The copyright © of this thesis belongs to its rightful author and/or other copyright owner. Copies can be accessed and downloaded for non-commercial or learning purposes without any charge and permission. The thesis cannot be reproduced or quoted as a whole without the permission from its rightful owner. No alteration or changes in format is allowed without permission from its rightful owner.



ECONOMIC CONVERGENCE AMONGST ECOWAS MEMBER COUNTRIES: THE ROLE OF FOREIGN DIRECT INVESTMENT



Degree of Doctor of Philosophy UNIVERSITI UTARA MALAYSIA June 2016

ECONOMIC CONVERGENCE AMONGST ECOWAS MEMBER COUNTRIES: THE ROLE OF FOREIGN DIRECT INVESTMENT



Thesis Submitted to School of Economics, Finance and Banking, Universiti Utara Malaysia, in Fulfillment of the Requirement for the Degree of Doctor of Philosophy

PERMISSION TO USE

In presenting this thesis in fulfillment of the requirements for a Post Graduate degree from the Universiti Utara Malaysia (UUM), I agree that the Library of this university may make it freely available for inspection. I further agree that permission for copying this thesis in any manner, in whole or in part, for scholarly purposes may be granted by my supervisor or in their absence, by the Dean of School of Economics, Finance and Banking where I did my thesis. It is understood that any copying or publication or use of this thesis or parts of it for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the UUM in any scholarly use which may be made of any material in my thesis.

Request for permission to copy or to make other use of materials in this thesis in whole or in part should be addressed to:



ABSTRACT

The phenoma of per capita income convergence has a lot of welfare implications. FDI is identified as a principal candidate for technology transfer to developing countries. However, the distribution of FDI is observed to be highly skewed in favour of limited number of countries. Africa in general, and ECOWAS in particular, perfromed poorly in FDI attraction compared to other countries. ECOWAS is also characterized by huge within group gap both in terms of FDI and real GDP per capita. Using data spanning from 1970 – 2014, this study investigates the relationship between real GDP per capita and FDI for a sample of 15 ECOWAS countries. The study employs SURADF procedure to investigate on absolute convergence within each income group as well as convergence within ECOWAS at large. It is observed that seven economies tend to converge to the group average real GDP per capita, of which only one is a low-income. On the speed of convergence, the study reveals that relatively poor economies tend to catch up with relatively richer economies in the group at 1.10 percent, a rate considered very slow. The study further reveals that FDI plays a significant role in facilitating per capita income convergence amongst ECOWAS member states. Investigation of the role of FDI in attaining across group convergence for ECOWAS and each income group also yields results showing a sharp difference between the two income groups. Low income countries have positive and significant relationship between FDI and convergence as opposed to the case of lower middle income. The policy implications of these findings is that ECOWAS countries need to implement policies that would aid FDI attraction as well as ensure adequate absorptive capacity, which is an important condition to reap the benefits of FDI.

