

An Empirical Analysis of the Impact of Exchange Rate Volatility on Trade Balance in Nigeria

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ABSTRAK

Tujuan dari makalah ini adalah untuk menguji pengaruh volatilitas nilai tukar terhadap neraca perdagangan di Nigeria. Data dikumpulkan dari Buletin Statistik Bank Sentral Nigeria dari tahun 1981 hingga 2016, dan model ARDL digunakan untuk menjawab tujuan penelitian ini. Penelitian ini menemukan bahwa volatilitas nilai tukar memiliki dampak negatif yang signifikan terhadap neraca perdagangan Nigeria. Dampak negatif ini dapat dikaitkan dengan kurangnya daya saing produk buatan lokal di pasar dunia. Namun, terdapat hubungan positif antara volatilitas nilai tukar dan pembentukan modal tetap bruto, meskipun hal ini tidak konsisten dengan teori ekonomi. Hasil ini dapat dikaitkan dengan ketergantungan negara yang berlebihan terhadap barang-barang asing. Oleh karena itu, volatilitas nilai tukar berdampak negatif terhadap neraca perdagangan di Nigeria. Berdasarkan temuan ini, setiap kali pembangunan ekonomi berkelanjutan menjadi tujuan para pembuat kebijakan di Nigeria, kebijakan strategis yang memadai yang memiliki kapasitas untuk menstabilkan nilai tukar negara harus diambil oleh para pembuat kebijakan di negara tersebut. Demikian pula, pemerintah Nigeria harus memiliki niat baik politik untuk memulai kebijakan promosi ekspor agresif yang akan memastikan daya saing barang produksi dalam negeri melalui pendekatan nilai tambah.

Keyword: Nilai Tukar; Volatilitas; Neraca Perdagangan

ABSTRACT

The aim of this paper is to examine the effect of exchange rate volatility on trade balance in Nigeria. Data were collected from the Central Bank of Nigeria Statistical Bulletin from 1981 to 2016, and ARDL model was utilized to address the objective of this study. It was discovered from the study that exchange rate volatility has a significant negative impact on Nigerian trade balances. This negative impact could be attributable to the lack of competitiveness of locally made products in the world market. However, there is a positive relationship between exchange rate volatility and gross fixed capital formation, though this is not consistent with economic theory. This result could be linked with the overdependence of the country on foreign goods. Therefore, exchange rate volatility has a negative impact on trade balance in Nigeria. Based on these findings, whenever, the sustainable economic development is the goal of the policy makers in Nigeria, adequate strategic policy that has the capacity to stabilize the country's exchange rate should be embarked upon by the policy makers in the country. Similarly, the Nigerian government should possess political goodwill to embark on aggressive export promotion policies that will ensure the competitiveness of domestically produced items through value added approach.

Keyword: Exchange Rate; Volatility; Trade Balance

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1. INTRODUCTION

One of the key factors that define a nation's competitiveness in the global market is the stability of its currency rate. The Nigerian government has implemented a number of currency rate regimes since the country's independence in 1960, starting with a fixed exchange rate system that was equal to the British pound and then

the US dollar. In the past, the disintegration of the Bretton Woods Agreement in 1973 was the catalyst for the global economies' exchange rate flexibility. However, Nigerian exchange rate instability started with the Structural Adjustment Programme's (SAP) crises in 1986. The days of the Nigerian Naira being more valuable than the US dollar are long gone.

A dollar was worth 89 kobo in 1985 (CBN, 1985); as of December 2023, one US dollar was worth 965 naira. This suggests that Nigeria's exchange rate has declined by almost 48,911% over the past 38 years. The Nigerian government has attempted multiple times in the last thirty years to bring back the former grandeur of the Naira, but the situation has always been the opposite. Exchange rate volatility is defined as the risk associated with unexpected movements in the exchange rate. Economic fundamentals such as the inflation rate, interest rate and the balance of payments, which have become more volatile in the 1980s and early 1990s, by themselves, are sources of exchange rate volatility.

More recently, increase cross-border flows that have been facilitated by the trend towards liberalization of the capital account, the advancement in technology, and currency speculation have also caused exchange rate to fluctuate (Hook and Boon 2015). The high degree of volatility and uncertainty of exchange rate movements since the beginning of the generalized floating in 1973 have led policy makers and researchers to investigate the nature and extent of the impact of such movements on the volume of trade.

