Turning to the CER, Australia and New Zealand take an active part in financial integration in the region and already show interest rate cointegration among their short-term interest rates. Getting on with free trade agreements, none of the EFTA countries which belong to the Euro area — Austria, Finland and Portugal — shows cointegration with the UK interest rate benchmark. In contrast, RIP holds for all countries which are not part of the Euro zone: Denmark, Iceland, Sweden and Switzerland, except Norway. The break dates occur at the beginning of the 1990s: one year after the rejection of Maastricht treaty for Denmark and before the increase of inflation during the decade. Break date in Iceland (1989:11) corresponds to the highest level inflation period, while it fits with the beginning of the recession in Sweden (1990:09) over the period 1991-1993. In Switzerland, the break date (1983) also corresponds to a high inflation period, when exchange market intervention led to stabilize the Franc over the period 1980-1982, inducing an increase in money supply.

Not surprisingly, considering NAFTA, Canada and the US show evidence of cointegration among their short-term interest rates. Turning to Mexico, the RIP holds with the US at the 10% significance level, considering a break point in 1987 before the Brady Plan in 1989. The restructuring and rescheduling of Mexico's debt payments at the beginning of the 1980s led to lower interest rates.

Mexico also belongs to MERCOSUR, the step 3 of Balassa's classification, that is customs

[19]For a detailed overview of the initatives taken in Asia, see Plummer and Wignaraja (2006).

Table 3 – Tests of the RIP hypothesis (Ctd.)

	ADF*	Z*(t)	Z*(α)
EFTA			
Austria			
Model 1	-4.84** (0.6)	-4.38* (0.6)	-35.07 (0.6)
Model 2	-5.1** (0.32)	-4.77* (0.33)	-40.06 (0.33)
Model 3	-4.83* (0.6)	-4.39 (0.6)	-35.12 (0.6)
Denmark			
Model 1	-5.69*** (0.54)	-6.71*** (0.57)	-80.4*** (0.57)
Model 2	-6.16*** (0.56)	-6.92*** (0.55)	-85.33*** (0.55)
Model 3	-5.73*** (0.57)	-6.73*** (0.57)	-80.88*** (0.57)
Finland			
Model 1	-4.14 (0.59)	-4.17 (0.59)	-30.15 (0.59)
Model 2	-4.48 (0.59)	-4.56 (0.59)	-38.36 (0.59)
Model 3	-4.28 (0.59)	-4.33 (0.59)	-32.84 (0.59)
Iceland			
Model 1	-5.7*** (0.16)	-6.47*** (0.34)	-68.42*** (0.33)
Model 2	-5.7*** (0.68)	-6.47*** (0.34)	-68.4*** (0.34)
Model 3	-5.93*** (0.15)	-7.79*** (0.15)	-92.6*** (0.15)
Portugal			
Model 1	-3.31 (0.2)	-3.33 (0.2)	-21.56 (0.2)
Model 2	-3.76 (0.21)	-4.07 (0.2)	-31.52 (0.2)
Model 3	-3.96 (0.23)	-4.05 (0.2)	-30.7 (0.2)
Norway			
Model 1	-4.55* (0.49)	-4.2 (0.46)	-32.14 (0.46)
Model 2	-4.52 (0.49)	-4.2 (0.46)	-32.16 (0.46)
Model 3	-4.74* (0.3)	-4.27 (0.46)	-33.65 (0.47)
Sweden			
Model 1	-3.92 (0.52)	-3.7 (0.55)	-25.81 (0.55)
Model 2	-5.93*** (0.19)	-5.78*** (0.19)	-57.86*** (0.19)
Model 3	-4.19 (0.19)	-3.93 (0.19)	-29.04 (0.19)
Switzerland			
Model 1	-4.56* (0.2)	-5.79*** (0.21)	-56.17*** (0.23)
Model 2	-4.61 (0.2)	-5.91*** (0.23)	-58.77*** (0.23)
Model 3	-4.99* (0.19)	-6.04*** (0.23)	-61.85*** (0.23)
NAFTA			
Canada			
Model 1	-4.7** (0.15)	-4.57* (0.15)	-31.98 (0.15)
Model 2	-5.55*** (0.7)	-5.5*** (0.7)	-47.04 (0.7)
Model 3	-4.64* (0.15)	-4.52 (0.15)	-33.79 (0.15)
Mexico			
Model 1	-6.24*** (0.34)	-4.66** (0.31)	-42.3** (0.31)
Model 2	-6.07*** (0.32)	-4.93* (0.31)	-47.27* (0.31)
Model 3	-6.44*** (0.34)	-4.83* (0.31)	-45.46* (0.31)

Note : *, **, ***: rejection of the null hypothesis of no cointegration at the 10%, 5%, 1% significance level respectively.

Table 3 – Tests of the RIP hypothesis (Ctd.)

	ADF*	Z*(t)	Z*(α)
MERCOSUR			
Argentina/Brazil			
Model 1	-15.68*** (0.5)	-15.71*** (0.5)	-282.43*** (0.5)
Model 2	-15.82*** (0.5)	-15.85*** (0.5)	-285.33*** (0.5)
Model 3	-18.12*** (0.5)	-18.14*** (0.5)	-329.61*** (0.5)
Mexico/Brazil			
Model 1	-6.74*** (0.27)	-4.67** (0.27)	-42.44** (0.27)
Model 2	-7*** (0.28)	-5.14** (0.27)	-50.99** (0.27)
Model 3	-6.7*** (0.27)	-4.67 (0.27)	-42.43* (0.27)
Paraguay/Brazil			
Model 1	-5.71*** (0.74)	-5.32*** (0.72)	-49.26** (0.72)
Model 2	-5.83*** (0.74)	-5.41** (0.72)	-50.67** (0.72)
Model 3	-5.85*** (0.73)	-5.36** (0.72)	-50.2** (0.72)
Uruguay/Brazil			
Model 1	-4.21 (0.74)	-4.03 (0.75)	-28.26 (0.75)
Model 2	-5.13** (0.72)	-5.01** (0.72)	-43.41* (0.72)
Model 3	-4.22 (0.74)	-4.03 (0.75)	-28.3 (0.75)
Brazil/Argentina			
Model 1	-9.96*** (0.54)	-14.48*** (0.36)	-254.21*** (0.36)
Model 2	-10.2*** (0.54)	-14.72*** (0.54)	-260.07*** (0.54)
Model 3	-9.96*** (0.54)	-14.48*** (0.36)	-254.24*** (0.36)
Mexico/Argentina			
Model 1	-5.91*** (0.31)	-4.69** (0.28)	-42.85** (0.28)
Model 2	-7.08*** (0.29)	-4.91* (0.29)	-46.72* (0.28)
Model 3	-5.92*** (0.2)	-4.73* (0.28)	-43.65* (0.28)
Paraguay/Argentina			
Model 1	-4.92** (0.72)	-5.04** (0.72)	-43.96** (0.72)
Model 2	-4.94* (0.72)	-5.07** (0.72)	-44.61* (0.72)
Model 3	-5.12** (0.72)	-5.29** (0.72)	-48.41** (0.72)
Uruguay/Argentina			
Model 1	-4.26 (0.57)	-6.78*** (0.57)	-70.31*** (0.57)
Model 2	-4.53 (0.77)	-6.88*** (0.85)	-73.29*** (0.85)
Model 3	-4.24 (0.54)	-7.53*** (0.67)	-83.14*** (0.67)

Note : *, **, ***: rejection of the null hypothesis of no cointegration at the 10%, 5%, 1% significance level respectively.

Table 3 – Tests of the RIP hypothesis (Ctd.)

