

Income Terms of Trade and Trade Balance: The Long Run Evidence from Bangladesh

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The paper uses the autoregressive distributed lag approach to cointegration to test the Harberger-Laursen-Metzler (HLM) effect in the context of Bangladesh. The HLM effect predicts that a rise in the terms of trade from an exogenous shock to a small open economy will lead to an improvement in the country's trade balance. The study findings confirm the existence of a long run relationship in the case of Bangladesh. The Granger test suggests unidirectional causality from income terms of trade to trade balance. The results are found consistent with the theoretical predictions.

Keywords: Income Terms of Trade, Trade Balance, ARDL, HLM Effect, Bangladesh

JEL Classification: F11, F32, F40

I. INTRODUCTION

Despite the presence of a sizeable literature examining the relationship between terms of trade and trade balance, evidence so far remains inconclusive. The idea that an exogenous shock to the terms of trade of a small open economy can lead to an improvement in the country's trade balance is known as the HLM effect, named after the first initials of its authors, Harberger (1950), Laursen and Metzler (1950). The model, based on Keynesian approach, posits that an improvement in a country's terms of trade leads to an increase in that country's income. Given that marginal propensity to consume is less than unity, the rise in

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The authors gratefully acknowledge the useful comments from the referees which helped to improve the quality of the paper. The authors would like to thank Dr. Gour G. Goswami, Professor of Economics for sharing from his own dataset. Standard caveats apply.

income boosts savings and investment. Based on the results of a sizeable literature, professionals agree that the effect can go either way. The HLM effect has been scrutinised within deterministic inter-temporal models by Sachs (1981), Obstfeld (1982) and Svensson and Razin (1983), inter alia. Backus (1993) and Mendoza (1995) explored the HLM effect using dynamic general-equilibrium model. Otto (2003) also examined the effect for a number of developing and small OECD economies.¹ He found that a positive shock to the terms of trade improves trade balance initially, but hurts later as the shocks become persistent. Dibooglu (2000) found that positive shocks to the terms of trade is important in the short run, but may not sustain in the long run, once other factors tend to offset the initial effect. Hoque (1995) found a long run relationship among current account deficit, terms of trade, domestic income and foreign income in a fixed exchange rate regime, but not under a flexible regime e.g. Australia. Using VECM model Kouassi, Decaluwe, Kapombe and Colyer (1998) found a long-run relationship between terms of trade and current account deficits in Ivory Coast. They argue that the current account deficit cannot be explained by terms of trade alone. In addition to unidirectional causality, dynamic simulations indicate that a significant portion of fluctuations in terms of trade can be explained by current account deficits.

1.1 Objectives of the Study

The primary objective of the paper is to test the HLM effect in Bangladesh. For empirical purposes, we implement the autoregressive distributed lag (ARDL) approach to cointegration to explore a long run relationship between trade balance and income terms of trade. We also test the direction of causality using the vector error correction model (VECM). It should be noted that the relationship between the series can be masked by the choice of a measure to be used, and thus produce misleading results. For small and open developing economy e.g. Bangladesh, a good understanding of the relationship between the series is important from policy perspectives. The absence of such a study on Bangladesh is the primary motivation for undertaking the present research. We find that trade balance and income terms of trade are cointegrated in Bangladesh, and the former Granger causes the latter. The research contributes to the literature in three distinct ways: (i) it examines an understudied area in the context of Bangladesh. (ii) the choice of ARDL approach is appropriate due to its

¹Otto finds two important results, (i) a strong support for an HLM effect; and (ii) the findings from the structural vector autoregression model are in line with those reported by Mendoza (1995) based on simulation of a specific dynamic stochastic equilibrium model for a small open economy.

