Purchasing Power Parity and the Irish Experience: Unit Roots and Cointegration Tests for Two Industrial Countries

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I. Introduction

The Purchasing Power Parity (PPP) relationship has been in the forefront of modern international finance. This relation has been tested empirically by many economists and the evidence on its relevance has been mixed. It is generally accepted by applied and theoretical economists that the parity does not hold in the short run. However, there is no consensus on the empirical evidence on the long run parity. Modern time-series econometrics that include unit root tests and cointegration techniques have been used extensively to test for the long run parity.[1] Unit root tests have tried to determine whether the real exchange rate is a random walk (i.e., a nonstationary series). If the real exchange rate follows a random walk, there would be no tendency to return to its long run value (i.e., the deviations from its long run value would be permanent). Dickey-Fuller tests have been used to test the null hypothesis of unit roots. However, this type of classical statistical tests has been criticized recently by statisticians and economists. This criticism is based on the fact that classical tests cannot discriminate between large autoregressive coefficients and unit roots. In other words, classical tests have low power.

In response to the above-mentioned widely-accepted criticism of unit root tests, Kwiatkowski, Phillips, Schmidt and Shin (hereafter referred to as KPSS, 1992) have suggested the use of tests for stationarity along with tests for unit roots. Then, if one finds that the null of stationarity is rejected *and* the null of unit root cannot be rejected, the series is considered to be nonstationary. KPSS (1992), after testing for both null hypo-

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[1] Examples include Abuaf-Jorion (1989), Corbae-Ouliaris [(1988), (1990)], Cheung-Lai (1993), Coughlin-Koedijk (1990), Enders (1988), Johnson (1991), Mark (1990), Pippenger (1993), Taylor (1988), Thom (1989) and Wright (1993).

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theses of unit root and stationarity, conclude that for many of the US time-series examined by Nelson and Plosser (1982) the existence of unit roots is in doubt. Therefore, they argue in favour of a combination of tests (eg., DF and KPSS) to test for the stationarity of a time series. We have decided to combine the KPSS test with the Augmented Dickey-Fuller (ADF) test.

This paper contributes to the empirical literature on PPP in three ways: first, we use a relatively new test, the classical KPSS test to test for the null of stationarity of the real exchange rate. Second, using monthly data for the 1981.1 - 1992.4 period, we find strong evidence that PPP holds, even with monthly data, for the UK and Germany based on Johansen's cointegration test.[2] These results imply that Ireland's competitive position against an ERM and a non-ERM country has been maintained following the country's entry to the ERM. PPP against Germany, in particular, implies that Ireland has linked its inflation rate to the low German rate justifying the country's membership in the EMS. Third, the estimation of the Error-Correction Mechanism (ECM) representations shows that adjustment towards the long-run PPP takes place through changes in the Irish price level rather than the foreign price level. These results are, in general, consistent with the small-open economy (SOE) version of PPP where the price level of the small economy adjusts to restore the PPP relation. The ECM evidence also shows that PPP against the UK has been maintained through changes in the (sterling/pound) nominal exchange rate.

In a recent paper, Wright (1993) tests for PPP for the Irish pound/sterling and Irish pound/DM exchange rates using monthly data for the 1981.1 - 1992.6 period. Wright (1993) using Johansen's cointegration approach, i.e., a different technique from that applied by Thom (1989) and Callan and Fitzgerald (1989), finds a similar result: PPP using both Irish/UK and Irish/German data is rejected. However, the author finds that PPP holds if the cointegrating vector is expanded to include the domestic and foreign interest rate. Our paper differs from Wright (1993) for four main reasons: first, we concentrate only on price levels and the nominal exchange rate and use two different testing procedures. Second, following Cheung-Lai (1993) and Pippenger (1993), we provide a different interpretation to the Johansen's test results on the proportionality hypothesis in the cointegrating vector and, hence, are able to accept PPP

[2] These results contrast sharply with those by Thom (1989) who could not provide supportive evidence for the PPP against the US and UK using Engle-Granger cointegration techniques and monthly data for the 1980 - 1987 period.

provided the deviation from the exact PPP relationship may be due to measurement errors in prices. Third, to deal with the low power of unit root tests, we make use of tests for both a unit root null and a stationarity null (using the recently developed KPSS test) when testing for the integration properties of the real exchange rate, the nominal exchange rate, and the price levels. Finally, using the ECM regressions, we determine the relative importance of domestic prices, foreign prices, and the nominal exchange rate in establishing the long-run PPP relationship.

