Forman Journal of Economic Studies
Vol. 4, 2008 (January-December) pp. 59-71

Purchasing Power Parity and Black Market Exchange Rate Nexus

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Abstract

The main purpose of this study is to test the purchasing power parity for selected Asian countries using black market exchange rates. Though in previous studies the primary attention was given to the official exchange rate rather than the black market exchange rate, its importance cannot be ignored due to volume of transactions carried out in black market, which remained much larger than that in the official market. Therefore, an effort has been made to highlight the importance of black market exchange rates in testing the purchasing power parity (PPP) hypothesis. We used monthly data from ten selected Asian countries and the bound-testing approach to test the long run relationship between the black market exchange rate and relative prices. The study concluded that PPP hypothesis gets more support when the black market exchange rate and production price index are used instead of consumer price index. It appears that the official exchange rate is still managed, which is different than the actual market clearing exchange rate. In other words, the black market exchange rate is closer to market rates as compared to managed exchange rates.

I. Introduction

The purchasing power parity (PPP) theory has a long history in economic literature, but this specific terminology was introduced after the First World War. Initially, this concept was propounded by the scholars of the University of Salamanca in the sixteenth century[2] and was revived in the context of debate concerning the appropriate level for nominal exchange rates among the major industrialized countries after the large-scale inflations during and after the world war (Cassel, 1916; 1918). The PPP theory claims that a unit value of currency has the same purchasing power in trading nations. It involves a relationship between the nominal exchange rate and the ratio of two prices; domestic to foreign country. In its absolute version,

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[2] *For detail se: Taylor, M. A. and Taylor P. M. (2004).*

the equilibrium exchange rate should be equal to the price ratio of domestic to foreign country, whereas in its relative version it states that changes in the nominal exchange rate over a period of time are equal to the inflation differential between the domestic and foreign country.

The PPP theory is based on the law of one price (LOP), according to which identical goods have the same prices in different markets when transportation cost and other trade barriers are ignored. This implies that the PPP theory plays an important role in the determination of exchange rate between two nation's currencies[3], and equilibrium exchange rate implies that each country's currency has same purchasing power in each of the two countries. This means that exchange rate between two countries is just equal to the ratio of their prices for a similar basket of goods and services. This implies that relative prices move proportionally to the changes in the nominal exchange rate in the long run. Therefore, exchange rate reverts to its long run equilibrium position[4] (Bhatti, 1996; Lothain & Taylor, 1996). If it does not revert, then either arbitrager are not going to respond to profitable opportunities or transaction costs and other trade barrier hamper the trade (Davutyan & Pippinger, 1985). This entails that exchange rate has a unit root and PPP does not hold. Therefore, it is important to test the empirical validity of PPP for any country.

Formal tests for the evidence of PPP are based on an empirical examination of the exchange rate. If the exchange rate is to settle down at any level then it shows reversion towards its own mean. Therefore, mean reversion is the necessary condition for PPP to hold in the long-run and for Absolute PPP it means the real exchange rate. Roll (1979) tested the null hypothesis that the real exchange rate does not mean reverting. He concluded that it is a non-mean reverting time series process and changes in each period are purely random and independent.

However, this early strand of the empirical literature suffered from logical and econometric weaknesses. These studies used standard econometrics techniques like Two Stage Least Squares (TSLS) to test the different versions of PPP and provided mixed results (Frenkel 1978, 1981; Davutyan & Pippenger 1985). These studies used the conventional tests that overlook the problem of non-stationary data series which makes the standard critical values inappropriate (Corbae & Ouliaris 1988). Therefore, recent developments in time series econometrics; unit root tests,

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[3]*Dornbush (1976), Nelson (1990), Wu (1996), and Parikh and Williams (1998); all are based on the PPP assumption.*

[4]*There are conceptual and empirical issues about what will be the value of the long-run equilibrium exchange rate. In the literature we have three criteria. First is a Price-based criterion, such as purchasing power parity (PPP) and its variants. Second are model-based criteria which based on the formal models of nominal exchange rates. Third are sustainability-based criteria, which make reference to trends in the current account and the external debts to GDP ratio. Out of all these, a price-based criterion is easy to implement and has strong operational advantages, so we used this one in this study. For detail, see Qayyum A. et al. (2004).*

cointegration analysis and their extensions have provided more appropriate tools for testing the PPP hypothesis. These techniques put emphasis on the analysis of residuals of the model instead of the level of the variables in the model.