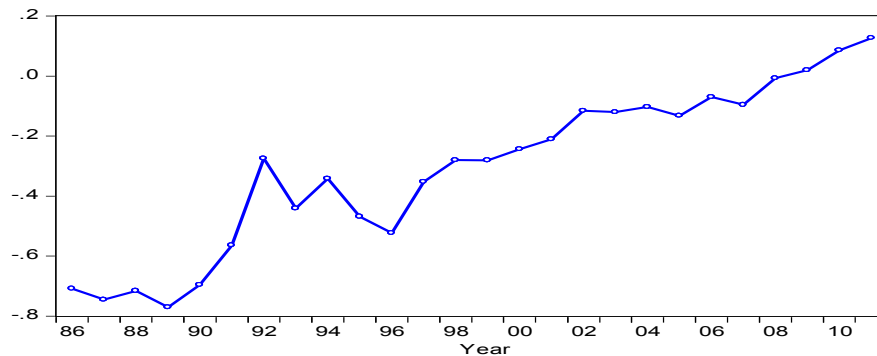
good small sample properties, and (c) it provides further evidence on the HLM effect which still remains inconclusive. The findings may have relevance as Bangladesh increasingly becomes part of a globalised world.

The rest of the paper is organised as follows. Section II discusses the income terms of trade and balance of trade in Bangladesh. Section III presents a brief literature review. Data sources and empirical strategy have been outlined in section IV. Results are reported in section V, followed by conclusions in section VI.

II. INCOME TERMS OF TRADE AND TRADE BALANCE IN BANGLADESH

Bangladesh is a small developing country with a population of 148.7 million (2010; World Bank) in the Indian sub-continent. The country depends on imports of food, capital machinery and oil, among others, and has been facing persistent balance of payments deficit since its inception some four decades ago. Import and export play a major role in its economic growth. Bangladesh, born out of the independence war in 1971, adopted a highly regulated economic system where financial, fiscal, commercial and industrial policies favoured an inward-oriented policy. The policy of overvalued exchange rate regime proved very ineffective. In the wake of rising tide of globalisation, Bangladesh, like many others, chose market friendly liberal economic policies, primarily aimed at achieving higher rate of export growth. Trade liberalisation, was initiated in the 1980s, but the policy did not gain momentum until the early 1990s, when tariff, non-tariff and other quantitative restrictions were eased. Although still in red, the trend in trade balance showed some signs of improvement over time (See Figures 1 & 2). The ratio of exports to imports and the trade gap declined during the past five years with some volatility (Nusrat 2008). Even as the country was beset with chronic trade deficit and preparing to address the malady in the terms of trade, no serious academic study emerged in this important area.

Figure-1: Log of Trade Balance in Bangladesh





III. LITERATURE REVIEW

Much of the literature exploring a direct relationship between trade balance and terms of trade has relied on simple correlation between the two series. Others have examined a long run relationship. While Haynes and Stone (1982) found positive relationship between the series for the U.S., Warner and Kreinin (1983), Gylfason and Risager (1984), Bahmani-Oskooee (1986) and Marquez (1990) found that deterioration in the terms of trade improves trade balance. Bahmani-Oskooee and Jonardhanan (1995) examined data from 24 countries but did not find long-run relationship between the series. Tsen (2006) found long run relationship between trade balance and commodity terms of trade, but not between income terms of trade and trade balance for Malaysia. Zortuk (2008) documented long run relationship between terms of trade (using both income and commodity measures) and trade balance for Turkey using Johansen cointegration and VECM Granger causality approaches. Bouakez and Kano (2008) applied present-value approach to current account balance by following Bergin and Sheffrin's (2000) consumption-smoothing model which allows inter-temporal substitution, and income and wealth effects from a change in world real interest rate. They document that inclusion of interest rate and exchange rate produces a forecast that matches volatility of current account data and better explains historical episodes of current account imbalance.

Hamori (2008) applied Pedroni (2004) panel cointegration method and confirmed long run relation between terms of trade and trade balance for 19 African nations. The results lend support to the Marshall-Lerner condition. Tsen (2009a) tested the HLM effect using data from Korea, Hong Kong and Singapore. He found that an improvement in the terms of trade leads to a decline

in the trade balance. He also found feedback relation for Hong Kong and Singapore; and that trade balance Granger causes income terms of trade in Korea. In another study on Asian countries, Tsen (2009b) found that the effect of terms of trade on trade balance varies by country. He pointed out that domestic demand, foreign income, terms of trade and oil prices appear to be major determinants of trade balance in the short- as well as long run.