The remaining of the paper is structured as follows: section II describes the ADF and KPSS tests, Johansen's procedure and discusses the methodology. Section III provides the empirical results for the real exchange rate using the combination of KPSS and the ADF tests. Section IV presents the cointegration results using Johansen's approach and the error-correction estimations. Finally, section V summarizes the main conclusions.

II. Testing for PPP: the Empirical Methodology

To test for PPP we employ two testing procedures. First, we use two classical tests, ADF and KPSS. The first tests for the null of a unit root and the second for the null of stationarity in the real exchange rate. Second, we apply Johansen's procedure to test for a long-run relation among the nominal exchange rate and the price levels.

1. PPP and Statistical Tests

Let $R = S + P - P^*$, be the real exchange rate, where S, P, and P^* are the logs of the nominal exchange rate, domestic price level, and foreign price level respectively. Provided that S, P, and P^* have unit roots, the following definitions of PPP can be considered:

(i) PPP exists if R is stationary.

(ii) PPP exists if (S, P, P^*) is cointegrated.

(i) is stronger than (ii) since it implies (ii) plus the restriction that the cointegrating vector is (1, 1, −1). PPP tests of type (i) include Corbae and Ouliaris (1988), Whitt (1992), and tests of type (ii) include Cheung and Lai (1993), Enders (1988), and Wright (1993). In this paper, we employ statistical tests to test for both PPP definitions (i) and (ii). Even if R is not stationary, cointegration among price levels and the nominal exchange rate would be consistent with PPP provided the deviation from the "exact" PPP relation is due to measurement errors in price indices as explained below.

2. *ADF and KPSS*

In this section we combine two classical tests, ADF and KPSS, in order to test for the stationarity of the real exchange rate. According to the ADF test, the following regression is run

$$R_t = \beta_0 + \rho_\tau R_{t-1} + \gamma t + \sum_{i=1}^{p} \beta_i \Delta R_{t-i} + \varepsilon_t \tag{1}$$

and the null hypothesis $\rho_\tau = 1$ is tested using a Student's t statistic denoted τ_τ. We chose $p = 4$ since it is the minimum number of lags necessary for white noise residuals. The normalized bias test, when the errors are serially correlated, is given by the statistic $cT(\rho_\tau - 1)$, where $c = 1/(1 - \beta_1 - \beta_2 - \beta_3 - \beta_4)$. Its critical values are given in Fuller (1976, p. 371).[3] Dickey, Bell, and Miller (1986) in their survey of unit root tests mention that the powers of the two tests, τ_τ and normalized bias, are the same.

The inclusion of a linear time trend in equation (1) above requires some justification. Economic theory suggests that there might be a linear trend in the PPP relation. In other words, the equilibrium value of the real exchange rate may vary over time. The argument (Balassa (1964), Samuelson (1964)) is as follows: an increase in the factor productivity of tradable goods, as a country grows more rapidly than another, causes a movement of capital and labour from the nontradable goods sector to the tradable goods sector. The reduction in the supply of nontradables leads to an increase in their relative price. Assuming that the prices of tradables are not very sensitive to domestic conditions, the domestic-foreign price level ratio and, therefore, the real exchange rate will increase. This is more likely to happen the greater the weight of nontradables in the price index being used. This argument shows that the real exchange rate of high-growth countries should be appreciating.

A finding that the unit root null cannot be rejected should not necessarily imply that the series is nonstationary since as KPSS (1992), among others, have argued, unit root tests cannot discriminate against close alternatives. Therefore, KPSS (1992) and Fisher and Park (1991) have

[3] Fuller (p. 374, (1976)) mentions that the asymptotic distribution of this statistic is the same as that of the unadjusted $T(\rho_\tau - 1)$ statistic.

suggested the use of a test for stationarity where the null hypothesis is that the series is stationary. The KPSS test is described below.