Taylor (1988) examined the PPP theory for five major industrial countries' currencies against the U.S. dollar using bilateral exchange rates and the cointegration procedure. He concluded that PPP does not hold in all five cases. These findings are supported by Corbae and Ouiliaris (1988), Layton and Stark (1990), Nachane and Chrissanthaki (1991), Crowder (1992) and Moosa and Bhatti (1996). However, Kim (1990) used cointegration technique for the annual data series of exchange rates between the U.S. dollar and currencies of five industrial countries. This study provided some support for the PPP hypothesis that was further supported by Lothain and Taylor (1996), Wu (1996), Bahmani-Oskooee and Barry (1997), Bahmani-Oskooee (1998), Sarno (2000), Taylor, et al. (2001), Liew et al. (2004) and Sarno et al. (2004).

As concerns the less developed countries (LDCs), McNown and Wallace (1989) tested the PPP hypothesis by using the bilateral exchange rates of four high inflation LDCs; Chile, Argentina, Brazil, and Israel. The PPP hypothesis received some support when it was based on Wholesale Price Indices (WPI) but cointegration technique failed to support the PPP hypothesis in case of Consumer Price Indices (CPI). Moreover, it also failed to get support in the light of Karfakis and Moschos (1989). For Pakistan, Bhatti (1996), Liew et al. (2004), and Ahmed and Khan (2002) tested the PPP postulate and their results support the evidence of the PPP hypothesis, whereas Chishti and Hasan (1993) have the opposite view that PPP does not hold in case of Pakistan. Saeed and Eatzaz (2006) also tested the PPP hypothesis for South Asian Countries by using monthly data on CPI, Wholesale Price Index (WPI) and nominal exchange rates for the period 1984-2002. The findings of this study indicate that PPP holds in the weaker form for Pakistan, evidence for India and Sri Lanka is weak and there is strong indication of the lack of PPP for Bangladesh.

A common characteristic of all the above mentioned studies is that each has used official exchange rates in testing the PPP theory, whereas almost all developing countries have a black market for foreign exchange. The black market exchange rates have a long tradition and in many countries these are supported by governments. Moreover, the volume of transactions in black markets has remained much larger than that in the official market.[5] Therefore, a number of studies were carried out, which used the black market exchange rate to test PPP instead of the official exchange rate. These include Phillip (1988), Bahmani-Oskooee (1993), El-Sakka and McNabb (1994), Baghestani (1997), Sanchez-Fung (1999), Luintel (2000), Kouretas and Zarangas (2001), and Bahmani-Oskooee and Goswami (2005). All these concluded that PPP receives relatively more support when black market exchange rates are used in testing the PPP theory as compared to official exchange rates.

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[5] *For detail ses: Cerrato, M., and N, Sarantis (2003).*

Therefore, in this study we once again put the case of the PPP hypothesis for Asian countries using black market exchange rates and the recently developed econometrics technique; Auto Regressive Distributed Lags model (Bound Testing Approach). The rest of the study is designed as follows: section II provides theoretical background and model specification, section III contains empirical findings and conclusion of the study is provided in section IV.

II. Theoretical Background and Model Specification

The purchasing power parity theory is considered an equilibrium condition for the determination of exchange rates and policies concerning them. The PPP theory is based on the law of one price which states that, in the absence of transportation costs and trade barriers, effective arbitrage in the goods market makes prices identical for the traded good across countries. This implies that

$$P_i = E.P_i^* \qquad (1)$$

Where P_i is the price of good *i* shown in the domestic country's currency, P^*_i is the price of good *i* expressed in the foreign country's currency unit and *E* is the nominal exchange rate. On aggregate level, the law of one price yields the purchasing power parity formulation as below.[6]

$$P_t = E.P_t^* \qquad (2)$$

Equation (2) can be written as:

$$E = P_t / P_t^* \qquad (3)$$

This absolute version of purchasing power parity states that nominal exchange rate is equal to the ratio between the domestic price level and foreign price level. The log-linear form of the testable version of absolute PPP[7] is:

$$Log\, E_{i,t} = \alpha_0 + \alpha_1\, Log\,(P_i / P^*)_t + \varepsilon_{\,i,t} \qquad (4)$$

Where $E_{i,t}$ shows the units of country *i*'s currency per foreign country currency in time period *t*, P_i is the price level of country *i*, P^* is the price level of the foreign country and $\varepsilon_{\,i,t}$ is the error term. The constant term (α_0) is included in equation (4) due to non-inclusion of transportation costs, tariff and non-tariff barriers in the model.[8] Normally, we test the restrictions [α_0 = 0 and α_1 = 1] to check the long run relationship between variables and to hold PPP this must not be rejected. Moreover,