Other than Tsen (2006),² most studies use commodity terms of trade³ which is a form of barter terms of trade. Appleyard and Field (2001) approximated the income terms of trade⁴ by taking the ratio of exports value to import price. They argue that income terms of trade is a better measure of terms of trade compared to commodity terms of trade. The former can rise faster relative to the latter. The high value of commodity terms of trade implies that price of exports is high relative to import price. However, the direction of causality between commodity terms of trade and income terms of trade may not necessarily imply the same thing. For example, an increase in the price of exports relative to imports could give the appearance of higher commodity terms of trade, when income terms of trade actually may worsen, perhaps offset by a decline in the quantity of exports.

IV. DATA AND METHODOLOGY

4.1 Sources of Data

Trade balance (TB_t) is defined as the ratio of real exports to real imports (value of exports/price of exports)/(value of imports/price of imports) i.e. $(X_t/Px_t)/(M_t/Pm_t)$.⁵ The value of exports and imports and the prices have been obtained from the *World Development Indicators* (WDI-CD-ROM, 2011). In particular, the data on unit value of exports and imports was obtained through the courtesy of Dr. Goswami. Income terms of trade (TT_t) are defined as (X_t/Pm_t) . All data is annual, covering the period 1985-2011.

²Tsen (2009a and 2009b) also explores long run relationship, in addition to the HLM effect.

³ It is defined as the ratio of export price to import price.

⁴ It is defined as export price multiplied by export volume and divided by import price.

⁵ See Wong (2006).

4.2 Methodology

For empirical implementation, we first begin with unit root test to check the order of integration of each series. Knowledge of time series properties of a data is helpful in assessing the impact of shock on a series. For example, in the case of trend stationary series, the effect of a shock is mean reverting. By contrast, policies can have permanent effect if the series is stochastically non-stationary, i.e., difference stationary, characterised by unit roots. While there are a number of tests that can check for the presence of unit root [augmented Dickey-Fuller (ADF), Phillip-Perron (PP), Dickey-Fuller Generalized Least Square (DF-GLS) and Kwiatkowski, Phillips, Schmidt, Shin (KPSS)], we choose the Ng-Perron test because of its desirable small sample properties. Also, it has more power compared to the traditional tests. For a long run relation, we apply the ARDL bounds testing approach to cointegration. The approach has several advantages such as better small sample properties and the ability to deal with different orders of integration of the regressors [I(0), I(1) or mutually cointegrated] (Pesaran, Shin and Smith 2001).

4.2.1 Ng-Perron Unit Root Test

In the Ng-Perron (2001) test, GLS is applied to de-trend the series D_t^d . The critical values of the tests are based on those of Philip-Perron (1988) Z_α and Z_t statistic, Bhargava (1986) R_1 statistic and Elliot, Rothenberg and Stock (1996) statistic. The following annotations are used:

$$k = \sum_{t=2}^T (D_{t-1}^d)^2 / T^2 \quad (1)$$

The de-trended GLS based statistics is given by:

$$MZ_a^d = (T^{-1}(D_T^d)^2 - f_0) / (2k)$$

$$MZ_t^d = MZ_a^d \times MSB$$

$$MSB^d = (k / f_0)^{1/2}$$

$$MP_T^d = \left\{ \begin{array}{l} \bar{c}^{-2} k - \bar{c} T^{-1} (D_T^d)^2 / f_0, \text{ and } \bar{c}^{-2} k + (1 - \bar{c}) T^{-1} (D_T^d)^2 / f_0 \end{array} \right. \quad (2)$$