The submissions of Aliyu (2019) and Benson and Victor (2021), who claimed that the country's currency has been continuously depreciating since the 1980s despite various policies implemented by the Federal Government of Nigeria to ensure a stable exchange rate, further support this assertion. It is noteworthy that the nation's currency's daily depreciation has resulted in a steady decline in investment, a low standard of living for the majority of people, and increased production costs. In the past ten years, this situation has acted as a catalyst for certain industrial companies to move their operations from Nigeria to nearby nations. As a result, it has been demonstrated in the literature that fluctuations in exchange rates and global trade are related. Currency depreciation will undoubtedly increase the cost of importing products and services from abroad. This means that the locally produced goods will actually face intense competition on the home market.

However, some have contended that a country's currency devaluation does not always succeed in ensuring a positive trade balance for the economy. These factors determine the domestic economy's capacity to maintain a positive trade balance; the nation's capacity to appropriately reorient demand while simultaneously producing enough commodities to satisfy the growing demands of its populace. (Dornbusch, 2018; Gutan, 2019). Because the focus of research in the literature is on the aftereffects of exchange rate volatility on investment and economic growth, there haven't been enough studies recently on exchange rate volatility and trade balance in Nigeria. Exchange rate regime varies with the level of financial development.

Throughout the developing world, the choice of exchange rate regime stands as perhaps the most contentious aspect of macroeconomic policy (Calvo and Reinhart, 2017). Witness, on the one hand, the intense international criticism of Africa's inflexible exchange rate system and on the other hand, West African policy makers are chastised for not doing enough to stabilize their country's highly volatile currency. Empirical evidences have shown that exchange rate volatility in turn is caused by both real and financial aggregate shocks (Calvo and Reinhart, 2002). Yet, despite the perceived implications of the exchange rate regime to long-run growth and economic stability, the existing theoretical and empirical literature on Africa (Nigeria in particular considering the level of the country's economic integration through trade and foreign capital inflows) offers little guidance. The theoretical literature is mainly tailored to richer countries with highly developed institutions and markets (e.g., Garber and Svensson, 2015; Obstfeld and Rogoff, 2016), and there is almost no discussion of long-run growth

Due to this, there is a vacuum in the literature that this study aims to close. In light of this, this study will investigate the connection between Nigeria's trade balance and exchange rate volatility. The study's distinctiveness also stems from its use of the Autoregressive Distributed Lag Model to meet its goal, which has not been completely explored in the bulk of previous studies.

The broad objective of this study is to examine the impact of exchange rate volatility on trade balance in Nigeria using the Autoregressive Distributed Lag Approach. The specific objectives however include, to estimate the impact exchange rate volatility on trade balance in Nigeria and to recommend strategies for improving trade balances in Nigeria through better alternatives.

The study will be relevant to those who will be making, interpreting or implementing exchange rate policies in Nigeria. The study will also be relevant to the Nigerian government and the Central Bank of Nigeria in planning, organizing and implementing exchange rate regimes as well as provide them with information on the extent to which exchange rate volatility has affected trade balances in Nigeria.

2. LITERATURE REVIEW

A. Theoretical Literature

Robert Mundell established the theoretical groundwork for the development of the Optimal Currency Area (OCA) theory in 1961. This theory concentrated on the selection of an economy's exchange rate regime. Mundell, however, created this theory in an effort to refute Friedman's school of thought, which maintained that flexible exchange rates are ideal (McKinnon, 1963). As a result, the idea gained popularity thanks to the groundbreaking writings of Kenen (1969) and Asher (2012). Given that this theory concentrates on trade and business cycle stabilization, it is crucial to clarify its topic. Similarly, this theory clarifies that the potential of a fixed exchange rate regime to raise trade volume and hence spur output growth is what makes it so important. This eliminates the cost of hedging and exchange rate unpredictability.

B. Empirical Literature

An attempt has been made to provide a succinct overview of prior research in this area, particularly on the relationship between exchange rate, trade balance, and economic growth in Nigeria.