Suppose the series y_t consists of a deterministic trend, a random walk, and a stationary error:

$$y_t = \xi t + r_t + \varepsilon_t \tag{2}$$

where r_t is a random walk, i.e.,

$$r_t = r_{t-1} + u_t \tag{3}$$

where u_t is *iid* $(0, \sigma_u^2)$. The initial value of r_t, r_0, is assumed fixed and, therefore, represents the constant of the equation. The null hypothesis of stationarity is that $\sigma_u^2 = 0$. Then, y is regressed on a constant and a time trend and the residuals are denoted by e_t. The partial sum process of the residuals is

$$S_t = \sum_{i=1}^{t} e_i,\ t = 1, 2, \ldots, T \tag{4}$$

To derive the asymptotic distribution of the test statistic, assuming that the errors ε_t are serially correlated, KPSS (1992) define first the "long-run variance":

$$\sigma^2 = \lim_{T \to \infty} T^{-1}\, E(S_T^2) \tag{5}$$

Then, assuming that $\xi \neq 0$, i.e., that the null hypothesis is trend stationarity, KPSS derive the asymptotic test statistic $\hat{\eta}_\tau$:

$$\hat{\eta}_\tau = T^{-2} \sum_{t=1}^{T} S_t^2 / s^2(l) \tag{6}$$

where $s^2(l)$ is an estimator of the "long-run variance" (given by equation (10) in KPSS (1992)), and l, the lag truncation parameter, is the number of lags used to calculate the variance $s^2(l)$. Asymptotic critical values for $\hat{\eta}_\tau$ are provided in Table 1 in KPSS (1992).

3. *Johansen's Cointegration Analysis*

An alternative way to test for the PPP theory is to determine whether there is a long-run relationship among the nominal exchange rate and the price levels in the two countries. In other words, if the three series are integrated of order 1, a cointegration test can be run to examine the possibility of a long-run equilibrium relation among these series. Engle and Granger (1987) were the first to introduce a procedure for a cointegration test. However, their approach does not allow for the determination of the number of cointegrating vectors (CIV) and for the testing of certain hypotheses on the cointegration parameters. Johansen and Juselius (1990) have provided maximum likelihood tests for the number of CIV in two cases: first, a model that allows for deterministic trends in the integrated variables, and second, a model that does not allow for deterministic trends. We choose the first type of models.

Johansen's cointegration approach applies the reduced rank regression. Assume a n-dimensional vector $X_t = (x_{1t}, \ldots, x_{nt})'$. Regress ΔX_t and X_{t-k-1} on a constant and the lagged differences of ΔX_t (up to k lags) and derive the residuals u_{1t} and u_{2t} respectively. Denote the product moment matrices of the residuals as

$$S_{ij} = T^{-1} \sum_{t=1}^{T} u_{it} u'_{jt},$$

where $i, j = 1, 2$, and T is the sample size. Then, the equation

$$|\lambda S_{22} - S_{21} S_{11}^{-1} S_{12}| = 0 \tag{7}$$

is solved for the eigenvalues λ. Johansen and Juselius (1990) specify two likelihood ratio (LR) test statistics to test for the number of cointegrating vectors. First, the likelihood ratio test statistic for the hypothesis of at most r cointegrating vectors against a general alternative, also called trace statistic, is:

$$-2\ln Q_r = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i)$$

where $\hat{\lambda}_i$ are the n-r smallest estimated eigenvalues derived from equation (7). The second LR statistic for the null of exactly r cointegrating vectors against the alternative of $r + 1$ vectors is the maximum eigenvalue statistic:

$$-2\ln Q_{r,r+1} = -T\ln(1 - \hat{\lambda}_{r+1})$$

Critical values for the above test statistics are tabulated in Johansen and Juselius (1990, p. 208 - 209). The second test is more powerful since the alternative hypothesis is an equality.