4.2.2 ARDL Approach to Cointegration

The ARDL test statistic is the well-known Wald or F-statistic in a generalised Dickey-Fuller type regression which is used to test significance of

the lagged variables in the conditional unrestricted equilibrium error correction model (ECM) (Pesaran *et al.* 2001). In this paper, we investigate a long-run relationship between trade balance (TB_t) and terms of trade (TT_t) in the unrestricted error correction model (UECM) as follows:

$$\ln TB_t = \alpha_1 + \alpha_2 T + \sum_{i=1}^m \alpha_3 \Delta \ln TB_{t-i} + \sum_{i=0}^m \alpha_4 \Delta \ln TB_{t-i} + \alpha_{TB} \ln TB_{t-1} + \alpha_{TT} \ln TT_{t-1} + \mu_t \quad (3)$$

$$\ln TT_t = \beta_1 + \beta_2 T + \sum_{i=1}^m \beta_3 \Delta \ln TT_{t-i} + \sum_{i=0}^m \beta_4 \Delta \ln TT_{t-i} + \beta_{TB} \ln TB_{t-1} + \beta_{TT} \ln TT_{t-1} + \mu_t \quad (4)$$

where $\ln TB_t$ and $\ln TT_t$ refer to the natural log of the series, T is a time trend, and η and μ are random error terms. The first part of the equations with α_3, α_4 and β_3, β_4 represents short-run dynamics. The second part α_{TB}, α_{TT} and β_{TB}, β_{TT} refers to long-run phenomenon. The null hypothesis in equation (3) $\alpha_3 = \alpha_4 = 0$ implies no long-run relationship, and conversely; and likewise for ($\beta_3 = \beta_4 = 0$) in equation (4).

In testing the null hypothesis of no cointegration in the ARDL approach, we compare the calculated F-statistic with the critical bounds either from Pesaran *et al.* (2001) or Narayan (2005). The latter is better suited in small samples. So, we use it in our study. If the F statistic exceeds the upper critical bound (UCB), the null hypothesis of no cointegration is rejected regardless of orders of integration of the regressors. If the computed F is lower than the LCB, the null hypothesis is sustained; and if the F lies between the two bounds, the result is inconclusive. When the order of integration of the variables is known and all the variables are I(1), the decision is made based on the UCB. Similarly, if all the variables are I(0), then the decision is made based on the LCB. Finally, for model selection, lag length is chosen using the Schwartz-Bayesian Criteria (SBC) and Hannan-Quinn (HQ) information criterion.

The Granger causality tests are conducted within the VECM. In terms of the Granger representation theorem, if two or more I(1) series are cointegrated, there must be Granger causality at least in one direction. Engle and Granger (1987) caution that if the Granger causality test is conducted in first difference within the vector autoregression (VAR) method, it can produce misleading conclusion when the series are cointegrated. So, they suggest the inclusion of the lagged error-correction term to capture the long-run relationship. The augmented Granger causality test is formulated in a bi-variate p^{th} order vector error-correction model (VECM) as follows:

$$\begin{bmatrix} \Delta \ln TB_t \\ \Delta \ln TT_t \end{bmatrix} = \begin{bmatrix} k_1 \\ k_2 \end{bmatrix} + \sum_{i=1}^p \begin{bmatrix} d_{11}(L) & d_{12}(L) \\ d_{21}(L) & d_{22}(L) \end{bmatrix} \times \begin{bmatrix} \Delta \ln TB_{t-i} \\ \Delta \ln TT_{t-i} \end{bmatrix} + \begin{bmatrix} \gamma_1 ECT_{t-1} \\ \gamma_1 ECT_{t-1} \end{bmatrix} + \begin{bmatrix} C_1 \\ C_2 \end{bmatrix} + \begin{bmatrix} \eta_1 \\ \eta_2 \end{bmatrix} \quad (5)$$

where Δ is a difference operator, ECT represents the error-correction term derived from long-run cointegrating relationship, C ($i = 1, 2$) is a constant and η ($i = 1, 2$) are serially uncorrelated random error terms with zero mean. The long-run causality is established if the t-statistic of the lagged ECT term is significant; while a significant joint F-statistic or Wald test suggests short-run causality.