Yinusa (2018) investigated the relationship between nominal exchange rate volatility and dollarization in Nigeria by applying Granger causality test for the period 1986–2003 using quarterly data. The study reported a bi-causality between them but the causality from dollarization to exchange rate volatility appears stronger and dominates. He however concluded that policies that aim to reduce exchange rate volatility in Nigeria must include measures that specifically address the issue of dollarization. But, the exact measure of exchange rate volatility in the study was not reported.

The relationship between exchange rate fluctuations and economic growth in the Nigerian economy from 1984 to 2014 was critically analyzed by Azeez, Kolapo, and Ajayi (2016). The results of this investigation confirmed the clear correlation between economic growth and the real exchange rate. Hossain (2019) examined the relationship between the performance of Nigerian macroeconomic variables and exchange rate volatility in a different study that examined the years 1993–2017. The report revealed a direct correlation between the country's economic growth and exchange rate. Nonetheless, Aderemi et al. (2019) used a vector error correction model to investigate the connection between foreign capital inflows into Nigeria and currency rate volatility between 1990 and 2016.

According to the paper's findings, 32% of the overall disequilibrium from the previous year's external shock has been addressed this year. Additionally, exchange rate volatility was briefly raised by FDI inflows, although it eventually decreased. However, remittances lessened the volatility of exchange rates, but external debt had the opposite effect. Similarly, Aliyu et al. (2019) calculated the relationship between the real exchange rate and Nigerian and Republic of Benin manufacturing exports. The analysis found that overvaluation of currency rates is the main barrier to both countries' economies trying to recover. The author suggested, among other things, that in order to restore exchange rate equilibrium and improve the economic performance of the nations, currency devaluation, the adoption of suitable policy measures, and domestic pricing of tradable goods should be changed.

Benson and Victor (2017) also came to the conclusion that Nigeria's exports decreased and its imports increased as a result of the exchange rate depreciation. However, the situation with regard to currency depreciation is the opposite. Thus, the researcher contended that as a result of exchange rate depreciation, there would eventually be a shift in focus from imported commodities to locally produced goods. This would have the unintended consequence of sharply shifting income from the foreign to the domestic sector through changes in trade terms. Over time, exporting and importing nations will eventually experience a sizable impact on each other's economic progress.

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3. RESEARCH METHOD

The analysis for this work used secondary data from 1987 to 2022. Data on imports, exports, trade balance, exchange rate, and inflation rate were taken from the 2023 edition of the CBN Statistical Bulletin. The Augmented Dickey-Fuller (ADF) and Philip Perron (PP) tests were conducted to test for a unit root in the data series. A bound cointegration test was employed to assess cointegration among the series. The autoregressive distributed lag technique was used to examine the short- and long-term effects of trade volatility on trade balances separately.

The general form of the model for this study is as follows:

$$TBAL = f(REER, RGDP, EXCHR, GFCF, FDI) \quad (1)$$

The results of several diagnostic tests, including the unit root test and the bound test on the variables used for the study, drove the decision to use this methodology. The study's use of an autoregressive lag model is justified by the variables' distinct orders of integration, or I(1) and I(0). (Pesaran and Pesaran 1997; Pesaran, Shin, and Smith, 2001). As a result, the ARDL model can be described as follows in general:

$$\ln TBAL_t = f(REER_t, \ln RGDP_t, \ln EXCHR_t, \ln GFCF_t, \ln FDI_t) \quad (2)$$

$$\ln TBAL_t = f(REER_POS_t, REER_NEG_t, \ln RGDP_t, \ln EXCHR_t, \ln GFCF_t, \ln FDI_t) \quad (3)$$

Where $\ln$ is the natural logarithm, TBAL is a log of trade balance, REER is the real effective exchange rate, REER_POS is the positive changes in the real effective exchange rate, RGDP is the Real Gross Domestic Product, EXCHR is the Exchange Rate, FDI is foreign direct investment, GFCF is gross fixed capital formation. $\ln TBAL_t = \alpha_0 + \alpha_1 \ln REER_t + \alpha_2 \ln RGDP_t + \alpha_3 \ln EXCHR_t + \alpha_4 \ln GFCF_t + \alpha_5 \ln FDI_t + u_t$