	ADF*	Z*(t)	Z*(α)
ANDEAN			
Bolivia			
Model 1	-4.12 (0.66)	-4.15 (0.64)	-30.61 (0.64)
Model 2	-4.17 (0.18)	-4.29 (0.2)	-30.94 (0.19)
Model 3	-4.11 (0.66)	-4.25 (0.6)	-32.05 (0.6)
Chile			
Model 1	-5.04** (0.25)	-4.66** (0.29)	-36.68* (0.28)
Model 2	-2.28 (0.78)	-5.16** (0.8)	-41.99 (0.8)
Model 3	-4.65 (0.24)	-4.83* (0.29)	-37.39 (0.29)
Colombia			
Model 1	-4.49 (0.36)	-3.51 (0.32)	-22.58 (0.33)
Model 2	-4.42 (0.36)	-3.4 (0.33)	-21.57 (0.33)
Model 3	-4.76* (0.36)	-3.93 (0.32)	-26.28 (0.32)
Ecuador			
Model 1	-4.1 (0.45)	-3.9 (0.45)	-26.48 (0.44)
Model 2	-4.5 (0.48)	-4.42 (0.47)	-33.94 (0.47)
Model 3	-3.78 (0.47)	-4.69* (0.45)	-35.81 (0.45)
Peru			
Model 1	-3.72 (0.52)	-3.71 (0.52)	-24.24 (0.52)
Model 2	-5.05** (0.56)	-4.48 (0.53)	-37.18 (0.53)
Model 3	-4.08 (0.57)	-4.31 (0.55)	-31.35 (0.55)
CACM			
Guatemala			
Model 1	-5.24*** (0.29)	-5.51*** (0.27)	-47.97** (0.27)
Model 2	-5.25** (0.29)	-5.69*** (0.27)	-50.03** (0.27)
Model 3	-5.48*** (0.29)	-5.86*** (0.27)	-52.91** (0.27)
Honduras			
Model 1	-4.54* (0.66)	-3.33 (0.25)	-19.66 (0.25)
Model 2	-5.28** (0.25)	-3.96 (0.25)	-27.87 (0.25)
Model 3	-4.52 (0.66)	-3.37 (0.23)	-22.51 (0.23)
Nicaragua			
Model 1	-5.51*** (0.17)	-4.06 (0.15)	-28.78 (0.15)
Model 2	-5.23** (0.17)	-4.01 (0.15)	-28.59 (0.15)
Model 3	-5.05** (0.18)	-4.44 (0.15)	-35.57 (0.15)
El Salvador			
Model 1	-6.5*** (0.24)	-6.39*** (0.24)	-59.71*** (0.24)
Model 2	-6.46*** (0.24)	-6.34*** (0.24)	-58.77*** (0.24)
Model 3	-6.84*** (0.24)	-6.79*** (0.24)	-66.1*** (0.24)

Note : *, **, ***: rejection of the null hypothesis of no cointegration at the 10%, 5%, 1% significance level respectively.

Table 3 – Tests of the RIP hypothesis (Ctd.)

	ADF*	Z*(t)	Z*(α)
EUROPEAN UNION			
UK			
Model 1	-6.17*** (0.15)	-5.02** (0.15)	-48.22** (0.15)
Model 2	-6.19*** (0.15)	-5.02** (0.15)	-48.08** (0.15)
Model 3	-6.29*** (0.15)	-5.06** (0.15)	-49.1** (0.15)
Poland			
Model 1	-5.45*** (0.27)	-3.88 (0.24)	-28.55 (0.24)
Model 2	-5.28** (0.27)	-3.92 (0.24)	-29 (0.26)
Model 3	-5.5*** (0.35)	-5.6*** (0.3)	-53.39** (0.3)
Romania			
Model 1	-5.64*** (0.16)	-5.16*** (0.15)	-46.94** (0.15)
Model 2	-7*** (0.16)	-5.83*** (0.16)	-57.49*** (0.16)
Model 3	-5.77*** (0.16)	-5.19** (0.15)	-46.67* (0.15)
Hungary			
Model 1	-4.37* (0.84)	-3.14 (0.85)	-17.83 (0.85)
Model 2	-4.17 (0.82)	-3.13 (0.85)	-17.82 (0.85)
Model 3	-4.31 (0.82)	-3.36 (0.69)	-20.31 (0.69)
Czech Rep.			
Model 1	-3.95 (0.18)	-3.75 (0.17)	-27.44 (0.17)
Model 2	-4.24 (0.18)	-3.98 (0.19)	-29.97 (0.19)
Model 3	-3.96 (0.18)	-3.81 (0.17)	-27.91 (0.17)
Sweden			
Model 1	-3.74 (0.59)	-3.5 (0.59)	-23.45 (0.59)
Model 2	-5.88*** (0.18)	-5.68*** (0.18)	-55.98** (0.19)
Model 3	-4.39 (0.16)	-4.27 (0.16)	-33.77 (0.16)
Bulgaria			
Model 1	-6.25*** (0.35)	-5.35*** (0.37)	-49.34** (0.37)
Model 2	-6.23*** (0.35)	-5.39** (0.37)	-49.89** (0.37)
Model 3	-6.31*** (0.34)	-5.76*** (0.37)	-56.07** (0.37)
Denmark			
Model 1	-5.17*** (0.54)	-6.67*** (0.52)	-78.6*** (0.52)
Model 2	-5.62*** (0.53)	-7*** (0.51)	-85.73*** (0.52)
Model 3	-5.21** (0.29)	-6.95*** (0.3)	-84.61*** (0.3)
Slovenia			
Model 1	-4.33 (0.3)	-3.7 (0.27)	-23.62 (0.27)
Model 2	-4.43 (0.3)	-3.73 (0.27)	-24.08 (0.27)
Model 3	-4.35 (0.3)	-4.06 (0.26)	-26.83 (0.26)
Lithuania			
Model 1	-7.86*** (0.28)	-4.02 (0.26)	-25.66 (0.26)
Model 2	-8.45*** (0.44)	-4.09 (0.51)	-25.39 (0.57)
Model 3	-7.77*** (0.28)	-3.99 (0.26)	-25.79 (0.26)
Latvia			
Model 1	-3.84 (0.27)	-5.72*** (0.24)	-55.92*** (0.24)
Model 2	-4.62 (0.34)	-6.6*** (0.39)	-68.45*** (0.39)
Model 3	-3.89 (0.23)	-5.74*** (0.24)	-56.39** (0.23)
Estonia			
Model 1	-4.56* (0.19)	-4.42* (0.16)	-31.75 (0.16)
Model 2	-4.7 (0.26)	-4.45 (0.16)	-32.69 (0.16)
Model 3	-5.29** (0.26)	-4.75* (0.27)	-40.06 (0.27)

Note : *, **, ***: rejection of the null hypothesis of no cointegration at the 10%, 5%, 1% significance level respectively.
Critical values are -4.34, -4.61 and -5.13 for Model 1, -4.72, -4.99 and -5.45 for Model 2, -4.68, -4.95 and -5.47 for Model 3.
The critical values are provided by Gregory and Hansen (1996, Table 1).
The numbers in parentheses are the break points reported as a percentage of the sample size.