Keywords: GDP per capita, convergence, FDI, ECOWAS, SURADF

ABSTRAK

Fenomena penumpuan pendapatan per kapita mempunyai banyak implikasi dari aspek kebajikan. FDI dikenal pasti sebagai penyumbang utama pemindahan teknologi kepada negara-negara sedang membangun. Walau bagaimanapun, pengagihan FDI didapati sangat condong ke arah beberapa buah negara tertentu sahaja. Afrika secara umumnya, dan negara-negara ECOWAS secara khususnya didapati agak lemah dalam aspek tarikan FDI berbanding negara-negara lain. ECOWAS juga dicirikan mempunyai jurang yang besar dalam kumpulan dari segi FDI dan KDNK per kapita. Dengan menggunakan data yang terangkum sejak tahun 1970 hingga tahun 2014, kajian ini menyelidik hubungan antara KDNK per kapita dan FDI bagi sampel 15 negara ECOWAS. Kajian ini menggunakan prosedur SURADF untuk menyelidik penumpuan mutlak dalam setiap kumpulan pendapatan serta penumpuan dalam ECOWAS secara amnya. Dapatan kajian mendapati terdapat tujuh ekonomi tertumpu kepada purata pendapatan KDNK per kapita sebenar, dan hanya satu didapati berpendapatan rendah. Dari segi kelajuan penumpuan, kajian ini mendapati bahawa negara berekonomi lemah cenderung untuk mengejar negara berekonomi lebih kukuh dalam kumpulannya pada kadar 1.10 peratus, yang mana dianggap sebagai sangat perlahan. Kajian ini seterusnya mendedahkan bahawa FDI memainkan peranan penting dalam memudahkan penumpuan terhadap pendapatan kapita dalam kalangan negara anggota ECOWAS. Penyelidikan terhadap peranan FDI terhadap penumpuan kepada keseluruhaan kumpulan ECOWAS dan pendapatan setiap kumpulan juga menghasilkan keputusan yang menunjukkan perbezaan yang jelas. Negara yang berpendapatan rendah mempunyai hubungan yang positif dan signifikan antara FDI dan penumpuan yang mana bertentangan dengan negara yang berpendapatan sederhana rendah. Implikasi dasar penemuan ini adalah negara ECOWAS perlu melaksanakan dasar-dasar yang dapat membantu tarikan FDI serta memastikan keupayaan penyerapan yang mencukupi memandangkan hal ini merupakan keadaan yang penting untuk meraih faedah daripada FDI.

Kata kunci: KDNK per kapita, penumpuan, FDI, ECOWAS, SURADF

ACKNOWLEDGEMENT

First and foremost, my profound gratitude goes to *Allahu Subhanahu Wa Ta'ala* for His infinite mercy, continuous guidance and endless blessings. Indeed, it goes without saying that the journey of PhD is an unachievable task for me but for the grace of Allah. Alhamdulillah!

The value of inputs I have received during the course of this programme from my Supervisor, Associate Professor Dr. Sallahuddin Hassan, cannot be quantified. He gave me complete and free access to his wealth of knowledge and experience. He painstakingly guided me from onset to the completion of the programme despite his tight administrative schedules and numerous academic responsibilities. I really benefited immensely from his obvious nature of hard work and thoroughness in reading the work. Indeed, I appreciate your tremendous contributions.

Equally, I am very grateful to my reviewers during the proposal defence in persons of Associate Professor Dr. Nor' Aznin Abu Bakar and Dr. Nor Azam Abdul Razak. Their constructive comments and observation have in no small way contributed in improving the quality of the thesis.

I am also indebted to my employer, Usmanu Danfodiyo University, Sokoto, for granting me leave to undertake the programme. For proving an enabling environment, I like to thank the Management and entire staff of University Utara, Malaysia.

My parents, in persons of Late Alhaji Musa Ishaq and Hajiya Hafsat Umar deserve to be acknowledged. You have immensely contributed towards whatever success I have made. I pray that my Almighty Allah reward you with *Jannatul-Firdaus*.

I also appreciate the understanding and moral support I got from my beloved wife, Hadiza Shehu Abara. Finally, for being a very important source of joy to me, my children Muhammad and Hafsat (Ummie) also deserve to be mentioned.

Murtala Musa Matric No. 96050

TABLE OF CONTENTS

TITLE PAGE	i		
CERTIFICATION OF THESIS WORK	ii		
PERMISSION TO USE			
ABSTRACT			
ABSTRAK			
ACKNOWLEDGEMENT			
TABLE OF CONTENTS			
LIST OF TABLES			
LIST OF FIGURES x			
LIST OF ABBREVIATIONS	xiii		
CHAPTER ONE INTRODUCTION	1		
1.1 Introduction	1		
1.2 Background and Motivation of Study	1		
1.3 Problem Statement	10		
1.4 Research Questions	16		
1.5 Objectives of the Study	16		
1.6 Significance of the Study iversiti Utara Malaysia	17		
1.7 Study Area	19		
1.7.1 ECOWAS – Establishment and Objectives	19		
1.7.2 Macroeconomic Background of ECOWAS	20		
1.8 Scope of the Study	21		
1.9 Organization of Chapters	21		
1.10 Conclusion	22		
CHAPTER TWO LITERATURE REVIEW	23		
2.1 Introduction	23		
2.2 Theory and Concepts of Economic Convergence	23		
2.2.1 Neoclassical Growth Theory versus Endogenous Growth Theories	24		
2.2.2 Absolute versus Conditional Convergence	26		
2.2.3 Club Convergence	26		
2.3 Measurement of Economic Convergence	31		
2.3.1 Beta Convergence versus Sigma Convergence	31		
2.4 Empirical studies on Economic convergence	33		