$\ln TBAL_t = \alpha_0 + \alpha_1 \ln REER_POS_t + \alpha_2 \ln REER_NEG_t + \alpha_3 \ln RGDP_t + \alpha_4 \ln EXCHR_t + \alpha_5 \ln GFCF_t + \alpha_6 \ln FDI_t + u_t$

The Standard Deviation of the initial difference of the exchange rate's logarithms is used to calculate exchange rate volatility. The standard deviation is computed over 33 years to represent long run variability and over one year to indicate short run volatility. Before estimating the ARDL, it is crucial for this study to look at a number of diagnostic tests, including the limits test and unit roots test. To find the order of integration and if long-term equilibrium exists among the variables, the conventional enhanced Dickey Fuller test, Philips Perron test, and limits test would be used, respectively.

4. RESULTS AND DISCUSSION

Table 1. Descriptive Statistics of Annual Data Series (1987-2022)

Descriptive Statistics	EXCHR	FDI	GFCF	LTBAL	RGDP
Mean	4.194898	7.737298	7.250404	6.658862	19.66875
Median	4.785511	7.804316	7.458026	6.891544	12.55000
Maximum	5.066087	9.633122	9.305274	8.669502	72.84000
Minimum	2.084156	4.699444	3.822490	3.465736	5.380000
Std. Deviation	1.017647	1.647953	1.622778	1.785215	18.64281
Skewness	-0.829678	-0.538913	-0.528318	-0.482310	1.736902
Kurtosis	2.037406	2.020382	2.266776	1.793550	4.703962
Jargue-Bera	3.680048	2.121359	1.654098	2.386013	14.97080
Probability	0.158814	0.346220	0.437338	0.303308	0.000561
Sum	100.6776	185.6952	174.0097	159.8127	472.0500
Sum. Sq. Deviation	23.81893	62.46223	60.56840	73.30085	7993.751
Observation	34	34	34	34	34

The above table presents descriptive statistics of the data employed for empirical analysis in this paper. This is important because it provides useful information concerning how sample series are distributed. The estimated results in the table indicate that the values of mean and median of the variables are almost the same. Since the data series were normally distributed, they could be used for further econometric analysis.

Table 2. Unit Root Test

Variables	ADF Test			PP Test		
	Level	1 st Diff.	Remarks	Level	1 st Diff.	Remarks
RGDP	-2.981***	2.987***	I (1)	-2.981***	-2.986***	I (1)
TBAL	-3.005***	-2.992***	I(1)	3.004***	-3.020***	I(1)
GFCF	-2.981***	-2.986***	I(1)	2.981***	-2.986***	I(1)
FDI	2.981***	-2.986***	I(1)	-2.981***	-2.986***	I(1)
EXCHR	2.981***		I (0)	2.981***		I (0)

In order to eliminate the emergence of spurious regression which is usually associated with the time series data in this paper, effort has been made to subject the data to stationarity tests with the aid of the standard Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. Consequently, the reported results in table 2 clearly shows that the data are a mixture of I(0) and I(1). Some variables of interest like exchange rate volatility, REER and trade balance are stationary after first difference possesses unit roots. This implies that these variables possess a unit root.

Table 3. ARDL Bounds Test

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	1.834255	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
5%	3.23	4.35

From the above, it could be established from the result of Bound Test that the Null hypothesis of no long run relationship could not be rejected because the value of F-Statistic is lower than the upper and lower Critical Value Bounds at all level of significance. Therefore, there is no cointegrating relationship between the

variables in the model. Since the variables of interest do not possess a long run equilibrium relationship, therefore the short run relationship is estimated in this paper.

Table 4. Short Run Relationship (Dependent Variable: Exchange Rate Volatility)

Variable	Coefficient	t-statistics	P-value
LEXCHRATE(-1)	0.723735***	11.31880	0.0000
LFDI	-73.51469**	2.655176	0.0156
LRGDP	0.898572	0.120753	0.9053
LTBAL	-0.045397*	1.749348	0.1080
LGCFC	-0.006547***	4.895809	0.0005
C	5.553630*	1.924234	0.0712

In the table above, the ARDL results of the short run relationship between the studied variables are presented. It is important to stress that estimated results did not conform to the apriori expectation. Exchange rate volatility has a significant negative impact on trade balance in the short run. This finding corroborates the assertion of Aliyu (2016). However, there is a positive relationship between exchange rate volatility and gross fixed capital formation, but the relationship is not significant. Consequently, there is a negative relationship between exchange rate volatility and trade balance, though the relationship is significant at 10% level of significance. It could be established thus that exchange rate volatility is not favorable to international trade in Nigeria because its impact on trade balance is negative. Also, foreign direct investment and exchange rate volatility have a significant inverse relationship in Nigeria. This means that exchange rate volatility has been one of the factors causing a fluctuation in foreign direct investment in the country.