Once one finds that two or more variables are cointegrated, restrictions on the estimated cointegrating vector parameters can be tested using a likelihood ratio test also suggested by Johansen and Juselius (1990). The test statistic for the hypothesis of $n - s$ restrictions on all CIV is:

$$-2 \ln Q_{n-s} = T \sum_{i=1}^{r} \ln\{(1 - \tilde{\lambda}_i) / (1 - \hat{\lambda}_i)\}$$

where s is the number of independent cointegrating parameters, r is the number of CIV established through the use of the trace and maximum eigenvalue statistics, and $\tilde{\lambda}_i$ and $\hat{\lambda}_i$ are the estimated eigenvalues from the restricted and unrestricted models respectively. Under the null, this statistic follows a χ^2 distribution with $r(n - s)$ degrees of freedom.

III. Unit Root Tests for the Irish Real Exchange Rate

1. Data

We use monthly data for the 1981.1 - 1992.4 period. Due to unavailability of monthly series of CPI for Ireland, we use the PPI (or WPI) series of the three countries in all regressions. The exchange rates are end-of-period rates in the Dublin market obtained from the Quarterly Bulletin of the Central Bank of Ireland. Price indexes come from the OECD Main Economic Indicators.

2. ADF and KPSS Unit Root Tests of the Real Exchange Rate

In order to test for a unit root in the real exchange rate according to the ADF test, the regression given by equation (1) is run for $p = 4$ and the Student's t value on the estimate of ρ is determined. The values of this statistic, τ_τ, are given in Table 1. Alternatively, one may use the normalized bias statistic $cT(\rho_\tau - 1)$. According to table 1, based on the τ_τ and normalized bias statistics, the unit root null on the real exchange rate can be rejected at 5% significance level only for the UK.

The values of the KPSS statistic, η_τ, in a model for the real exchange rate with a constant and a deterministic trend included are given in Table 1. We report results for three different values of l, the lag truncation parameter that is used to estimate the long-run variance and, hence, derive the asymptotic critical values. KPSS (1992) argue that the best choice is $l = 8$, since this achieves an optimal trade off between large size

Table 1

Unit root tests on the real exchange rate

Monthly data 1981.1 - 1992.4

Country			KPSS		
	τ_τ	$cT\ (\rho_\tau - 1)$	$(l = 4)$	$(l = 8)$	$(l = 12)$
UK	– 3.57*	– 22.95*	0.380*	0.259*	0.215*
Germany	– 2.44	– 14.74	0.133	0.085	0.069

Notes: τ_τ refers to tests of H_0: $\rho_\tau = 1$ in the regression $R_t = \beta_0 + \rho_\tau R_{t-1} + \gamma t + \sum_{i=1}^{4} \beta_i \Delta R_{t-i} + \varepsilon_t$. The critical value at 5% is – 3.45. (Table 8.5.2 in Fuller, 1976). $cT(\rho_\tau - 1)$ is the normalized bias test for the same null hypothesis. c equals $1/(1-\beta_1-\beta_2-\beta_3-\beta_4)$. The 5% critical value is approximately – 20.9. KPSS (1992) assumes that the null is stationarity in the real exchange rate. The critical value for KPSS at the 5% level is 0.146. l = 4, 8, or 12 specifies the number of lags in the long-run variance. * indicates rejection of null at 5%.

distortions and low power. Based on the results of Table 1, the null of stationarity cannot be rejected for Germany at the 5% significance level.

The results of Table 1 imply that, based on the combination of ADF-KPSS we cannot conclude on the existence of a unit root in the real exchange rate for the UK and Germany. This provides the motivation for the use of Johansen's cointegration tests as an alternative approach to test for PPP which does not impose any a priori restrictions on the cointegrating vector.

IV. Johansen's Cointegration Tests

First, the individual series, i.e., the nominal exchange rate and the domestic and foreign price levels, are subjected to the ADF and KPSS tests in order to determine their integration properties. The results are given in Tables 2 and 3. Table 2 lists the results for the price level. Based on the combination of KPSS and normalized bias statistic (or τ_τ), we conclude that the price levels have a unit root in all countries since we reject the stationarity null hypothesis and cannot reject the unit root null.