2.4.1 Cross-Section Approach	33
2.4.2 Panel Data Approach	39
2.4.3 Time Series Approach	44
2.5 Foreign Direct Investment and Economic Convergence	52
2.6 Trade and Economic Convergence	63
2.7 Government Size and Economic Convergence	71
2.8 Population Growth and Economic Convergence	75
2.9 Literature Gap	77
2.10 Conclusion	78
CHAPTER THREE RESEARCH METHODOLOGY	79
3.1 Introduction	79
3.2 Conceptual Framework	79
3.3 Model Estimation	82
3.3.1 Absolute Convergence	82
3.3.2 Conditional Convergence	83
3.3.3 Foreign Direct Investment and Real GDP Per capita Convergence	ce 86
3.4 Justification of Variables	87
3.4.1 Real GDP Convergence	88
3.4.2 Foreign Direct Investment	88
3.4.3 Trade Openness	89
3.4.4 Population Growth Rates	90
3.4.5 Government Size	90
3.5 Sources of Data	90
3.6 Study Sample	91
3.7 Method of Data Analysis	92
3.7.1 System Generalized Method of Moments	92
3.7.2 Unit Root	94
3.7.2.1 Time Series Test	94
3.7.2.2 Panel Unit Root Test	96
3.7.3 Diagnostic Tests	98
3.7.3.1 Serial Correlation	98
3.7.3.2 Test for Overidentifying Restrictions	99
3.7.3.3 Test for Autocorrelation	100
3.8 Conclusion	101
CHAPTER FOUR DISCUSSION OF RESULTS	102

4.1	Introduction 10		
4.2	Descriptive Analysis		
4.3	3 Unconditional Convergence		
	4.3.1 Ranking of Real GDP per Capita	114	
	4.3.2 Unit Root Test	119	
4.4	Conditional Convergence	126	
4.5	5 Foreign Direct Investment and Convergence to the Group Average Real per Capita GDP		
4.6	Foreign Direct Investment and Pairwise Convergence of GDP per Capita	141	
	4.6.1 Foreign Direct Investment and Pairwise Convergence – Low-income	141	
	4.6.2 Foreign Direct Investment and Pairwise Converge – Lower Middle-income	145	
	4.6.3 Foreign Direct Investment and Pairwise Converge – Low-Income to Lower Middle-Income	148	
4.7	.7 Conclusion		
CHAPTER FIVE SUMMARY AND CONCLUSIONS 153			
5.1	Introduction	153	
5.2	Summary of Findings	153	
5.3	Policy Implications	157	
5.4	4 Limitations of the Study 15		
5.5	5 Recommendations for Further Research 16		
5.6	Conclusion	162	
REFERENCES 16			

LIST OF TABLES

Table		Page
Table 1.1	5-Year Average of Annual Real GDP Per Capita for WAC, 1970 – 2014	3
Table 1.2	RGDP Per Capita Ratio (Richest to Poorest Country among Low- Income WAC, 1970 – 2014	5
Table 3.1	Economies in the Sample	90
Table 4.1	Convergence of Real GDP per Capita amongst Income Groups and across ECOWAS, 1970 – 2014	103
Table 4.2	Real GDP per Capita (\$) of ECOWAS Member Countries, 1970 – 2014	105
Table 4.3	Real FDI per Capita Stock (\$) – ECOWAS Member Countries, 1986 – 2014	106
Table 4.4	Trade Openness (%)	107
Table 4.5	Government Size (%)	109
Table 4.6	Population growth (%)	111
Table 4.7	Correlation Matrix of the Variables	112
Table 4.8	Ranking of Real GDP Per Capita among ECOWAS Members, 1970-2014	113
Table 4.9	Ranking of ECOWAS Real GDP per capita by Income Groups, 1970 – 2014	115
Table 4.10	Seemingly Unrelated Regression Based Augmented Dickey-Fuller Unit Root Test – ECOWAS	119
Table 4.11	Seemingly Unrelated Regression Based Augmented Dickey-Fuller Unit Root Test – Low Income	122
Table 4.12	Seemingly Unrelated Regression Based Augmented Dickey-Fuller Unit Root Test – Lower Middle Income	124
Table 4.13	Estimation of the Speed of Convergence	125
Table 4.14	System-GMM Estimations Results for Convergence amongst ECOWAS Countries	129
Table 4.15	System-GMM Estimations Results for Convergence amongst Low Income Countries	134
Table 4.16	System-GMM Estimations Results for Convergence amongst Lower Middle Income Countries	137
Table 4.17	System-GMM Estimations Results for Convergence across Low Income Countries	141
Table 4.18	System-GMM Estimations Results for Convergence across Lower Middle Income Countries	145
Table 4.19	System-GMM Estimations Results for Convergence of Low Income to Lower Middle Income Countries	149