Table 4 – Tests of the RIP hypothesis. Robustness check

	ADF*	Z*(t)	Z*(α)
ASEAN +3			
Indonesia			
Model 1	-5.55*** (0.85)	-3.5 (0.82)	-23.84 (0.61)
Model 2	-5.91*** (0.59)	-3.8 (0.61)	-27.86 (0.61)
Model 3	-5.57*** (0.6)	-3.57 (0.61)	-24.92 (0.61)
Maly			
Model 1	-4.45* (0.34)	-4.42* (0.33)	-35.88 (0.33)
Model 2	-4.55 (0.34)	-4.48 (0.33)	-36.87 (0.33)
Model 3	-4.78 (0.15)	-4.81* (0.15)	-43.12 (0.15)
Philippines			
Model 1	-5.06** (0.27)	-5.57*** (0.25)	-54.33*** (0.25)
Model 2	-5.16** (0.27)	-5.77*** (0.25)	-57.97*** (0.25)
Model 3	-5.19** (0.27)	-5.75*** (0.25)	-57.73*** (0.25)
Singapore			
Model 1	-5.81*** (0.24)	-3.47 (0.74)	-22.86 (0.74)
Model 2	-5.68*** (0.44)	-3.55 (0.24)	-24.53 (0.24)
Model 3	-5.91*** (0.17)	-4.97** (0.15)	-47.5** (0.15)
Thailand			
Model 1	-5.04** (0.74)	-4.96** (0.73)	-46.3** (0.73)
Model 2	-5.21** (0.74)	-5.14** (0.73)	-49.51** (0.73)
Model 3	-5.19** (0.17)	-5.05** (0.73)	-47.94** (0.73)
Vietnam			
Model 1	-3.29 (0.5)	-2.31 (0.45)	-12.39 (0.45)
Model 2	-3.84 (0.33)	-2.72 (0.15)	-15.07 (0.15)
Model 3	-3.14 (0.46)	-2.72 (0.45)	-17.6 (0.45)
Laos			
Model 1	-3.2 (0.48)	-2.22 (0.39)	-9.78 (0.39)
Model 2	-3.16 (0.41)	-2.44 (0.39)	-11.92 (0.39)
Model 3	-2.95 (0.28)	-2.87 (0.3)	-15.5 (0.3)
Cambodia			
Model 1	-2.5 (0.29)	-2.51 (0.29)	-14.3 (0.29)
Model 2	-4.38 (0.31)	-4.33 (0.31)	-34.14 (0.31)
Model 3	-3.18 (0.45)	-3.19 (0.45)	-22.64 (0.45)
China			
Model 1	-4.12 (0.47)	-2.59 (0.49)	-14.21 (0.49)
Model 2	-4.14 (0.47)	-2.62 (0.43)	-14.27 (0.43)
Model 3	-4.18 (0.41)	-3.41 (0.6)	-20.65 (0.6)
Korea			
Model 1	-5.02** (0.17)	-4.42* (0.46)	-37.33* (0.46)
Model 2	-5.75*** (0.73)	-5** (0.74)	-46.7* (0.74)
Model 3	-5.11*** (0.17)	-4.49 (0.15)	-38.12 (0.75)

Note : *, **, ***: rejection of the null hypothesis of no cointegration at the 10%, 5%, 1% significance level respectively.

Table 4 – Tests of the RIP hypothesis. Robustness check (Ctd.)

	ADF*	Z*(t)	Z*(α)
MERCOSUR			
Argentina			
Model 1	-12.04*** (0.38)	-13.08*** (0.38)	-230.23*** (0.38)
Model 2	-12.9*** (0.37)	-13.18*** (0.37)	-232.6*** (0.37)
Model 3	-12.09*** (0.38)	-13.12*** (0.38)	-231.08*** (0.38)
Mexico			
Model 1	-6*** (0.3)	-4.56* (0.27)	-40.55** (0.27)
Model 2	-5.86*** (0.28)	-4.8* (0.27)	-44.72* (0.27)
Model 3	-6.37*** (0.3)	-4.67 (0.27)	-42.52* (0.27)
Paraguay			
Model 1	-4.76** (0.73)	-4.9** (0.73)	-41.91** (0.73)
Model 2	-4.81* (0.26)	-4.92* (0.73)	-42.36* (0.73)
Model 3	-4.85* (0.73)	-5** (0.73)	-43.57* (0.73)
Uruguay			
Model 1	-4.23 (0.73)	-4.02 (0.73)	-27.51 (0.73)
Model 2	-5.54*** (0.73)	-5.46*** (0.73)	-50.36** (0.73)
Model 3	-4.32 (0.73)	-4.11 (0.73)	-28.51 (0.73)
Brazil			
Model 1	-12*** (0.54)	-11.99*** (0.54)	-199.34*** (0.54)
Model 2	-12.21*** (0.36)	-12.21*** (0.36)	-204.96*** (0.36)
Model 3	-12.04*** (0.54)	-12.03*** (0.54)	-200.53*** (0.54)
ANDEAN			
Bolivia			
Model 1	-3.92 (0.57)	-3.81 (0.64)	-22.52 (0.64)
Model 2	-4.17 (0.2)	-4.26 (0.64)	-30.48 (0.64)
Model 3	-4.04 (0.57)	-4.04 (0.64)	-24.37 (0.64)
Chile			
Model 1	-2.51 (0.62)	-4.89** (0.59)	-41.42** (0.59)
Model 2	-2.45 (0.6)	-5.33** (0.41)	-44.06** (0.41)
Model 3	-2.66 (0.6)	-4.95** (0.59)	-41.99* (0.59)
Colombia			
Model 1	-4.26 (0.36)	-2.93 (0.41)	-17.18 (0.41)
Model 2	-4.24 (0.36)	-2.94 (0.34)	-17.18 (0.39)
Model 3	-4.48 (0.36)	-3.82 (0.3)	-25.79 (0.31)
Ecuador			
Model 1	-3.24 (0.17)	-2.92 (0.17)	-16.31 (0.17)
Model 2	-4.1 (0.2)	-3.63 (0.17)	-23.96 (0.17)
Model 3	-3.55 (0.41)	-3.29 (0.4)	-16.07 (0.23)
Peru			
Model 1	-3.47 (0.17)	-3.47 (0.2)	-23.91 (0.2)
Model 2	-4.09 (0.23)	-3.95 (0.2)	-28.75 (0.2)
Model 3	-3.69 (0.23)	-3.42 (0.21)	-23.43 (0.21)

Note : *, **, ***: rejection of the null hypothesis of no cointegration at the 10%, 5%, 1% significance level respectively.

Table 4 – Tests of the RIP hypothesis. Robustness check (Ctd.)

	ADF*	Z*(t)	Z*(α)
		CACM	
Guatemala			
Model 1	-4.29 (0.64)	-4.65** (0.66)	-35.73 (0.66)
Model 2	-4.78* (0.24)	-4.98* (0.66)	-39.99 (0.66)
Model 3	-4.74* (0.64)	-5.17** (0.65)	-42.76* (0.65)
Honduras			
Model 1	-4.87** (0.66)	-3.04 (0.7)	-18.3 (0.7)
Model 2	-5.1** (0.66)	-3.22 (0.25)	-20.83 (0.27)
Model 3	-4.85* (0.66)	-3.05 (0.7)	-18.42 (0.7)
Nicaragua			
Model 1	-3.69 (0.15)	-3.99 (0.15)	-27.84 (0.15)
Model 2	-3.67 (0.15)	-3.98 (0.15)	-27.7 (0.15)
Model 3	-6.18*** (0.16)	-6.54*** (0.18)	-59.79*** (0.18)
El Salvador			
Model 1	-4.07 (0.25)	-5.41*** (0.25)	-45.19** (0.25)
Model 2	-4.72* (0.26)	-5.61*** (0.25)	-47.57* (0.25)
Model 3	-7.89*** (0.24)	-7.9*** (0.23)	-82.11*** (0.24)

Note : *, **, ***: rejection of the null hypothesis of no cointegration
at the 10%, 5%, 1% significance level respectively.
Critical values are -4.34, -4.61 and -5.13 for Model 1,
-4.72, -4.99 and -5.45 for Model 2, -4.68, -4.95 and -5.47 for Model 3.
The critical values are provided by Gregory and Hansen (1996, Table 1).
The numbers in parentheses are the break points reported as
a percentage of the sample size.