5. CONCLUSION

This paper examined the relationship between exchange rate volatility and trade balance in Nigeria between the periods of 1987 and 2022 with the application of Bound Test and ARDL model. The findings of the study, among others, are that the variables of interest do not have a long run equilibrium relationship. Exchange rate volatility has a significant negative impact on Nigerian trade balance, and consequently reflecting a negative implication on trade balance. This negative impact could be attributable to the lack of global competitiveness of Nigeria's locally made products in the world market. Some of the locally made products in Nigeria lack value added qualities that can make them compete with the products of other advanced countries and some emerging countries like China, India and other Asian Tigers in the global market.

However, there is a positive relationship between exchange rate volatility and gross fixed capital formation, though this is not consistent with economic theory. This contradictory finding could be a result of the overdependence of the country on foreign goods. Another reason that might account for this could be as a result of value added qualities that imported goods possess; meanwhile some of the locally made products in Nigeria lack these qualities. Also, foreign direct investment and volatility in exchange rate show a significant negative relationship in Nigeria. This means that volatility in exchange rate is responsible for fluctuations in investments made by foreigners in the country.

Adequate strategic policy that has the capacity to stabilize the country's exchange rate should be embarked upon by the policy makers in the country. Similarly, the Nigerian government should possess political goodwill to embark on aggressive export promotion policies that will ensure the competitiveness of domestically produced item through value added approach in the global market. In the same vein, as a matter of urgency, importation of all items that can be locally produced should be drastically discouraged if not totally banned in Nigeria.

REFERENCES

- Aderemi, T. A., Akinbode, S. O., Omogboye, M. A., & Fagbola, L. O. (2019). Exchange rate volatility and foreign capital inflows in Nigeria: A vector error correction model approach. *Acta Universitatis Danubius. Œconomica*, 15(5), 34–43.
- Aliyu, S. R. U. (2016). Exchange rate volatility and export trade in Nigeria: An empirical investigation. *SSRN Electronic Journal*, 20(13), 1071–1084.
- Aliyu, S. R. U. (2017). Impact of oil price shock and exchange rate volatility on economic growth Nigeria: An empirical investigation. *Research Journal of International Studies*.
- Aliyu, S. U. R., Yakub, M. U., Sanni, G. K., & Duke, O. O. (2018). Exchange rate pass-through in Nigeria: Evidence from a vector error correction model. *CSAE Conference*, Oxford University.
- Aprilia, N. (2022). Pengaruh E-Trust terhadap E-Loyalty pada Marketplace Shopee. *Jurnal Ilmu Ekonomi dan Bisnis*, 10(1), 1–10.
- Adelowokan, O. A., Adesoye, A. B., & Balogun, O. D. (2015). Exchange rate volatility on investment and growth in Nigeria: An empirical analysis. *Global Journal of Management and Business Research*, 15(10), 19–30.
- Benson, U. O., & Victor, E. O. (2012). Real exchange rate and macroeconomic performance: Testing for the Balassa-Samuelson hypothesis in Nigeria. *International Journal of Economics and Finance*, 4(2), 127–134.