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[6] *This formulation is the absolute version of PPP.*
[7] *The relative version of PPP refers to the relationship between relative changes in nominal exchange rate and differential of relative changes in price levels.*
[8] *For detail see: Krichene (1998).*

for equilibrium relationship between the exchange rate and relative prices, both must be cointegrated. According to Engle and Granger (1987), there are two ways to establish cointegration between variables: (i) variables in the equation are non-stationary but their residuals are stationary and (ii) we incorporate an adjustment mechanism in the equation by which the gap between two sides declines as variables adjust to their long run equilibrium values.[9] This second approach makes equation (4) in the form of Error Correction Model as below:

$$\Delta Log\, E_{i,t} = \beta_0 + \sum_{k=1}^{n1} \beta_1 k\, \Delta Log\, E_{i,t-k} + \sum_{k=0}^{n2} \beta_2 k\, \Delta Log\, (P_i / P^*)_{t-k} + \lambda \varepsilon_{i,t-1} + \upsilon_{i,t} \quad (5)$$

This equation shows that deviation between the exchange rate and relative prices is measured by the lagged value of ε and it should decline for the adjustment towards long run equilibrium values of these variables. This implies that an estimate of λ should be negative and significant, whereas its magnitude indicates the speed of adjustment. For the cointegration test all data series should have the same cointegrating order and if they do not, then the Engle and Granger (1987) method cannot be applied. This implies that both variables must have the same integrating order one. But if one variable is integrated of order one I(1) and the other is of zero I(0), then we use another technique, Bounds Testing Approach, in which we replace the lagged value of ε, (ε_{t-1}) with the lagged linear combination of variables.[10] For this we first calculate the ε_t from equation (4) and take its lag by one period, as shown below:

$$\varepsilon_{i,t-1} = Log\, E_{i,t-1} - \alpha_1\, Log\, (P_i / P^*)_{t-1} \quad (6)$$

By substituting equation (6) in equation (5), we get the following equation:

$$\Delta Log\, E_{i,t} = \beta_0 + \sum_{k=1}^{n1} \beta_1 k\, \Delta Log\, E_{i,t-k} + \sum_{k=0}^{n2} \beta_2 k\, \Delta Log\, (P_i / P^*)_{t-k} + \lambda_1\, Log\, E_{i,t-1} + \lambda_2\, Log\, (P_i / P^*)_{t-1} + \upsilon_{i,t} \quad (7)$$

The formulation of error correction model (7) is preferred to the previous one (5) due to: (i) variables used in equation (7) can be integrated of order one or zero; (ii) long run equilibrium relation among variables can be established by testing for joint significance of λ_1 and λ_2 by using F test with new critical values given by Pesaran et al. (2001); (iii) by assumption, if all variables are integrated of order one I(1) and I(0), they provide an upper bound and lower bound critical values for these

[9] *For detail see: Bahmani-Oskooee, M., and Tankui, A. (2008).*
[10] *For detail see: Pesaran et al. (2001).*

bounds respectively; (iv) for the long run equilibrium relationship, the calculated F statistic should be greater than the upper bound critical value.

Moreover, equation (7) can be used to estimate short run as well as long run effects. The estimated coefficient of $\beta_2 k$ indicates the short run effects between the exchange rate and relative prices, whereas for the long run we see the estimated value of λ_2 that is normalized on estimate of λ_1. To check whether PPP holds or not, we set the estimated values of this lagged linear combination equal to zero and solve for $Log\ E_{i,t-1}$ in the following:

$$\hat{\lambda}_1 \, Log\, E_{i,t-1} + \hat{\lambda}_2 \, Log\,(P_i / P^*)_{t-1} = 0 \qquad (8)$$

and

$$Log\, E_{i,t-1} = -\frac{\hat{\lambda}_2}{\hat{\lambda}_1} Log\,(P_i / P^*)_{t-1} \qquad (9)$$

Equation (9) states that the value of $\hat{\lambda}_2 / \hat{\lambda}_1$ must be unity for holding the PPP.