unions. Results show evidence of strong cointegration among interest rates whichever country benchmark is used to test the RIP, Argentina or Brazil and the United States as a robustness test. In Mexico, the smallest test statistics indicated that the break point in the sample also occurs before the Brady Plan. When considering the United States as benchmark, the breakpoints correspond to the monetary regime shifts in Argentina and Brazil after the hyperinflation period, respectively in 1990 and 1994. In ANDEAN countries, with Venezuela as the benchmark, the null hypothesis of no cointegration is not rejected. Robustness tests are not so convincing. The ANDEAN, except Ecuador, community has shown a downward trend of inflation since the beginning of the last decade. However, inflation still stands at levels well above the MERCOSUR. As for the CACM countries, they seem to show interest rate cointegration considering either Costa Rica or the United States as the benchmark. Guatemala and Salvador, two of the largest economies within the CACM, show strong evidence of cointegration with the third one, the Costa Rica and with the United States, the most important trade partner of the area. The tests reveal a break at the end of the last century for both countries. In 1999, because of a large trade deficit, Guatemala saw its currency (quetzal) depreciate by 15% and the central bank decided to increase interest rates. At the same time, El Salvador also experienced a large trade deficit but has faced high interest rates since the civil war that led to dollarization in 2001. As a consequence, the country presents the lowest inflation and interest rates in the region. On the contrary, the hypothesis of no cointegration is not rejected for Honduras and Nicaragua, two countries which beneficiated of the Heavily Indebted Poor Country Initiative (HIPC). From a general point of view, no significant differences appear in terms of RIP for Latin-American customs unions[20] when considering either a regional leader or the US, as for the ASEAN.

With regard to the European Union, there is no evidence of RIP in less developed countries of EU with Germany as reference. Results are disparate across economies in transition. Poland, Romania, Bulgaria and Latvia positively respond to interest cointegration with Germany, while Hungary, Czech Republic, Slovenia, Lithuania and Estonia do not. For all countries meeting the RIP hypothesis, break dates correspond to an increase in the inflation rate following economic expansion in the second part of the 1990s. The former socialist countries (CEECs) also adopted various monetary regimes in order to stabilize their monetary framework before entering the EU.

5. CONCLUSION

The aim of this paper was to investigate the degree of financial integration, following the degree of trade integration according to Balassa's (1961) classification, from preferential trading area to complete economic integration. To this end, we rely on interest rates in order to test two conditions for financial integration: the expectations hypothesis of the term structure of interest rates (EHTS) and the real interest rate parity (RIP). Both conditions are tested on a selection of

[20]The only exception could be Nicaragua, but a break in the trend is not very reliable since the available time span is quite short.

regional trade agreements to check for differences according to various degrees of trade integration.

Relying on cointegration techniques accounting for potential breaks, our results show that customs unions, corresponding to step 3 of the Balassa's (1961) classification, seem to be a decisive threshold after which financial integration robustly takes place. Indeed, while EHTS and RIP are not clearly evidenced for preferential trading and free trade areas such as ASEAN+3, LAIA, and EFTA, both conditions are verified for customs unions such as ANDEAN, CACM, MERCOSUR and the European Union. On the whole, our results are consistent with Eichengreen and Park's (2005) intuition that "finance follows trade" only after a certain degree of trade integration.

A natural extension of this paper would rely on panel cointegration techniques. Since structural breaks are clearly at work in our considered countries, a promising approach is to go further than panel standard tests by allowing for breaks in panel cointegration tests. This is left for future research.

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APPENDIX

Table A.1 – Definition of the RTAs and exchange rate regime specificities

RTA Definition	ANDEAN (1969) Andean Community of Nations	APT (ASEAN (1967)+3) Association of South-East Asian Nations	CACM (1960) Central American Common Market	CER (1983) Closer Economic Relations	EFTA (1960) European Free Trade Agreement
member countries	Bolivia	Cambodia	Costa Rica	Australia	Austria (l.1995)
	Colombia	Indonesia	El Salvador	New Zealand	Denmark (l.1973)
	Ecuador	Laos	Guatemala		Finland (l.1995)
	Peru (e.1997/2004)	Malaysia	Honduras		Iceland
	Venezuela (l.2006)	Philippines	Nicaragua		Norway
		Singapore			Portugal (l. 1986)
		Thailand			Sweden (l.1995)
		(+3)			Switzerland
		China			United Kingdom (l.1973)
		Japan			
		Korea			

RTA Definition	Euro area 12 (1999)[a]	EU (1957) European Union (=Euro area +)	LAIA (1980) Latin American Integration Association	MERCOSUR (1991) Mercado Comun del Sur	NAFTA (1992) North American Free Trade Agreement
member countries	Austria	Bulgaria (e.2007)	Argentina	Argentina	Canada
	Belgium	Czech Republic (e.2004)	Brazil	Brazil	Mexico
	Finland	Denmark (e.1973)	Bolivia	Paraguay	United States
	France	Estonia (e.2004)	Chile	Uruguay	
	Germany	Hungary (e.2004)	Colombia	Venezuela	
	Greece	Latvia (e.2004)	Ecuador	Associate	
	Ireland	Lithuania (e.2004)	Mexico	*Bolivia*	
	Italy	Poland (e.2004)	Paraguay	*Chile*	
	Luxembourg	Romania (e.2007)	Peru	*Colombia*	
	Netherlands	Slovak Republic (e.2004)	Uruguay	*Ecuador*	
	Portugal	Slovenia (e.2004)	Venezuela	*Peru*	
	Spain	Sweden (e.1995)			
		United Kingdom (e.1973)			

Note: "e.X" represents the year when the considered country entered the RTA. "l.X" represents the year when the considered country left the RTA.

a: We decided to consider only the 11 euro area "founding members" plus Greece: Slovenia entered the euro area only in 2007, and Cyprus and Malta do not appear in our sample due to the lack of data availability.

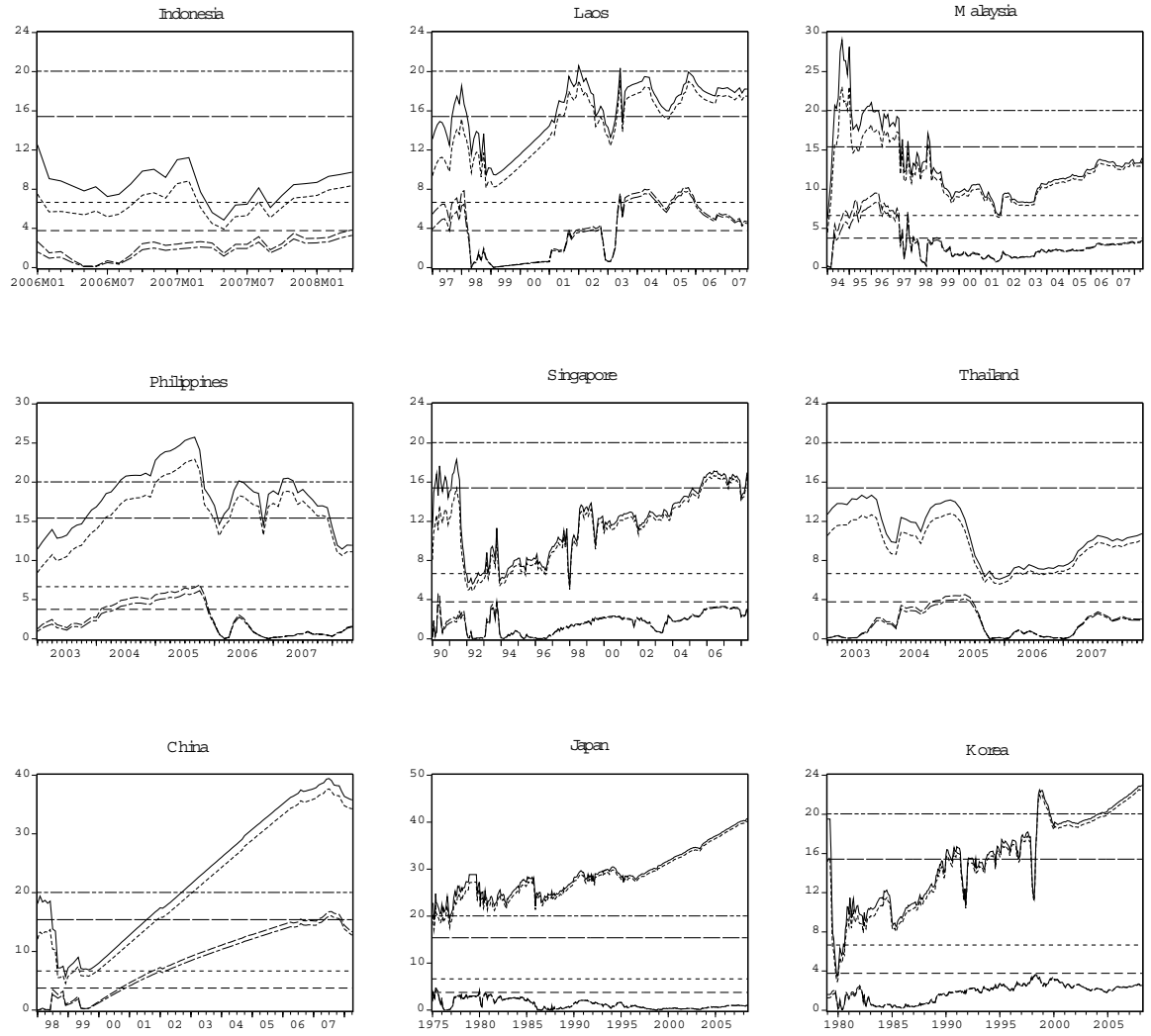
Table A.2 – Sources and definition of data