- Bini-Smaghi, L. (1991). Exchange rate volatility and trade: Why it is so difficult to find any empirical relationship? *Applied Economics*, 23, 927–936.
- Caporale, T., & Doroodian, K. (1994). Exchange rate variability and the flow of international trade. *Economics Letters*, 46, 49–54.
- CBN. (1985). *Statistical bulletin*. Central Bank of Nigeria.
- CBN. (2007a). Brief on the determination of the optimum exchange rate band under the IFEM. External Sector Division, Research Department, Central Bank of Nigeria.
- CBN. (2007b). The extent of naira exchange rate misalignment. Research and Statistics Department, Central Bank of Nigeria.
- CBN. (2023). *Statistical bulletin*. Central Bank of Nigeria.
- Corrinne, H., & McCauley, R. N. (2003). Living with flexible exchange rates: Issues and recent experience in inflation targeting emerging market economies. *BIS Working Papers*, No. 130.
- Cote, A. (1994). Exchange rate volatility and trade. *Bank of Canada Working Paper*, 94-5.
- Cottani, J., Cavallo, D., & Khan, M. S. (1990). Real exchange rate behavior and economic performance in LDCs. *Economic Development and Cultural Change*, 39, 61–76.
- De Grauwe, P. (1987). International trade and economic growth in the EMS. *European Economic Review*, 31(1–2), 389–398.
- De Grauwe, P. (1988). Exchange rate variability and the slowdown in growth of international trade. *IMF Staff Papers*.
- Dell’Ariccia, G. (1998). Exchange rate fluctuations and trade flows: Evidence from the European Union. *IMF Working Paper*, WP/98/107.
- Diaz-Alejandro, C. F. (1984). Exchange rates and terms of trade in the Argentine Republic: 1973–76. In M. Syrquin & S. Teitel (Eds.), *Trade stability, technology and equity in Latin America* (pp. xx–xx). New York: Academic Press.
- Dibooglu, S., & Enders, W. (1995). Multiple cointegrating vectors and structural economic models: An application to the French franc/U.S. dollar exchange rate. *Southern Economic Journal*, 61(4), 1098–1116.
- Dornbusch, R. (1988). *Open macroeconomics* (2nd ed.). New York.
- Edwards, S. (1989). *Real exchange rates, devaluation and adjustment: Exchange rate policy in developing countries*. MIT Press.
- Egwaikhide, F. O. (1999). Determinants of imports in Nigeria: A dynamic specification. *African Economic Research Consortium (AERC) Research Paper*, No. 91.
- Eichengreen, B., & Irwin, D. A. (1995). Trade blocs, currency blocs and the reorientation of trade in the 1930s. *Journal of International Economics*, 38, 1–24.
- Engle, R. F., & Granger, C. W. J. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica*, 55, 251–276.
- Engle, R. F., & Kroner, K. F. (1995). Multivariate simultaneous generalized ARCH. *Econometric Theory*, 11, 122–150.
- Ethier, W. (1973). International trade and the forward exchange market. *American Economic Review*, 63, 494–503.
- European Commission. (1995). The impact of exchange rate movements on trade within the single market. *European Economy*, No. 4.
- Flam, H., & Jansson, P. (2000). EMU effects on international trade and investment. *Stockholm University Seminar Paper*, No. 683.
- Fountas, S., & Aristotelous, K. (1999). Has the European Monetary System led to more exports? Evidence from four European Union countries. *Economics Letters*, 62, 357–363.
- Franke, G. (1991). Exchange rate volatility and international trading strategy. *Journal of International Money and Finance*, 10, 292–307.
- Friedman, M. (1953). The case for flexible exchange rates. In *Essays in Positive Economics* (pp. 157–203). University of Chicago Press.
- Glick, R., & Rose, A. K. (2002). Does a currency union affect trade? The time series evidence. *European Economic Review*, 46(6), 1125–1151.
- Gujarati, D. N. (2003). *Basic econometrics* (4th ed.). McGraw-Hill.
- Hodrick, R. J., & Prescott, E. C. (1997). Postwar U.S. business cycles: An empirical investigation. *Journal of Money, Credit, and Banking*, 29, 1–16.
- Hooper, P., & Kohlhaugen, S. (1978). The effect of exchange rate uncertainty on the prices and volumes of international trade. *Journal of International Trade*, 8, 483–511.
- Hossain, A. (2002). Exchange rate responses to inflation in Bangladesh. *IMF Working Paper*, WP/02/XX.
- Lawal, A. I., Atunde, I. O., Ahmed, V., & Abiola, A. (2016). Exchange rate fluctuation and the Nigeria economic growth. *EuroEconomica*, 35(2), 1–14.
- McKinnon, R. (1963). Optimal currency areas. *American Economic Review*, 53, 717–724.
- Pesaran, M., & Pesaran, B. (1997). *Microfit 4.0 (Windows version)*. Oxford University Press.