LIST OF FIGURES

Figure	Pa	ge
Figure 1.1	Standard Deviation of Real GDP Per Capita among WAC, 1970 – 2014	4
Figure 1.2	Ratio of Real GDP Per Capita of Richest Country to the Poorest among Lower Middle-Income of WAC, 1970 – 2014	6
Figure 1.3	Distribution of FDI Net Inflows among Low and Lower Middle-Income of WACs, 1981 – 2014	9
Figure 3.1	Research Framework	80



LIST OF ABBREVIATIONS

Full Meaning
Augmented Dickey-Fuller
Developed Countries
Economic Community of West African States
European Economic Community
European Union
Foreign Direct Investment
Gross Domestic Product
Generalized Method of Moments
Im, Pesaran and Shin
Less Developed Countries
Low Income
Lagrange Multiplier
Lower Middle Income
Organization for Economic Cooperation and Development
Ordinary Least Squares
Real Foreign Direct Investment
Real Gross Domestic Product
Sub-Saharan Africa
Seemingly Unrelated Regression Augmented Dickey-Fuller
United Nations Conference on Trade and Development
United Nations Economic Comparison for Europe
United States of America
United States Dollars
West African Countries
World Development Indicators

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter consists of ten sections. It serves the purpose of introducing the entire research. Section 1.2 provides background and motivation for conducting the study. While Section 1.3 consists of problem statement, Section 1.4 presents a number of research questions which are translated into objectives of the study as contained in Section 1.5. Significance of the study is provided in Section 1.6. Study area is highlighted in Section 1.7. Scope of the study is highlighted in Section 1.8. Finally, while Section 1.9 explains organization of chapters for the entire research, Section 1.0 concludes the chapter.

1.2 Background and Motivation of Study Utara Malaysia

Issues surrounding economic growth, its determinants and convergence¹ among countries of the world and regions have received remarkable attention of researchers (Crespo-Cuaresma, Foster & Stehrer, 2011). Beside its human welfare effects, the phenomenon of income/growth convergence is considered as an avenue to testing the validity of alternative economic growth theories (Islam, 2003). Despite the reemergence of interest in the debate on growth convergence and its determinants, consensus among economists appears to be impossible. In the view of United Nations

¹The term convergence refers to an economic phenomenon where poor countries tend to grow faster than the richer ones over the long run. Convergence is said to be absolute or unconditional when the gap in the output growth between richer and poor countries vanishes over time regardless of the differences in observable characteristics of the countries. On the contrast, convergence is regarded as conditional if the reduction in the gap depends on certain observable characteristics of the countries.