	Short-term interest rates		*Long-term interest rates*		*CPI*
Country	*Source*	*Period*	*Source*	*Period*	*Source*
Australia	IFS	01.1970-05.2008	Reserve Bank of Australia	01.1970-07.2008	IFS
Austria	Eurostat	01.1980-05.2008	Reuters + IFS	01.1971-07.2008	Statistics Austria
Belgium	Eurostat	01.1970-05.2008	Reuters	01.1970-07.2008	National Bank of Belgium
Bolivia	IFS	01.1995-03.2008	Datastream	01.1987-03.2008	IFS
Brazil	IFS	12.1979-04.2008	Reuters	10.2000-04.2008	IFS
Bulgaria	IFS	01.1991-04.2008	Reuters	05.2001-06.2008	National Stat. Institute
Cambodia	IFS	05.1994-03.2008	NA	NA	IFS
Canada	IFS	01.1970-05.2008	Bank of Canada	01.1970-07.2008	IFS
Chile		12.1999-05.2008		01.1987-05.2008	IFS
China	IFS	01.1980-04.2008	Reuters	10.2004-06.2008	NBS of China
Colombia		01.1986-05.2008	Reuters	01.1986-05.2008	IFS
Costa Rica	IFS/Reserve Bank of Costa Rica	01.1970-03.2008	Reserve Bank of Costa Rica	05.2005-04.2008	IFS
Czech Republic	IFS	01.1993-05.2008	Reuters	03.1998-06.2008	IFS
Denmark	Eurostat	01.1980-05.2008	Reuters	01.1970-07.2008	Statistics Denmark
Ecuador	Datastream	03.1970-04.2008	Datastream	01.1983-04.2008	IFS
El Salvador	Reserve Bank of Salvador	01.1997-03.2008	Reserve Bank of Salvador	01.2005-03.2008	IFS
Estonia	IFS	09.1993-04.2008	Eurostat	01.2001-05.2008	IFS
Finland	Eurostat	01.1980-05.2008	Bank of Finland	01.1970-07.2008	IFS
France	Eurostat	01.1970-05.2008	Bank of France	01.1970-06.2008	INSEE
Germany	Eurostat	01.1970-05.2008	Reuters	01.1970-07.2008	Federal Stat Office
Greece	Eurostat	05.1980-05.2008	Eurostat	09.1992-06.2008	IFS
Guatemala	Reserve Bank of Guatemala	01.1996-03.2008		NA	IFS
Honduras	Reserve Bank of Honduras	01.1982-03.2008		NA	IFS
Hungary	Eurostat	01.1994-05.2008	Reuters	02.1997-06.2008	IFS
Indonesia	IFS	01.1983-04.2008	Reuters	08.2004-06.2008	Statistics Indonesia
Iceland	IFS	11.1986-03.2008	IFS	01.1992-03.2008	IFS
Ireland	Eurostat	02.1971-05.2008	Reuters, Eurostat + IFS	01.1970-06.2008	Central Statistics
Italy	Eurostat	01.1970-05.2008	Reuters	01.1970-07.2008	IFS
Japan	IFS	01.1970-05.2008	Reuters	01.1970-07.2008	IFS
Korea	IFS	08.1976-03.2008	Bank of Korea + IFS	05.1973-07.2008	Korea National Statistics Office
Laos	IFS	12.1994-03.2008	IFS	01.1979-10.2007	IFS
Latvia	IFS	08.1993-04.2008	Eurostat	01.2001-06.2008	IFS
Lihutania	IFS	12.1993-05.2008	Eurostat	01.2001-06.2008	IFS
Luxembourg	Eurostat	01.1970-05.2008	Eurostat + IFS	01.1970-05.2008	IFS
Malaysia	IFS	01.1971-05.2008	Central Bank of Malaysia	02.1992-05.2008	Department of Statistics Department of Statistics
Mexico	IFS	01.1978-05.2008	IFS	12.1998-07.2008	IFS
Netherlands	Eurostat	01.1970-05.2008	Reuters	01.1970-07.2008	Statistics Netherlands
New Zealand	IFS	01.1978-03.2008	IFS	01.1970-11.2007	IFS
Nicaragua	Reserve Bank of Nicaragua	01.1998-02.2008	Reserve Bank of Nicaragua	01.1996-02.2008	IFS
Norway	IFS	01.1982-03.2008	Datastream	01.1972-03.2008	IFS
Paraguay	IFS	12.1994-05.2008	Datastream	12.1994-05-2008	IFS
Peru	Datastream	02.1992-05.2008	Datastream	12.1984-05.2008	IFS
Philippines	IFS	01.1977-05.2008	Reuters	01.2001-06.2008	IFS
Poland	IFS	12.1990-04.2008	Reuters	11.1999-06.2008	IFS
Portugal	Eurostat	01.1970-05.2008	Eurostat	01.1986-06.2008	IFS

Table A.2 – Sources and definition of data (Ctd.)