III. Empirical Findings

We estimated equation (7) using black market exchange rates with Consumer Price Index (CPI) and Production Price Index (PPI) as prices. The monthly data series for CPI and PPI for 10 Asian countries are collected from the International Financial Statistics (IFS) publication of IMF, and the black market exchange rate data series are from Reinhart and Rogoff (2004).[11] The study period for each country is different depending on the availability of the data.[12] The results of the F test for cointegration depends on the number of lags imposed on each first-differenced data series. We used Akaike's Information Criterion and Schwarz Criterion for the selection of optimal lag length. After the selection of optimum lag length, we estimated the equation (7), calculated $\hat{\lambda}_2 / \hat{\lambda}_1$, and the required results are presented in table 1.[13]

The estimated F statistic is used to determine the co-integration among variables. The estimated results indicate that the calculated F statistic is greater than its upper bound critical value of 4.14 for the countries, Indonesia, Pakistan and Malaysia (PPI as prices) and Thailand and Singapore (CPI as prices). Furthermore,

[11] *www.puaf.umd.edu/faculty/papers/reinhart/reinhart.htm*

[12] *The data series for: Japan CPI 1957-98 and PPI 1968-98; Indonesia CPI 1968-98 and PPI 1971-98; Sri Lanka CPI 1957-98 and PPI 1976-98; Pakistan CPI 1957-98 and PPI 1961-98; Korea CPI 1970-98 and PPI 1957-98; Malaysia CPI 1990-98 and PPI 1968-98; India CPI 1957-98 and PPI 1968-98; Thailand CPI 1965-98 and PPI 1957-98; Singapore CPI 1973-98 and PPI 1974-98; and Philippines CPI 1957-98.*

[13] *For detailed results see: tables A-1 and A-2, in Appendix.*

Table: 1. Estimated Results for the Long Run Coefficients (Effects)

Country	Price	Constant	Log (E)	Log (P/P*)	$-\lambda_2 / \lambda_1$	F- Stat.
Japan	CPI	-0.0002 (-0.0182)	0.0001 (0.0604)	-0.0096 (-1.1851)	- 54.912	0.9712
	PPI	0.0608 (1.2211)	-0.0146 (-1.3206)	0.0320 (1.4103)	- 2.1838	0.6577
Indonesia	CPI	-0.0096 (-0.1018)	0.0038 (0.3548)	0.0061 (0.3638)	1.5952	1.18106
	PPI	0.3323 (1.8407)***	-0.0341 (-1.7208)***	0.0542 (2.0937)**	- 1.5870	19.7623
Sri Lanka	CPI	0.0088 (0.5160)	-0.0011 (-0.2788)	-0.00004 (-0.0076)	0.0416	1.2264
	PPI	0.2888 (1.0904)	-0.0393 (-0.9973)	0.1074 (0.9626)	- 2.7299	0.4323
Pakistan	CPI	0.11761 (2.3593)*	-0.0281 (-2.1746)**	0.0460 (2.4598)*	- 1.6364	2.6283
	PPI	0.5477 (5.7099)*	-0.1549 (-5.6020)*	0.1337 (5.7485)*	- 0.8633	7.0314
Korea	CPI	0.4925 (3.5121)*	-0.0715 (-3.4905)*	0.0597 (3.2947)*	- 0.8349	2.9854
	PPI	0.2309 (3.3955)*	-0.0335 (-3.4003)*	0.0383 (3.1236)*	- 1.1424	2.9854
Malaysia	CPI	-0.0214 (-0.6512)	0.0373 (1.2273)	0.2491 (1.6736)***	6.6722	3.0063
	PPI	-0.0103 (-0.2684)	0.0260 (0.7675)	0.1041 (1.5999)***	3.9995	6.2217
India	CPI	0.0906 (2.0750)**	-0.0217 (-1.9267)**	0.0377 (2.0246)**	- 1.7398	1.0853
	PPI	0.1139 (2.2537)**	-0.0292 (-2.1592)**	0.0392 (2.1992)**	- 1.3434	1.1660
Thailand	CPI	0.1254 (2.0909)**	-0.0377 (-2.0129)**	0.0403 (1.3893)	- 1.0707	6.6317
	PPI	0.1139 (2.2537)**	-0.0292 (-2.1592)**	0.0392 (2.1992)**	- 1.3431	1.16604
Singapore	CPI	0.0941 (2.6835)*	-0.1424 (-2.6972)*	0.0523 (2.0791)**	- 0.3677	5.3896
	PPI	0.0456 (1.7707)***	-0.063519 (-1.6460)***	0.0085 (0.3463)	- 0.1336	1.9482
Philippines	CPI	0.0193 (0.3247)	-0.0025 (-0.1539)	0.0047 (0.2647)	- 1.8553	1.5395