The contents of the thesis is for internal user only

REFERENCES

- Afonso, A., & Furceri, D. (2010). Government size, composition, volatility and economic growth. *European Journal of Political Economy*, **26**(**4**), 517-532.
- Alexiadis, S., & Tomkins, J. (2004). Convergence clubs in the regions of Greece. *Applied Economics Letters*, **11(6)**, 387-391.
- Alfaro, L., Chanda, A., Kalemli-Ozcan, S., & Sayek, S. (2010). Does foreign direct investment promote growth? Exploring the role of financial markets on linkages. *Journal of Development Economics*, 91(2), 242-256.
- Arbatli, E. C. (2011). Economic policies and FDI inflows to emerging market economies. International Monetary Fund.
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277-297.
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, **68**(1), 29-51.
- Aubyn, M. S. (1999). Convergence across industrialised countries (1890–1989): New results using time series methods. *Empirical Economics*, 24(1), 23-44.
- Badinger, H., Müller, W., & Tondl, G. (2004). Regional convergence in the European Union, 1985-1999: A spatial dynamic panel analysis. *Regional Studies*, 38(3), 241-253.
- Barlow, R. (1994). Population growth and economic growth: Some more correlations. *Population and Development Review*, 20(1), 153-165.
- Barro, R. J. (1991). Economic growth in a cross section of countries. *The Quarterly Journal of Economics*, **106(2)**, 407-443.

- Barro, R. J. (2001). Human Capital and growth. *The American Economic Review*, **91(2)**, 12-17.
- Barro, R. J., & Sala-i-Martin, X. (2004). Economic Growth: MIT Press: *Cambridge*, *Massachusetts*.
- Barro, R. J., & Sala-i-Martin, X. X. (1992). Convergence. Journal of Political Economy, 100(2), 223-251.
- Barro, R. J., Sala-i-Martin, X., Blanchard, O. J., & Hall, R. E. (1991). Convergence across states and regions. *Brookings Papers on Economic Activity*, **1991** (1), 107-182.
- Baum, C. F., Schaffer, M. E., & Stillman, S. (2003). Instrumental variables and GMM:Estimation and testing. *Stata Journal*, *3*(1), 1-31.
- Baumol, W. J. (1986). Productivity growth, convergence, and welfare: what the longrun data show. *The American Economic Review*, **76**(5), 1072-1085.
- Ben-David, D. (1993). Equalizing exchange: Trade liberalization and income convergence. *The Quarterly Journal of Economics*, 108(3), 653-679.
- Ben-David, D. (1996). Trade and convergence among countries. Journal of International Economics, 40(3), 279-298.
- Ben-David, D. (2001). Trade liberalization and income convergence: A comment. *Journal of International Economics*, **55**(1), 229-234.
- Ben-David, D., & Bohara, A. K. (1997). Evidence on the contribution of trade reform towards international income equalization. *Review of International Economics*, 5(2), 246-255.
- Ben-David, D., & Kimhi, A. (2004). Trade and the rate of income convergence. The Journal of International Trade & Economic Development, 13(4), 419-441.

- Benhabib, J., & Spiegel, M. M. (1994). The role of human capital in economic development evidence from aggregate cross-country data. *Journal of Monetary economics*, 34(2), 143-173.
- Bernard, A. B., & Durlauf, S. N. (1995). Convergence in international output. *Journal* of Applied Econometrics, **10**(2), 97-108.
- Bernard, A. B., & Jones, C. I. (1996). Comparing apples to oranges: Productivity convergence and measurement across industries and countries. *The American Economic Review*, 86(5), 1216-1238.
- Bijsterbosch, M., & Kolasa, M. (2010). FDI and productivity convergence in Central and Eastern Europe: An industry-level investigation. *Review of World Economics*, 145(4), 689-712.
- Bitzer, J., & Kerekes, M. (2008). Does foreign direct investment transfer technology across borders? New evidence. *Economics Letters*, *100*(3), 355-358.
- Blomström, M., & Sjöholm, F. (1999). Technology transfer and spillovers: Does local participation with multinationals matter?. *European Economic Review*, 43(4), 915-923.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, **87(1)**, 115-143.
- Branstetter, L. (2006). Is foreign direct investment a channel of knowledge spillovers? Evidence from Japan's FDI in the United States. *Journal of International Economics*, 68(2), 325-344.
- Breuer, J. B., McNown, R., & Wallace, M. (2002). Series-specific unit root tests with panel data. *Oxford Bulletin of Economics and statistics*, **64**(5), 527-546.