Table 3 includes the results for the nominal exchange rates. According to both τ_τ and normalized bias we conclude that all nominal exchange rates have a unit root.[4] KPSS implies that the null of stationarity is

[4] The only exception being the UK under the normalized bias statistic.

Table 2

Unit root tests on price levels:

Monthly data 1981.1 - 1992.4

Country				KPSS	
	τ_τ	$cT\ (\rho_\tau - 1)$	$(l = 4)$	$(l = 8)$	$(l = 12)$
UK	– 2.86	– 8.49	0.444*	0.263*	0.193*
Germany	– 2.04	– 8.73	0.286*	0.171*	0.128
Ireland	– 2.45	– 5.73	0.467*	0.28*	0.211*

Notes: τ_τ refers to tests of H_0: $\rho_\tau = 1$ in the regression $P_t = \beta_0 + \rho_\tau P_{t-1} + \gamma t + \sum_{i=1}^{4} \beta_i \Delta P_{t-i} + \varepsilon_t$, where P is the price level. The critical value at 5% is – 3.45. $cT(\rho_\tau - 1)$ is the normalized bias test for the same null hypothesis. c equals $1/(1 - \beta_1 - \beta_2 - \beta_3 - \beta_4)$. The 5% critical value is approximately – 20.9. KPSS (1992) assumes that the null is stationarity in the price level. The critical value for KPSS at the 5% level is 0.146. l = 4, 8, or 12 specifies the number of lags in the long-run variance. * indicates rejection of null at 5%.

Table 3

Unit root tests on nominal exchange rates:

Monthly data 1981.1 - 1992.4

Country				KPSS	
	τ_τ	$cT\ (\rho_\tau - 1)$	$(l = 4)$	$(l = 8)$	$(l = 12)$
UK	– 3.35	– 30.12*	0.091	0.064	0.056
Germany	– 1.25	– 3.84	0.500*	0.299*	0.225*

Notes: τ_τ refers to tests of H_0: $\rho_\tau = 1$ in the regression $S_t = \beta_0 + \rho_\tau S_{t-1} + \gamma t + \sum_{i=1}^{4} \beta_i \Delta S_{t-i} + \varepsilon_t$, where S is the nominal exchange rate. The critical value at 5% is – 3.45. $cT(\rho_\tau - 1)$ is the normalized bias test for the same null hypothesis. c equals $1/(1 - \beta_1 - \beta_2 - \beta_3 - \beta_4)$. The 5% critical value is approximately – 20.9. KPSS (1992) assumes that the null is stationarity in the nominal exchange rate. The critical value for KPSS at the 5% level is 0.146. l = 4, 8, or 12 specifies the number of lags in the long-run variance. A * indicates rejection of null at 5%.

rejected for Germany but not UK. Therefore, combining the results of the ADF tests and KPSS we conclude that the German nominal exchange rate has a unit root, whereas for the UK rate the results are inconclusive. We assume that the UK exchange rate has also a unit root and apply the Johansen approach to both countries.

Table 4 provides the results from Johansen's three likelihood ratio tests. In the reduced rank regression k was set equal to 5 for Germany and 8 for UK, the largest lag lengths that lead to robust results. The first panel of Table 4 provides the results from the trace and maximum eigenvalue tests. According to both tests, there is one cointegrating vector for each country. In the second panel of table 4, we provide estimates of the cointegrating vectors. Since PPP, with no measurement errors in prices, would imply that certain restrictions apply to the model parameters, we decided to test for the validity of these restrictions in the cointegrating vector. PPP is consistent with the fact that u_t, the error term in the following regression

Table 4

Johansen's tests

(a) Cointegration tests

		Maximum eigenvalue tests	
H_0	UK	Germany	5% level
$r = 0$	28.425	23.257	20.97
$r = 1$	9.738	10.751	14.07
$r = 2$	0.24E-5	0.058	3.76
		Trace tests	
H_0	UK	Germany	5% level
$r = 0$	38.162	34.066	29.68
$r = 1$	9.738	10.809	15.41
$r = 2$	0.24E-5	0.058	3.76