The critical value for the upper bound of F test at 10% level of significance is 4.14. This is taken from the Pesaran et al. (2001, Table CI: Case III, page 300).

the value of ($\lambda 2$ / $\lambda 1$) is closer to unity that confirms the PPP hypothesis except for Malaysia and Singapore. This test also provides support in favor of PPP for Korea, India and Thailand (with PPI). These results imply that a PPP hypothesis gets more support when PPI is used instead of CPI. These results also support the earlier findings of McNown and Wallace (1989), Bhatti (1996), Liew et al. (2004), Tang and Butiong (1994), Ahmed and Khan (2002), and Saeed and Eatzaz (2006). The performance of the PPP postulate is further improved due to use of black market exchange rates in the estimation process. This performance also supports the previous views presented by Bahmani-Oskooee (1993), El-Sakka and McNabb (1994), Baghestani (1997), Sanchez-Fung (1999), Luintel (2000), Kouretas and Zarangas (2001) and Bahmani-Oskooee and Goswami (2005).

IV. Conclusions

This study is carried out to test the Purchasing Power Parity for selected Asian countries. We have used the black market exchange rate with Consumer Price Index (CPI) and Production Price Index (PPI) to investigate the long run relationship between the exchange rate and relative prices using monthly data series. For estimation, we used the bounds testing approach. The estimated results indicate that calculated F statistic is greater than its upper bound critical value of 4.14 for three countries; Indonesia, Pakistan and Malaysia when PPI is used as prices and it becomes true only for two countries, Thailand and Singapore with CPI as prices. Furthermore, the PPP hypothesis is also supported by the value of the ratio between long run coefficients of price ratio to exchange rate **($- \lambda_2 / \lambda_1$)** that is close to unity for India (PPI), Korea (PPI) and Thailand (PPI, CPI). This confirms that a PPP hypothesis gets more support when PPI is used for prices instead of CPI.

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Appendix

Table: A.1. Estimated Coefficients (Effects) for Short and Long Run

Parameters	Japan CPI (57 to 98)	Japan PPI (68-98)	Indonesia CPI (68 to 98)	Indonesia PPI (71-98)	Sri Lanka CPI (57-98)	Sri Lanka PPI (76-98)	Pakistan CPI (57-98)	Pakistan PPI (61:6-98)	Korea CPI (70-98)	Korea PPI (57-98)
Constant	-0.0002 (-0.0182)	0.0608 (1.2211)	-0.0096 (-0.1018)	0.3323 (1.8407)***	0.0088 (0.5160)	0.2888 (1.0904)	0.11761 (2.3593)*	0.5477 (5.7099)*	0.4925 (3.5121)*	0.2309 (3.3955)*
LER (-1)	0.0001 (0.0604)	-0.0146 (-1.3206)	0.0038 (0.3548)	-0.0341 (-1.7208)***	-0.0011 (-0.2788)	-0.0393 (-0.9973)	-0.0281 (-2.1746)**	-0.1549 (-5.6020)*	-0.0715 (-3.4905)*	-0.0335 (-3.4003)*
LPR (-1)	-0.0096 (-1.1851)	0.0320 (1.4103)	0.0061 (0.3638)	0.0542 (2.0937)**	-0.00004 (-0.0076)	0.1074 (0.9626)	0.0460 (2.4598)*	0.1337 (5.7485)*	0.0597 (3.2947)*	0.0383 (3.1236)*
DLER(-1)	0.0486 (1.0719)	0.0688 (1.3964)	0.0393 (0.6962)	-0.0983 (-1.6351)***	-0.0486 (-1.0798)	0.0466 (0.2727)	-0.0804 (-1.7634)***	-0.0268 (-0.5587)	0.1634 (2.8667)*	0.2319 (5.1989)*
DLER(-2)	0.0283 (0.6385)	0.0415 (0.8415)	-0.0743 (-1.3461)	-0.0927 (-1.6480)***	-0.1156 (-2.5673)*	0.1126 (0.6543)	-0.0906 (-2.0033)**	-0.0474 (-1.0107)	-0.0437 (-0.7601)	-0.0308 (-0.6872)
DLPR	-0.1172 (-0.6781)	0.0719 (0.3681)	0.1907 (1.0146)	1.5571 (11.2297)*	0.0109 (0.2497)	0.0650 (0.3691)	0.0378 (0.2473)	0.1236 (0.9954)	0.2620 (0.9263)	1.1544 (9.9155)*
DLPR(-1)	-0.2594 (-1.5114)	-0.1064 (-0.5468)	-0.0413 (-0.2238)	-0.3634 (-2.2607)**	-0.0222 (-0.5133)	0.0149 (0.0902)	0.2595 (1.6897)***	-0.3363 (-2.6125)*	-0.1666 (-0.5440)	-0.2099 (-1.5886)
DLPR(-2)	-0.0505 (-0.2934)	-0.0867 (-0.4493)	0.2209 (1.2551)	-0.0513 (-0.3471)	-0.0165 (-0.3818)	0.0698 (0.4248)	0.0869 (0.5683)	-0.1570 (-1.2567)	-0.1784 (-0.6321)	-0.1133 (-0.9019)
L2/L1	- 54.9120	- 2.1838	1.5952	- 1.5870	0.0416	- 2.7299	- 1.6364	- 0.8633	- 0.8349	- 1.1424
F Stat	0.9712	0.6577	1.18106	19.7623	1.2264	0.4323	2.6283	7.0314	2.9854	2.9854