V. EMPIRICAL FINDINGS

Table I reports the descriptive statistics and correlation matrix. The series are positively correlated and highly significant for Bangladesh.

TABLE I
CORRELATION MATRIX AND DESCRIPTIVE STATISTICS

Series	Mean	Median	Maximum	Minimum	Jarque-Bera	Probability	$\ln TT_t$	$\ln TB_t$
$\ln TT_t$	21.1750	21.0937	21.9525	20.2811	1.5673	0.4567	1.0000	0.9227
$\ln TB_t$	-0.3086	-0.2274	0.1263	-0.7707	2.0498	0.3588	0.9227	1.0000

Although the ARDL approach works regardless of the order of integration of the series $I(0)$ or $I(1)$, a formal test insures that none of the series is $I(2)$ or higher. In the latter case, the computed F-statistics ceases to be valid (Ouattara 2004). The results, based on Ng-Perron (2001) unit root test, reported in Table II, suggest that both series are $I(1)$.

TABLE II
UNIT ROOT ESTIMATION

Ng-Perron Test at Level				
Variables	MZa	MZt	MSB	MPT
$\ln TT_t$	-4.1327	-1.2566	0.3040	20.1477
$\ln TB_t$	-5.0644	-1.4814	0.2925	17.4583
Ng-Perron Test at 1 st Difference				
$\ln TT_t$	-21.7837**	-3.2994	0.1514	4.1882
$\ln TB_t$	-17.9086**	-2.9923	0.1670	5.08861

Note: ** shows the significance level at 5 per cent.

The ARDL bounds testing approach to cointegration estimates $(p + I)^k$ number of regressions where p is the maximum number of lags utilised and k is the total number of variables. Thus, the total number of equations estimated for (3) and (4) is $(1 + 1)^2 = 4$. The computed F-statistic (8.396), (Table III) exceeds the UCB (8.265) at the 5% level of significance (from Narayan 2005). This confirms cointegration between the series over the period 1985-2011.

TABLE III
ARDL ESTIMATION FOR COINTEGRATION

Dependent Variable		ARDL Bounds F-statistics
Lag Order 1	$\ln TB_t$	8.396**
	$\ln TT_t$	1.276
Critical Values	Narayan (2005)	
	Lower Bound	Upper Bound
1%	10.605	11.650
5%	7.360	8.265
10%	6.010	6.780
Diagnostic Test		
Test	F-statistic (Prob. values)	F-statistic (Prob. values)
χ^2_{NORMAL}	0.8208 (0.6633)	1.2573(0.5333)
χ^2_{SERIAL}	0.0127 (0.9116)	2.2906 (0.1405)
χ^2_{ARCH}	0.0225 (0.8821)	0.7792(0.3898)
χ^2_{HETERO}	1.7925 (0.2051)	0.5701(0.8790)
χ^2_{RESET}	0.0363 (0.8514)	2.5616(0.1153)

Note: ** indicates significance at 5 % level.

The impact of income-terms of trade (TT) is positive on the trade balance (TB) in Bangladesh. A 1 per cent rise in the TT is expected to improve the TB by 0.48 per cent and is highly significant.

$$\ln TB_t = -10.5722 + 0.4847 \ln TT_t$$

$$(-12.0773) \quad (11.7280)$$

$$R\text{-Squared} = 0.8514; D.W. = 2.0842$$

$\ln TT_t$ explains 85 per cent of the variation in $\ln TB_t$ in terms of linear relation ($R^2 = 0.8514$). These findings contrast with those of Obstfeld (1982) who found negative impact of TT on TB. Otto (2003) found that TT shock improves TB initially but dissipates once shocks become stubborn.

The Granger test shows unidirectional causality from income terms of trade to trade balance in the long run. Thus, an improvement in the former will lead to an improvement in the latter in Bangladesh, not the other way around. The estimated ECM_{t-1} term is negative (-0.5037), and significant at the 5 per cent level.