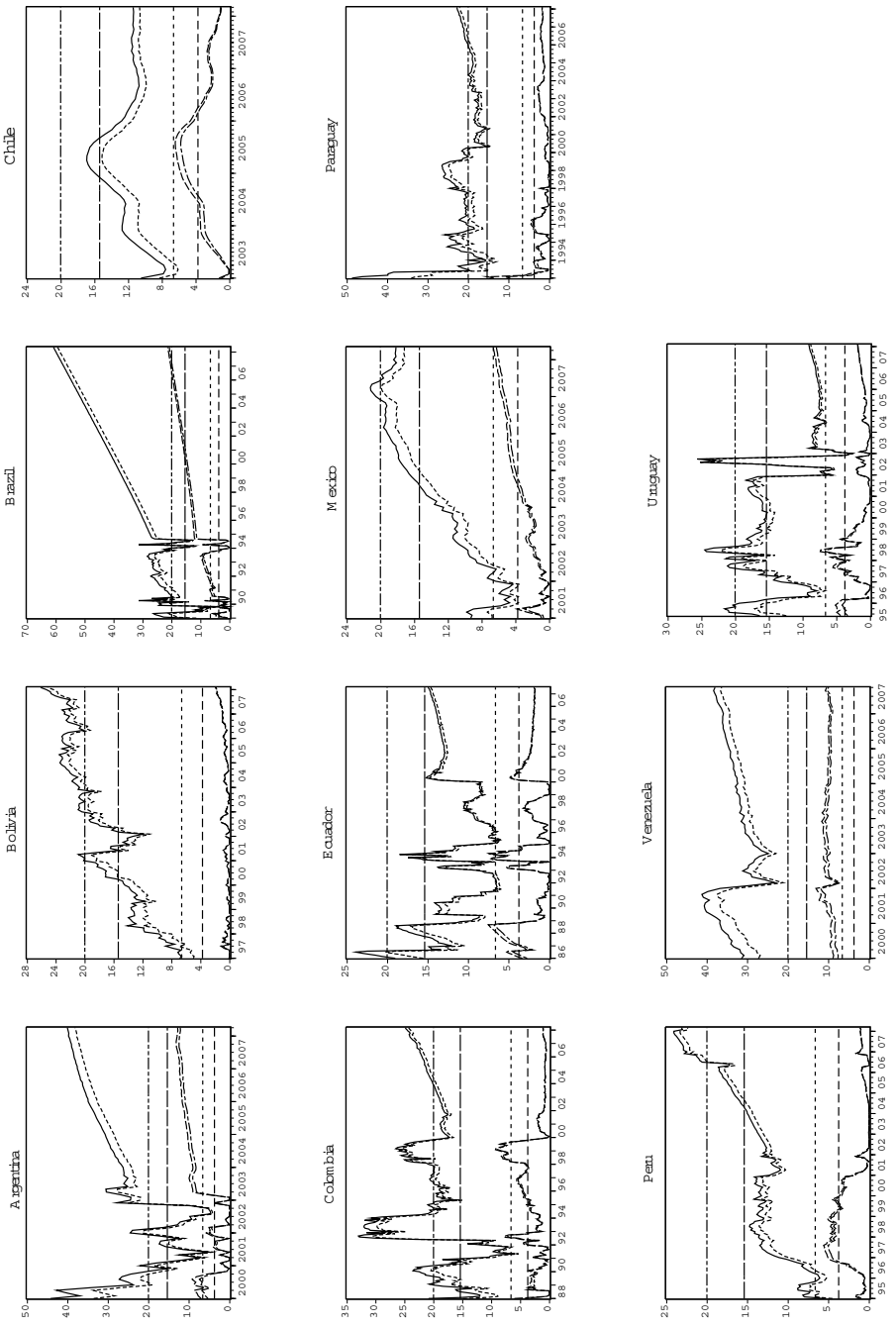
	Short-term interest rates		*Long-term interest rates*		*CPI*
Country	*Source*	*Period*	*Source*	*Period*	*Source*
Romania	IFS	01.1995-04.2008	IFS	02.2002-07.2008	IFS
Singapore	IFS	04.1972-05-2008	Reuters	01.1988-07.2008	IFS
Slovakia	Eurostat	07.1995-05.2008	Eurostat	01.2001-06.2008	IFS
Slovenia	IFS	01.1993-03.2008	IFS	05.1998-03.2008	IFS
Spain	Eurostat	01.1977-05.2008	Reuters	03.1978-07.2008	National Institute of Statistics
Sweden	Eurostat	01.1987-05.2008	Reuters	01.1970-07.2008	Statistics Sweden
Switzerland	IFS	09.1975-03.2008	IFS	01.1972-03.2008	
Thailand	IFS	01.1977-05.2008	Bank of Thailand	09.1999-06.2008	IFS
United kingdom	IFS + Reuters	01.1978-07.2008	Reuters	01.1970-07.2008	IFS
Unites States	IFS	01.1970-07.2008	Reuters	01.1970-07.2008	IFS
Uruguay	Datastream	12.1992-05.2008	Datastream	07.1976-05.2008	IFS
Vietnam	IFS	02.1997-12.2006	IFS	01.1996-12.2006	IFS
Venezuela	IFS	01.1996-12.2007	IFS	01.1984-12.2007	IFS

Figure A.1 – Trace test. APT (ASEAN+3)



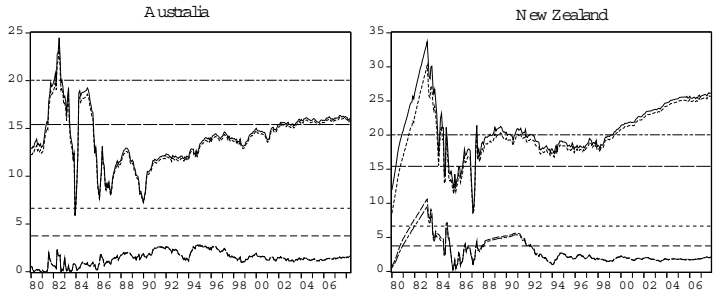
Note: Horizontal lines correspond to the critical values of the Johansen trace tests. In the upper part of the graph, these are for the null of no cointegration, respectively at 5 (15.41) and 1% (20.04) significance levels. In the lower part of the graph can be found the critical values corresponding to the null of at most one cointegrating relationship, respectively at 5 (3.76) and 1% (6.65) levels. When the plot of the trace(s) stands above the horizontal line(s), the null hypothesis is rejected at the corresponding significance level. It is also worth noting that an upward trend for the trace means that the robustness of the cointegrating relationship grows with time.

Figure A.2 – Trace test. LAIA



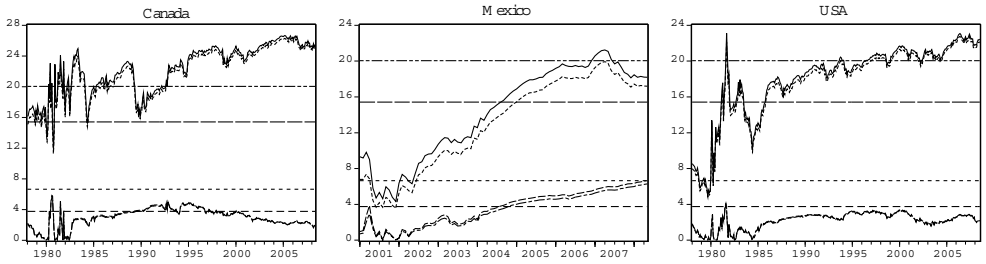
Note: See Figure A.1.