- Breuer, J. B., McNown, R., & Wallace, M. S. (2001). Misleading inferences from panel unit root tests with an illustration from purchasing power parity. *Review of International Economics*, 9(3), 482-493.
- Breusch, T. S. (1978). Testing for autocorrelation in dynamic linear models. *Australian Economic Papers*, *17*(31), 334-355.
- Caggiano, G., & Leonida, L. (2009). International output convergence: Evidence from an autocorrelation function approach. *Journal of Applied Econometrics*, 24(1), 139-162.
- Carkovic, M. V., & Levine, R. (2002). Does foreign direct investment accelerate economic growth? University of Minnesota Department of Finance Working Paper, University of Minnesota: USA.
- Carlino, G. A., & Mills, L. O. (1993). Are US regional incomes converging? A time series analysis. *Journal of Monetary Economics*, 32(2), 335-346.
- Carlino, G., & Mills, L. (1996). Convergence and the US states: A time-series analysis. *Journal of Regional Science*, **36**(**4**), 597-616.
- Caselli, F., Esquivel, G., & Lefort, F. (1996). Reopening the convergence debate: A new look at cross-country growth empirics. *Journal of Economic Growth*, 1(3), 363-389.
- Cass, D. (1965). Optimum growth in an aggregative model of capital accumulation. *The Review of Economic Studies*, **32(3)**, 233-240.
- Cellini, R., & Scorcu, A. E. (2000). Segmented stochastic convergence across the G-7 countries. *Empirical Economics*, **25(3)**, 463-474.
- Cheng, L. K., & Kwan, Y. K. (2000). What are the determinants of the location of foreign direct investment? The Chinese experience. *Journal of International Economics*, 51(2), 379-400.

- Cheung, K. Y., & Ping, L. (2004). Spillover effects of FDI on innovation in China: Evidence from the provincial data. *China Economic Review*, **15**(1), 25-44.
- Choi, C. (2004). Foreign direct investment and income convergence. *Applied Economics*, **36(10)**, 1045-1049.
- Choi, C. (2009). Does bilateral trade lead to income convergence? Panel evidence. *Journal of Economic Development*, **34**(1), 71-79.
- Ciruelos, A., & Wang, M. (2005). International technology diffusion: Effects of trade and FDI. *Atlantic Economic Journal*, **33(4)**, 437-449.
- Collier, P., & Gunning, J. W. (1999). Explaining African economic performance. *Journal of Economic Literature*, **37(1)**, 64-111.
- Cook, S. (2008). An alternative perspective on the stochastic convergence of incomes in the United States. *Applied Economics Letters*, **15**(12), 929-934.
- Coulombe, S., & Lee, F. C. (1995). Convergence across Canadian provinces, 1961 to 1991. *Canadian Journal of Economics*, **28(4)**, 886-898
- Crespo, N., & Fontoura, M. P. (2007). Determinant factors of FDI spillovers-what do we really know? *World Development*, **35(3)**, 410-425.
- Crespo-Cuaresma, J., Foster, N., & Stehrer, R. (2011). Determinants of regional economic growth by quantile. *Regional Studies*, **45(6)**, 809-826.
- Dalgaard, C. J., & Vastrup, J. (2001). On the measurement of σ -convergence. *Economics Letters*, **70(2)**, 283-287.
- Damijan, J. P., Knell, M., Majcen, B., & Rojec, M. (2003). The role of FDI, R&D accumulation and trade in transferring technology to transition countries: Evidence from firm panel data for eight transition countries. *Economic Systems*, 27(2), 189-204.

- Dar, A. A., & AmirKhalkhali, S. (2002). Government size, factor accumulation, and economic growth: evidence from OECD countries. *Journal of Policy Modeling*, 24(7), 679-692.
- Dawson, J. W., & Sen, A. (2007). New evidence on the convergence of international income from a group of 29 countries. *Empirical Economics*, **33**(**2**), 199-230.
- Dawson, J. W., & Strazicich, M. C. (2010). Time-series tests of income convergence with two structural breaks: Evidence from 29 countries. *Applied Economics Letters*, 17(9), 909-912.
- De Long, J. B. (1988). Productivity growth, convergence, and welfare: Comment. *The American Economic Review*, **78**(**5**), 1138-1154.
- Devarajan, S., & Kasekende, L. A. (2011). Africa and the global economic crisis: Impacts, policy responses and political economy. *African Development Review*, 23(4), 421-438.
- Devarajan, S., Swaroop, V. & Zou, H. (1996). The composition of public expenditure and economic growth. *Journal of Monetary Economics*, **37**, 313-344.
- Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, **74**(**366a**), 427-431.
- Domar, E. D. (1946). Capital expansion, rate of growth, and employment. *Econometrica*, 137-147.
- Dowrick, S., & Nguyen, D. T. (1989). OECD comparative economic growth 1950-85: Catch-up and convergence. *The American Economic Review*, **79(5)**, 1010-1030.
- Doytch, N., & Uctum, M. (2011). Does the worldwide shift of FDI from manufacturing to services accelerate economic growth? A GMM estimation study. *Journal of International Money and Finance*, 30(3), 410-427.