TABLE IV
VECM GRANGER CAUSALITY ANALYSIS

Variables	Type of Causality				
	Short Run		Long Run	Joint Significance of Long-and-short Runs	
	$\Sigma \Delta \ln TB_{t-1}$	$\Sigma \Delta \ln TT_{t-1}$	ECT_{t-1}	$\Sigma \Delta \ln TB_{t-1}, ECT_{t-1}$	$\Sigma \Delta \ln TT_{t-1}, ECT_{t-1}$
$\Delta \ln TB_t$...	2.7424*** [0.0913]	- 0.5037** [-0.0219]	...	4.4948** [0.0160]
$\Delta \ln TT_t$	0.1559 [0.8567]

Note: ** and *** denote the significance at the 5 and 10% levels respectively. Figures in parentheses are p-values.

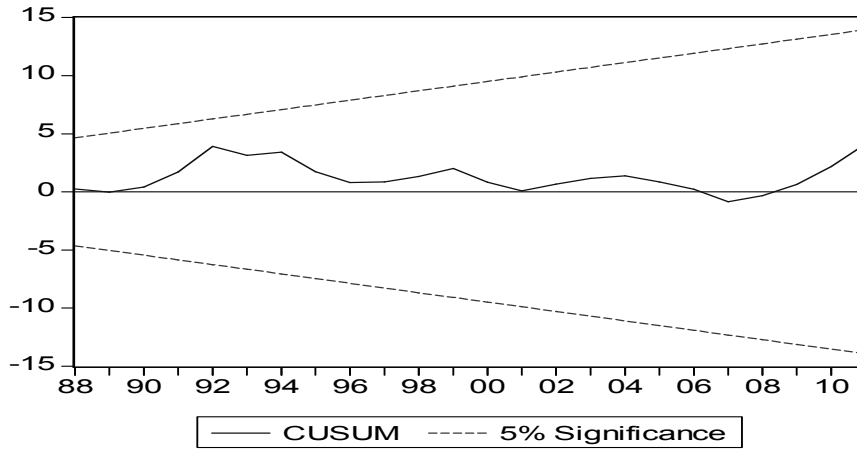
The speed of adjustment from the short to the long run is -0.5037. This implies that deviation from the long run equilibrium is corrected by 50% each year. In the short run, income terms of trade Granger causes trade balance. The joint causality analysis validates both short and long run causality. The findings are consistent with those reported by Tsen (2009a) for Korea and Singapore. He also reports unidirectional causality from TB to income TT for Hong Kong.

5.1 Sensitivity Analysis

The model passes tests for sensitivity, serial correlation, non-normality of errors, and autoregressive conditional heteroscedasticity. Ramsey Reset test shows that model is well specified. Cumulative sum (CUSUM) and cumulative sum of squares (CUSUMsq) tests on the recursive residuals suggest stability of

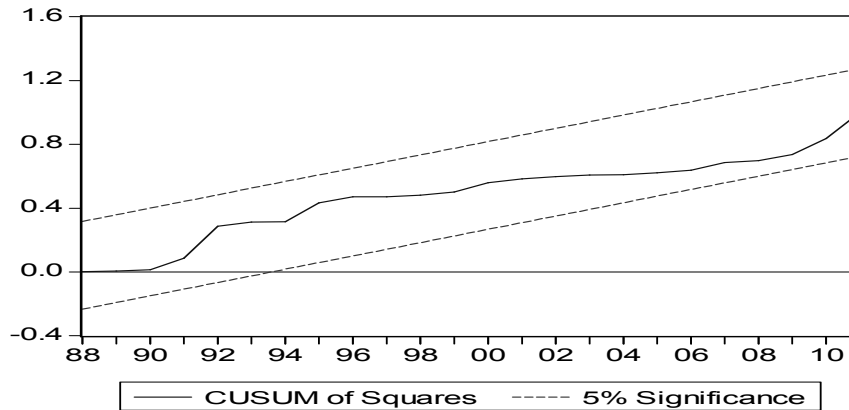
the ARDL model. These tests show that the parameters lie within the 95% confidence bands (Figures 3 and 4).