Figure A.3 – Trace test. CER



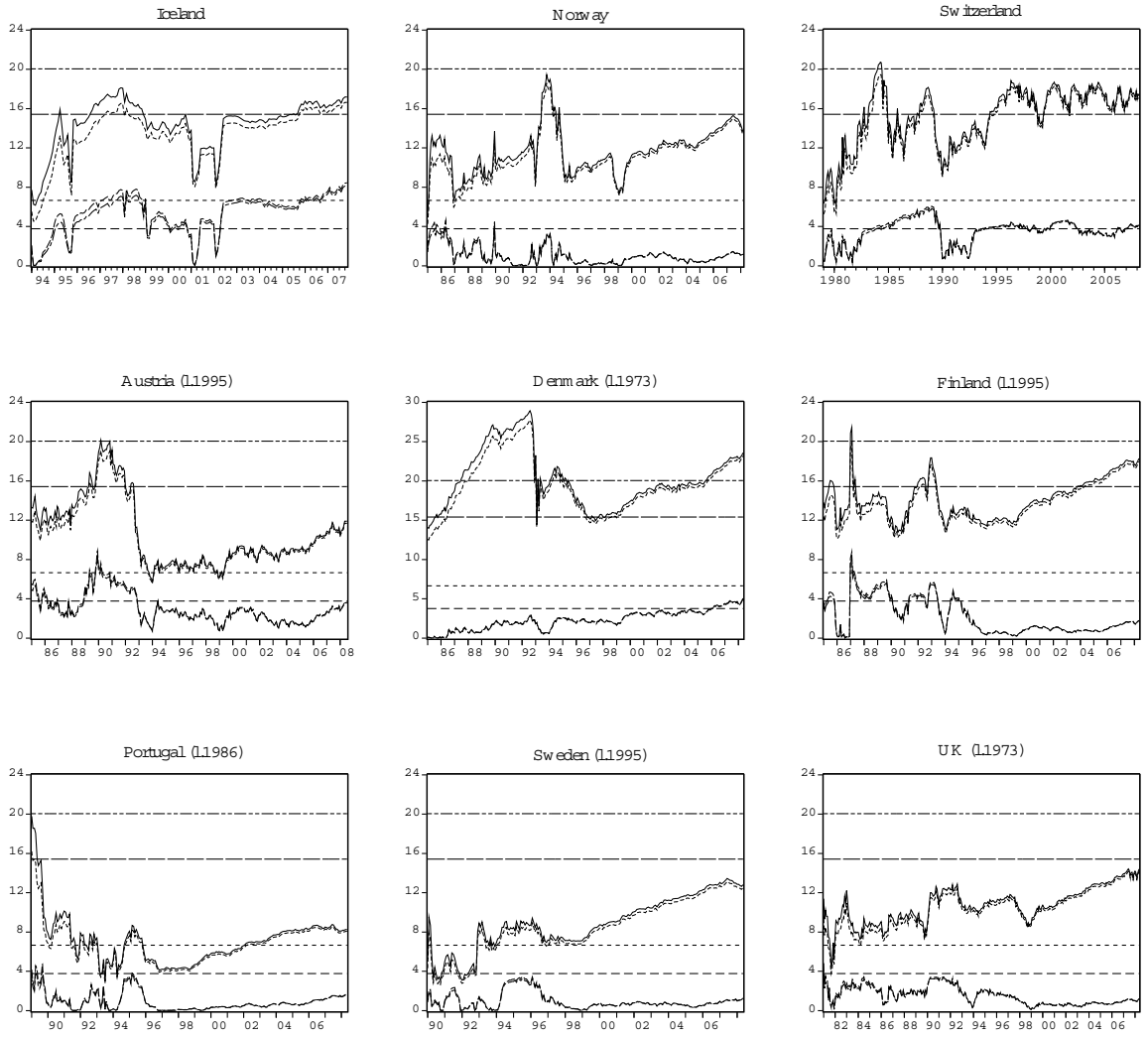
Note: See Figure A.1.

Figure A.4 – Trace test. NAFTA



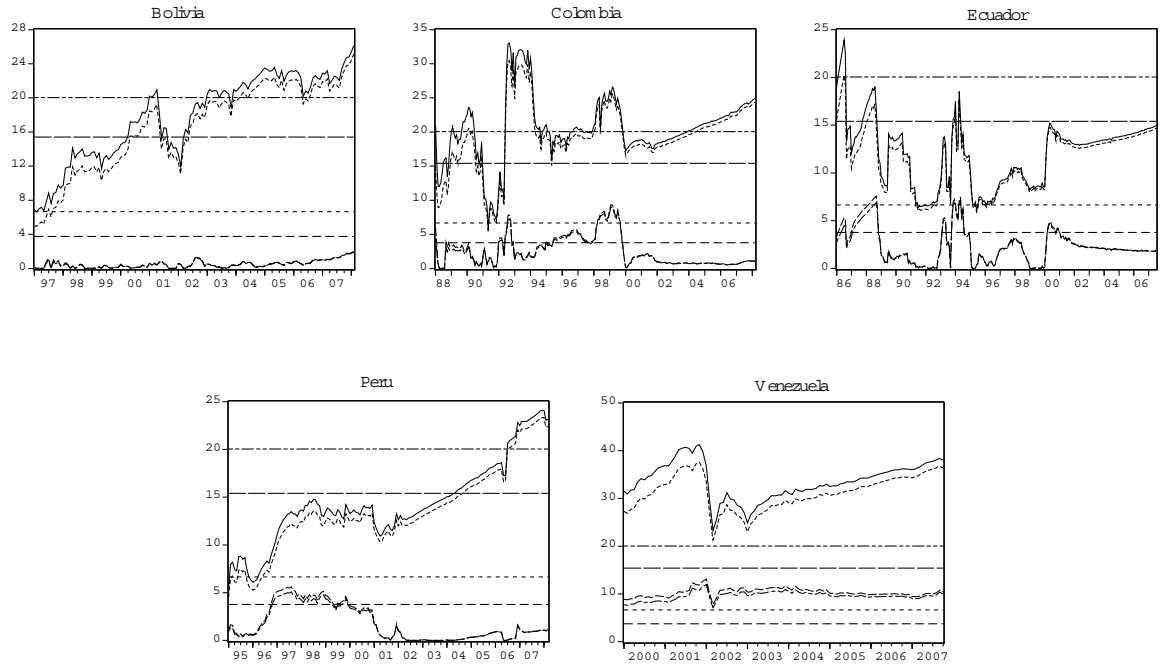
Note: See Figure A.1.

Figure A.5 – Trace test. EFTA



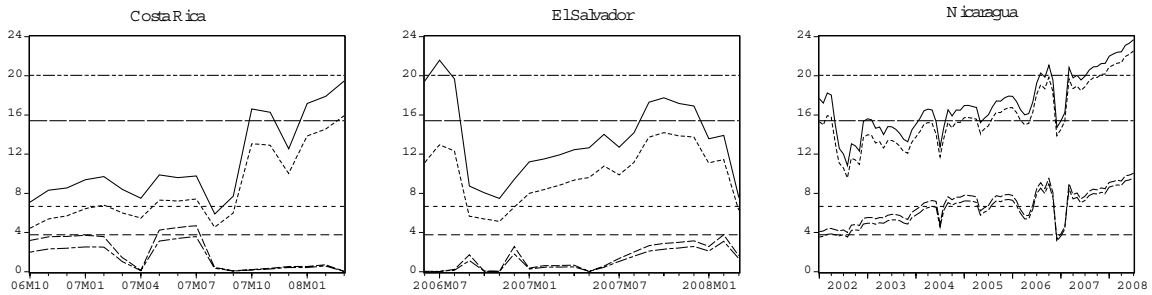
Note: See Figure A.1.