Table: A.2. Estimated Coefficients (Effects) for Short and Long Run

Parameters	Malaysia		India		Thailand		Singapore		Philippines	
	CPI (90 to 98)	PPI (68-98)	CPI (57 to 98)	PPI (57-98)	CPI (65-98)	PPI (57-98)	CPI (73-98)	PPI (74-98)	CPI (75-98)	PPI
Constant	-0.0214 (-0.6512)	-0.0103 (-0.2684)	0.0906 (2.0750)**	0.1139 (2.2537)**	0.1254 (2.0909)**	0.1139 (2.2537)**	0.0941 (2.6835)*	0.0456 (1.7707)***	0.0193 (0.3247)	……..
LER (-1)	0.0373 (1.2273)	0.0260 (0.7675)	-0.0217 (-1.9267)**	-0.0292 (-2.1592)**	-0.0377 (-2.0129)**	-0.0292 (-2.1592)**	-0.1424 (-2.6972)*	-0.063519 (-1.6460)***	-0.0025 (-0.1539)	……..
LPR (-1)	0.2491 (1.6736)***	0.1041 (1.5999)***	0.0377 (2.0246)**	0.0392 (2.1992)**	0.0403 (1.3893)	0.0392 (2.1992)**	0.0523 (2.0791)**	0.0085 (0.3463)	0.0047 (0.2647)	……..
DLER(-1)	0.3057 (2.7033)*	0.2358 (1.9145)**	-0.0265 (-0.5820)	-0.0239 (-0.5215)	-0.3128 (-5.3662)*	-0.0239 (-0.5215)	-0.3047 (-3.5785)*	-0.3674 (-4.2158)*	-0.1145 (-2.4091)*	……..
DLER(-2)	-0.0564 (-0.4913)	0.0550 (0.4514)	0.0138 (0.3044)	0.0156 (0.3423)	-0.0489 (-0.8516)	0.0156 (0.3423)	0.0256 (0.3175)	-0.0103 (-0.1223)	-0.0396 (-0.8431)	……..
DLPR	-0.7803 (-1.0124)	0.9429 (3.3698)*	0.2471 (1.2549)	0.0953 (0.6155)	-0.1376 (-0.5664)	0.0953 (0.6155)	0.2062 (0.9255)	-0.0635 (-0.3208)	-0.0451 (-0.2232)	……..
DLPR(-1)	0.0084 (0.0105)	-0.8433 (-2.8211)*	0.1190 (0.5417)	0.1213 (0.7550)	0.4400 (1.7780)***	0.1213 (0.7550)	0.0224 (0.1091)	0.1433 (0.6338)	-0.0341 (-0.1611)	……..
DLPR(-2)	-0.7734 (-1.0020)	-0.2841 (-0.9657)	-0.2465 (-1.2450)	0.1388 (0.9073)	-0.3453 (-1.4157)	0.1388 (0.9073)	-0.0939 (-0.4742)	-0.1693 (-0.8042)	-0.2986 (-1.5284)	……..
L2/L1	6.6722	3.9995	- 1.7398	- 1.3434	- 1.0707	- 1.3431	- 0.3677	- 0.1336	- 1.8553	…..…
F Stat	3.0063	6.2217	1.0853	1.1660	6.6317	1.16604	5.3896	1.9482	1.5395	……..