Figure 3: Plot of Cumulative Sum of Recursive Residuals



Note: The straight lines represent critical bounds at 5% significance level.

Figure 4: Plot of Cumulative Sum of Squares of Recursive Residuals



Note: The straight lines represent critical bounds at 5% significance level.

VI. CONCLUSION AND POLICY IMPLICATIONS

This paper applies ARDL bounds testing approach to Bangladesh data to test the HLM effect to examine a relationship between income terms of trade and trade balance. Annual data from 1985 to 2011 is used. Ng-Perron test confirms

that each series is I (1). We find long run relation, and unidirectional causality from income terms of trade to trade balance both in the long run and the short run. Based on the findings we suggest that Bangladesh should emphasise on investment to lift domestic output, boost export and thus improve trade balance. Some studies indicate that real devaluations improve trade balance [Nusrat (2008) for Bangladesh; Shahbaz (2009) for Pakistan; and Wahid and Shahbaz (2009) for the Philippines]. Although Bangladesh operates under freely floating exchange rate system, the country might be able to avoid a major shock—internal and external—so long as a well-managed floating exchange rate policy is followed. Also, Bangladesh can learn useful lessons from the experiences of its relatively stronger neighbours such as India and Sri Lanka.

REFERENCES

- Appleyard, D. and A. J. Field Jr. 2001. *International Economics*, 4th edn. Singapore: McGraw-Hill,
- Backus, David K. 1993. "Interpreting Comovements in the Trade Balance and the Terms of Trade." *Journal of International Economics*, 34(3-4):375-387.
- Bahmani-Oskooee, M. and A. Janardhanan. 1995. "Is there any Long-run Relation between the Terms of Trade and Trade Balance?" *Journal of Policy Modeling*, 17:199-205.
- Bahmani-Oskooee, M. 1986. "The Determinants of International Trade Flows." *Journal of Development Economics*, 20:107-123.
- Bergin, Paul R. & M. Sheffrin 2000. "Interest Rates, Exchange Rates and Present Value Models of the Current Account." *Economic Journal*, Royal Economic Society. 110(463): 535-58.
- Bhargava, A. 1986. "On the Theory of Testing for Unit Roots in Observed Time Series." *The Review of Economic Studies*, 53: 369-384.
- Bouakez, Hafedh and Takashi Kano. 2008. "Terms of Trade and Current Account Fluctuations: The Harberger-Laursen-Metzler Effect Revisited." *Journal of Macroeconomics*, 30(1): 260-281.
- Dibooglu, S. 2000. "Aggregation Supply, Domestic Absorption, and Terms of Trade: a Structural Decomposition of the US Trade Balance." *The International Trade Journal*, 14, 147-168.
- Elliot, G., T. J. Rothenberg and J. H. Stock. 1996. "Efficient Tests for an Autoregressive Unit Root." *Econometrica*, 64: 813-36.
- Engle R. F. and C. W. J. Granger. 1987. "Cointegration and Error Correction Representation: Estimation and Testing." *Econometrica*, 55: 251-276.