(b) Cointegrating vectors and tests of parameter restrictions

	a	$-b$	H_s	H_p
UK	1.019	– 0.670	8.893*	22.134*
Germany	3.627	– 0.876	4.515*	10.272*

Note: For the hypothesis of summetry, H_s, the degrees of freedom are $r(n-2)$ where n is the number of variables in the cointegrating regression. For the hypothesis of proportionality, Hp, the degrees of freedom are $r(n-1)$. * implies significance at 5%.

$$S_t = aP_t + b\,P_t^* + u_t$$

is stationary. In addition, without measurement errors in the price levels, the restrictions $a = -1$ and $b = 1$ would imply that the domestic and foreign price levels have proportional effects on the nominal exchange rate. The restriction $a = -b$ would imply that the two price levels have symmetric effects on the exchange rate. Testing for these restrictions can be performed using a likelihood ratio test as described in section II. In the second panel of Table 4 we provide the values of the statistics that test for the proportionality and symmetry hypotheses for the two countries. Both the symmetry and proportionality hypotheses are rejected for both countries. The results of Table 4 imply that PPP holds in both countries in our sample provided we allow for measurement errors in the price indices. In other words, the deviation from the "exact PPP" (i.e., the one based on the theoretical price indices) may be due to measurement errors in price levels (see Cheung-Lai, 1993). These measurement errors arise, for example, due to the fact that price indices do not have identical weights across countries or one country's non traded goods are included in its price index. Therefore, as Cheung and Lai (1993) and Pippenger (1993) point out, a priori symmetry and proportionality restrictions imposed on the cointegrating vectors can lead to a false rejection of the cointegrating hypothesis. By testing for cointegration *without* imposing any a priori restrictions on the cointegrating vector we have avoided this problem.

Combining the results derived from the unit root/stationarity and cointegration tests, we observe the following: even though the proportionality restriction is rejected for the UK and Germany, the unit root/stationarity tests lead to ambiguity concerning the integration properties of the real exchange rate. This inconsistency may be accounted for by the low power of the unit root and stationarity tests.

Tables 5 and 6 list the results from the estimation of the error-correction regressions for each country. The number of lags included in each EC regression is the same as the number of lags included in the VAR when testing for cointegration. We report the error-correction terms, their t-statistics, and some diagnostics. The cointegrating vectors have been normalized so that a negative adjustment coefficient is consistent with the reestablishment of the long-run equilibrium. According to the EC regressions for the UK, the exchange rate and the Irish price level represent the economic forces adjusting to reestablish the long-run PPP. These findings are consistent with the small open-economy version of the

Table 5

Error-correction regressions: UK

	Dependent variable		
	Δ log Exchange	Δ log PUK	Δ log PIRE
u (– 1)	– 0.32 (3.78*)	0.01 (1.78)	– 0.06 (3.60*)
$\bar{R}^2$	0.09	0.24	0.33
BG (20)	16.77	21.30	11.53
ARCH (1)	4.00*	0.11	0.06
SE of regression	0.021	0.002	0.004

Note: A * indicates significance at the 5% level. u represents the error-correction term from the cointegrating regressions reported in Table 4. BG is the Breusch-Godfrey statistic of residual serial correlation where the alternative hypothesis is that the errors are AR(20) or MA(20). ARCH is the Lagrange multiplier test of autoregressive conditional heteroskedasticity. BG and ARCH are distributed as χ^2 with degrees of freedom given in parentheses.

Table 6

Error-correction regressions: Germany

	Dependent variable		
	Δ log Exchange	Δ log PGER	Δ log PIRE
u(–1)	0.02 (2.76*)	– 0.003 (1.56)	– 0.03 (2.90*)
$\bar{R}^2$	0.10	0.27	0.39
BG (20)	8.76	14.28	16.15
ARCH (1)	0.01	0.04	0.21
SE of regression	0.009	0.003	0.004

Note: See previous table.