Figure A.6 – Trace test. ANDEAN



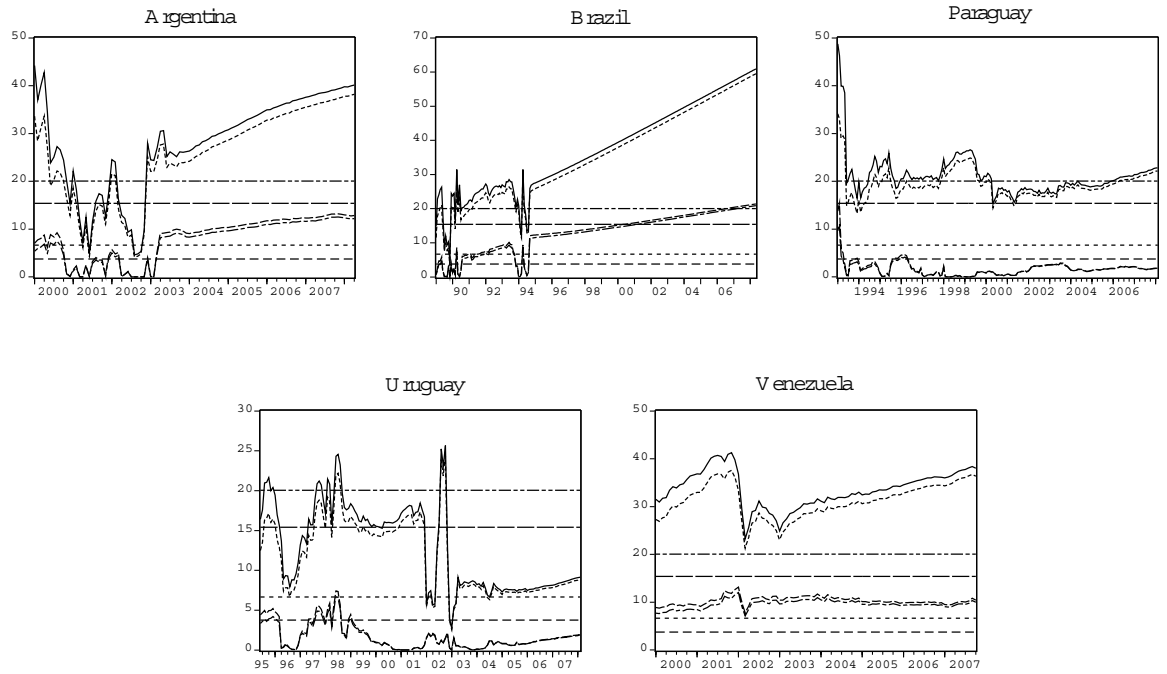
Note: See Figure A.1.

Figure A.7 – Trace test. CACM



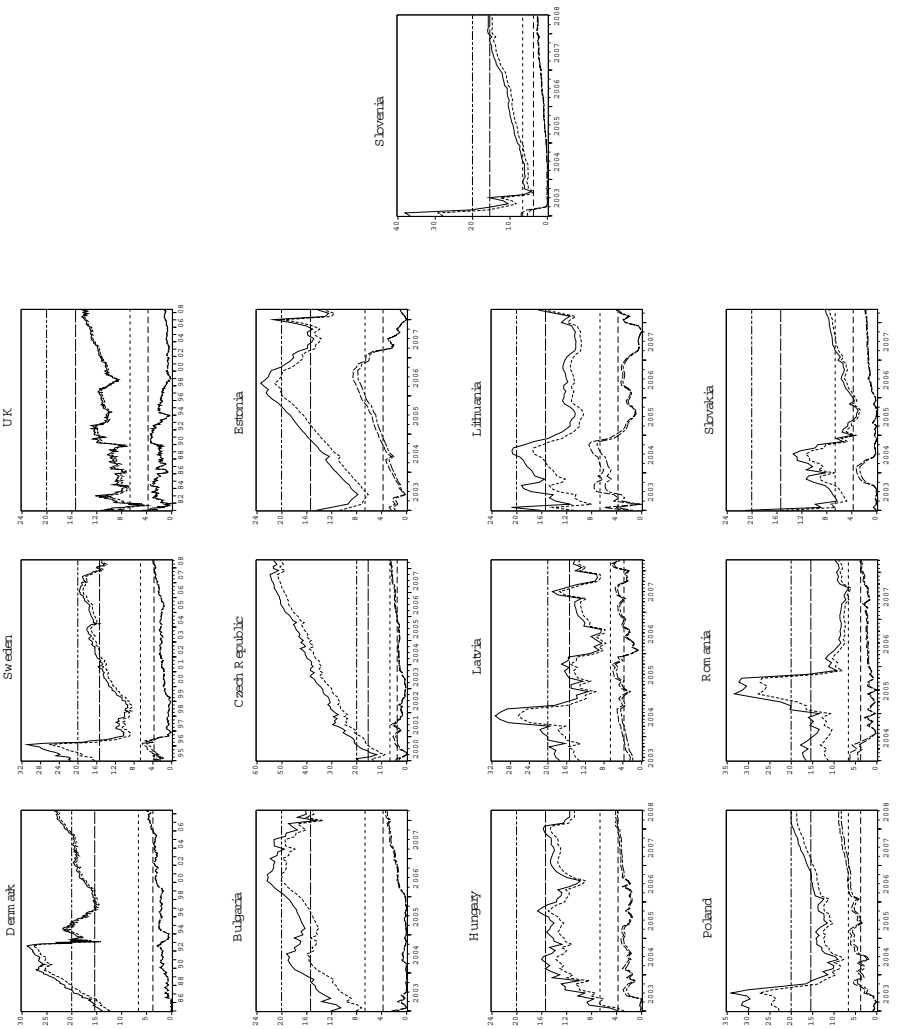
Note: See Figure A.1.

Figure A.8 – Trace test. MERCOSUR



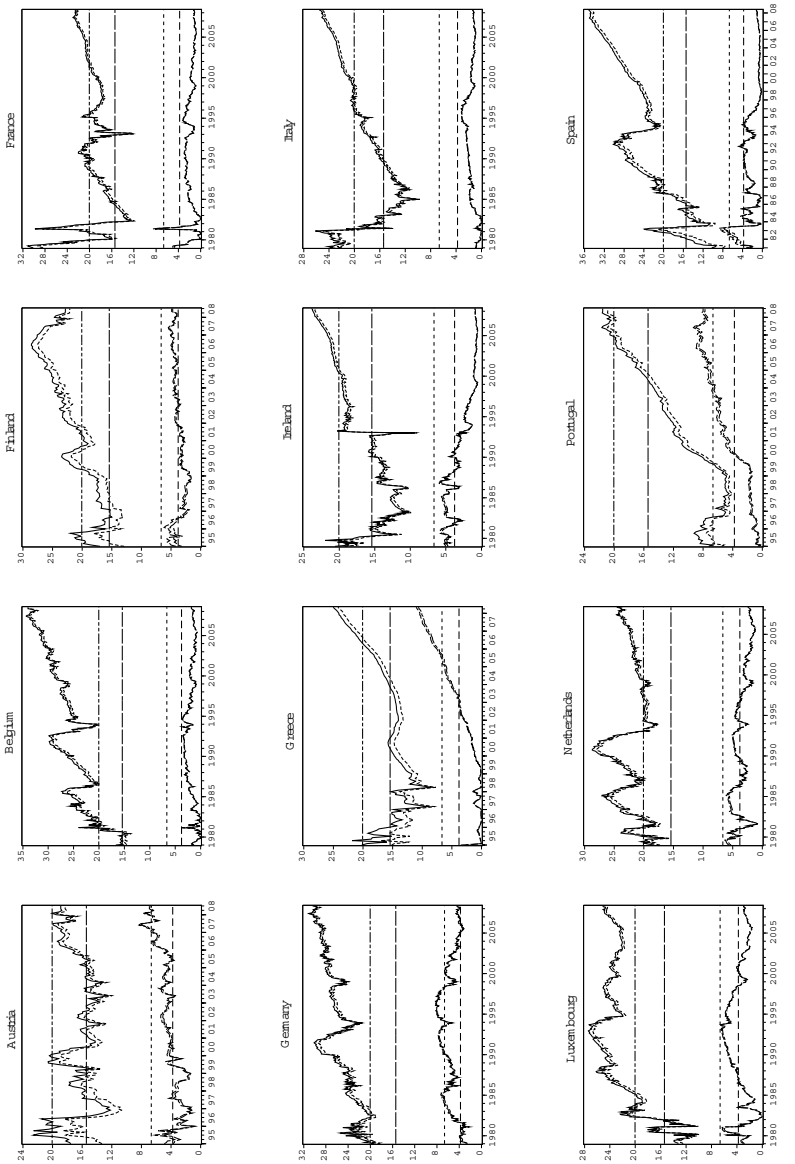
Note: See Figure A.1.

Figure A.9 – Trace test. EU



Note: See Figure A.1.

Figure A.10 – Trace test. Euro-12



Note: See Figure A.1.

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