- Gylfason, T. and O. Risager. 1984. "Does Devaluation Improve the Current Account?" *European Economic Review*, 25: 37-64.
- Hamori, S. 2008. "Trade Balances and the Terms of Trade in G-7 Countries: Panel Cointegration Approach." *Applied Econometrics and International Development*, 8: 13-22.
- Harberger, A. C. 1950. "Currency Depreciation, Income and the Balance of Trade." *Journal of Political Economy*, 8: 47-60.
- Haynes, S. E. and J. A. Stone. 1982. "Impact of the Terms of Trade on the U.S. Trade Balance: A Reexamination." *Review of Economics and Statistics*, 64: 702-706.
- Hoque, A. 1995. "Co-integration Relationship between Terms of Trade and Current Account Deficit: the Australian Evidence." *Applied Economics Letters*, 2: 130-133.
- Kouassi, E., B. Decaluwe, C. M Kapombe and D. Colyer. 1998. "Is it real? The Long-run Relation between Terms of Trade and Current Account Deficits: The Ivory Evidence." *Applied Economics Letters*, 5: 437-440.
- Laursen, S. and L. A. Metzler. 1950. "Flexible Exchange Rates and the Theory of Employment." *Review of Economics and Statistics*, 32: 281-199.
- Marquez, J. 1990. "Bilateral Trade Elasticities." *The Review of Economics and Statistics*, 72: 70-77.
- Mendoza, E. G. 1995. "The Terms of Trade, the Real Exchange Rate and Economic Fluctuations." *International Economic Review*, 36: 101-137.
- Narayan, P. K. 2005. "The Saving and Investment Nexus for China: Evidence from Cointegration Tests." *Applied Economics*, 37: 1979-1990.
- Ng, S. and P. Perron. 2001. "Lag Length Selection and the Construction of Unit Root Test with Good Size and Power." *Econometrica*, 69: 1519-1554.
- Nusrat, A. 2008. Unpublished Ph.D thesis, Department of Economics, Birmingham University, U.K.
- Obstfeld, M. 1982. "Aggregate Spending and Terms of Trade: Is there a Laursen-Metzler Effect?" *Quarterly Journal of Economics*, 97, 251-270.
- Otto, G. 2003. "Terms of Trade Shocks and the Balance." *Journal of International Money and Finance*, 22: 155-184.
- Ouattara, B. 2004. "Foreign Aid and Fiscal Policy in Senegal." Mimeo, University of Manchester.
- Pedroni, Peter. 2004. "Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the PPP Hypothesis." *Econometric Theory*, 20(3): 597-625.

- Pesaran, M. H., Y. Shin and R. J. Smith. 2001. "Bounds Testing Approaches to the Analysis of Level Relationships." *Journal of Applied Econometrics*, 16: 289-326.
- Phillips, P. C. B and P. Perron. 1988. "Testing for a Unit Root in Time Series Regression." *Biometrika*, 75: 35-446.
- Sachs, J. D. 1981. "The Current Account and Macroeconomic Adjustment in the 1970s." *Brookings Papers on Economic Activity*, 1: 201-268.
- Shahbaz, M. 2009. "On Nominal and Real Devaluations Relation: An Econometric Evidence for Pakistan." *International Journal of Applied Econometrics and Quantitative Studies*, 9: 85-108.
- Sheffrin, S. M. and W. T. Woo. 1990. "Present Value Tests of an Inter-temporal Model of the Current Account." *Journal of International Economics*, 29: 237-253.
- Svensson, Lars E. O. and Assaf Razin. 1983. "The Terms of Trade and the Current Account: The Harberger-Laursen-Metzler Effect." *Journal of Political Economy*, 91(1): 97-125.
- Tsen, W. K. 2006. "Is there a Long-run Relationship between Trade Balance and Terms of Trade?" *The Case of Malaysia. Applied Economics Letters*, 13: 307-311.
- 2009a. "Terms-of-Trade and Trade Balance: Some Empirical Evidence of Asian Economies." *The International Trade Journal*, 23: 422-457.
- 2009b. "Terms of Trade and Trade Balance in Korea, Hong Kong and Singapore." *Labuan Bulletin of International Business & Finance*, 7: 53-76.
- Wahid, A. N. M. and M. Shahbaz. 2009. "Does Nominal Devaluation Precede Real Devaluation?" The Case of the Philippines." *Transition Studies Review*, 16: 47-61.
- Warner, D. and M. Kreinin. 1983. "Determinants of International Trade Flow." *Review of Economics and Statistics*, 65 (1): 96-104.
- Zortuk, M. 2008. "Testing the Relationship between Trade Balance and Terms of Trade: the Case of Turkey." *Problems and Perspectives in Management*, 6:39-43.