PPP. The results for Germany show that the exchange rate does not adjust in the direction necessary for restoring the PPP relation. The wrong sign for the adjustment coefficient in the exchange rate equation for Germany might be due to the workings of the EMS where Ireland pegs its currency to the DM and competitive depreciations are not allowed except when there is a realignment.

V. Conclusions

This paper tests for the absolute form of PPP for Ireland against two industrial countries. The combination of two classical tests, ADF and KPSS, where the latter reverses the null hypothesis, provides ambiguous results concerning the validity of PPP. However, the use of Johansen's cointegration approach that does not impose a priori restrictions on the cointegrating vector, implies a PPP relationship for both countries. The testable propositions implied by the PPP theory allow us to test for the proportionality and symmetry restrictions imposed on the cointegrating vector. The rejection of these restrictions can be attributed to measurement errors in price indices as explained above.

The major implication of this study is that deviations from absolute PPP are not permanent even though they tend to persist for a long time. This result is of utmost importance for policymakers since it implies the maintenance of competitiveness between Ireland, and Germany and the UK during the post-1981 period. Our results are also consistent with the small-open economy version of the PPP theory since changes in the Irish price level represent the major factor accounting for the short-run adjustment towards the long-run PPP relationship.

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Summary

Purchasing Power Parity and the Irish Experience: Unit Roots and Cointegration Tests for Two Industrial Countries

This paper uses unit root/stationarity and cointegration tests to test for Purchasing Power Parity between Ireland and two industrial countries. Using monthly data for the post-1981 period, we show that the PPP relationship holds provided the rejection of the symmetry and proportionality hypotheses can be attributed to measurement errors in price indexes. In particular, PPP against Germany and the associated link of Irish inflation to the German inflation rate, implies that Ireland's EMS membership has been justified. It is also shown that, in agreement with the small, open economy theory of PPP, the adjustment towards the PPP relationship takes place primarily through changes in the domestic price level.

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Zusammenfassung

Kaufkraftparität und die irische Erfahrung: Einheitswurzel- und Kointegrationstests bei zwei Industrieländern

In diesem Beitrag werden Einheitswurzel-/stationäre Prozeß- und Kointegrationstests für die Prüfung der Kaufkraftparität Irlands im Vergleich mit zwei Industrieländern verwendet. Auf der Grundlage von monatlich erhobenen Daten für den Zeitraum seit 1981 zeigen wir, daß die Kaufkraftparitätsbeziehungen Bestand haben, sofern die Ablehnung der Hypothesen von Symmetrie und Verhältnismäßigkeit auf Meßfehler bei den Preisindizes zurückgeführt werden kann. Insbesondere implizieren die Kaufkraftparität im Vergleich mit Deutschland und die dadurch bewirkte Bindung der irischen Inflations- an die deutsche Inflationsrate, daß die Mitgliedschaft Irlands beim EWS gerechtfertigt ist. Es wird bewiesen, daß in Übereinstimmung mit der Kaufkraftparitätstheorie einer kleinen offenen Volkswirtschaft die Anpassung an die Kaufkraftparitätsbeziehungen in erster Linie durch Veränderungen im Inlandspreisniveau erfolgt.

Résumé

La parité du pouvoir d'achat et l'expérience irlandaise: unit roots et tests de cointégration pour deux pays industrialisés

Ce travail utilise l'unit root et des tests de cointégration pour examiner la parité du pouvoir d'achat entre l'Irlande et deux pays industrialisés. Sur base de données mensuelles de la période postérieure à 1981, il est montré que, en supposant le rejet des hypothèses de symétrie et de proportionalité, les rapports de la parité du pouvoir d'achat peuvent être attribués à des erreurs de mesure dans les indices de prix. En particulier, la parité du pouvoir d'achat face à l'Allemagne et le lien entre les taux d'inflation irlandais et allemand implique que l'adhésion de l'Irlande au SME est justifiée. Il est aussi montré que, suivant la théorie de la parité du pouvoir d'achat en petite économie ouverte, ce sont principalement les changements dans le niveau des prix nationaux qui permettent à la parité du pouvoir d'achat de se réajuster.