- Durbin, J., & Watson, G. S. (1950). Testing for serial correlation in least squares regression: I. *Biometrika*, **37(3/4)**, 409-428.
- Durbin, J., & Watson, G. S. (1951). Testing for serial correlation in least squares regression. II. *Biometrika*, 38(1/2), 159-177.
- Durlauf, S. N. (2003). *The convergence hypothesis after 10 years*. Social Systems Research Institute, University of Wisconsin: USA
- Durlauf, S. N., & Johnson, P. A. (1995). Multiple regimes and cross-country growth behaviour. *Journal of Applied Econometrics*, **10**(**4**), 365-384.
- Easterly, W., King, R., Levine, R., & Rebelo, S. (1994). *Policy, technology adoption, and growth* (No. w4681). National Bureau of Economic Research.
- Evans, P., & Karras, G. (1996). Do economies converge? Evidence from a panel of US states. *The Review of Economics and Statistics*, **78**(**3**), 384-388.
- Fakthong, T. (2012). Convergence in income inequality and growth under public investment in human capital: The case of Thailand. *Procedia Economics and Finance*, 2, 315-324.
- Fischer, M. M., & Stirböck, C. (2006). Pan-European regional income growth and clubconvergence. *The Annals of Regional Science*, **40(4)**, 693-721.
- Folster, S., & Henrekson, M. (2001). Growth effects of government expenditure and taxation in rich countries. *European Economic Review*, 45(8), 1501-1520.
- Friedman, M. (1992). Do old fallacies ever die? *Journal of Economic Literature*, **30**(**4**), 2129-2132.
- Furceri, D. (2005). β and σ -convergence: A mathematical relation of causality. *Economics Letters*, **89(2)**, 212-215.
- Galor, O. (1996). Convergence? Inference from theoretical models. *Economic Journal*, *106*(437), 1056-1069.

- Galor, O., & Weil, D. N. (1993). The gender gap, fertility, and growth. *American Economic Review*, **86(3)**, 374-387.
- Giles, D. E. (2005). Output convergence and international trade: Time-series and fuzzy clustering evidence for New Zealand and her trading partners, 1950–1992. *Journal of International Trade & Economic Development*, **14**(1), 93-114.
- Glaeser, E. L., Scheinkman, J., & Shleifer, A. (1995). Economic growth in a crosssection of cities. *Journal of Monetary Economics*, **36**(1), 117-143.
- Glass, A. J., & Saggi, K. (2002). Multinational firms and technology transfer. *The Scandinavian Journal of Economics*, **104(4)**, 495-513.
- Godfrey, L. G. (1978). Testing against general autoregressive and moving average error models when the regressors include lagged dependent variables. *Econometrica*, *46*, 1293-1301.
- Gong, G., & Keller, W. (2003). Convergence and polarization in global income levels:A review of recent results on the role of international technology diffusion. *Research Policy*, 32(6), 1055-1079.
- Greasley, D., & Oxley, L. (1997). Time-series based tests of the convergence hypothesis: some positive results. *Economics Letters*, **56**(2), 143-147.
- Grier, K. B., & Tullock, G. (1989). An empirical analysis of cross-national economic growth, 1951–1980. *Journal of Monetary Economics*, 24(2), 259-276.
- Guseh, S. (1997). Government size and economic growth in developing countries: A political-economy framework. *Journal of Macroeconomics*, *19*(1), 175-191.
- Habibullah, M. S., Dayang-Affizzah, A. M., & Puah, C. H. (2012). Regional income disparities in Malaysia: A stochastic convergence analysis. *Malaysian Journal of Society and Space*, 8(5), 100-111.

- Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica*, 1029-1054.
- Harrod, R. F. (1939). An essay in dynamic theory. *The Economic Journal*, **49**(**193**), 14-33.
- Heckelman, J. C. (2013). Income convergence among US states: Cross-sectional and time series evidence. *Canadian Journal of Economics*, **46(3)**, 1085-1109.
- Hsiao, C. (1985). Benefits and limitations of panel data. *Econometric Reviews*, **4**(1), 121-174
- Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115(1), 53-74.
- Islam, N. (1995). Growth empirics: A panel data approach. The Quarterly Journal of Economics, 110(4), 1127-1170.
- Islam, N. (2003). What have we learnt from the convergence debate? Journal of Economic Surveys, 17(3), 309-362.
- Jayanthakumaran, K., & Lee, S. W. (2013). Evidence on the convergence of per capita income: A comparison of founder members of the association of South East Asian nations and the South Asian association of regional cooperation. *Pacific Economic Review*, 18(1), 108-121.
- Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*, **12(2)**, 231-254.
- Johansen, S. (1995). A stastistical analysis of cointegration for I (2) variables. Econometric Theory, 11(1), 25-59.
- Keller, W. (2004). International technology diffusion. *Journal of Economic Literature*, 42(3), 752-782.

- King, A., & Ramlogan-Dobson, C. (2014). Are income differences within the OECD diminishing? Evidence from Fourier unit root tests. *Studies in Nonlinear Dynamics* & *Econometrics*, 18(2), 185-199.
- Knight, M., Loayza, N., & Villanueva, D. (1993). Testing the neoclassical theory of economic growth: A panel data approach. *Staff Papers-International Monetary Fund*, 512-541.
- Kolluri, B. R., Panik, M. J., & Wahab, M. S. (2000). Government expenditure and economic growth: evidence from G7 countries. *Applied Economics*, 32(8), 1059-1068.
- Kormendi, R. C., & Meguire, P. G. (1985). Macroeconomic determinants of growth: cross-country evidence. *Journal of Monetary Economics*, *16*(2), 141-163.
- Kumar, M. (2011). Examining the convergence in the economic growth of Indian States. *The IUP Journal of Public Finance*, 9(4), 19-27.
- Lane, P. R. (2001). International trade and economic convergence: The credit channel. Oxford Economic Papers, 53(2), 221-240.
- Lee, J. (2009). Trade, FDI, and productivity convergence: A dynamic panel data approach in 25 countries. *Japan and the World Economy*, **21**(3), 226-238.
- Lei, C. K., & Tam, P. S. (2010). A panel data approach to the income convergence among Mainland China, Hong Kong and Macao. *Journal of the Asia Pacific Economy*, 15(4), 420-435.
- Levin, A., Lin, C. F., & Chu, C. S. J. (2002). Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics*, **108**(1), 1-24.
- Lichtenberg, F. R. (1994). Testing the convergence hypothesis. *The Review of Economics and Statistics*, **76(3)**, 576-579.

- Liu, X. (2009). Trade and income convergence: Sorting out the causality. *The Journal* of International Trade & Economic Development, **18**(1), 169-195.
- Loewy, M. B., & Papell, D. H. (1996). Are US regional incomes converging? Some further evidence. *Journal of Monetary Economics*, *38*(3), 587-598.
- Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, **22**(1), 3–42.
- Maddala, G. S., & Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and statistics*, *61*(S1), 631-652.
- Maddison, A. (1983). A comparison of levels of GDP per capita in developed and developing countries, 1700–1980. *Journal of Economic History*, **43**(1), 27-41.

Mankiw, N. G. (2002). Macroeconomics: Worth Publishers Inc. US.

- Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, **107**, 407-37
- Mayer-Foulkes, D., & Nunnenkamp, P. (2009). Do multinational enterprises contribute to convergence or divergence? A disaggregated analysis of US FDI. *Review of Development Economics*, 13(2), 304-318.
- McCoskey, S. K. (2002). Convergence in Sub-Saharan Africa: A nonstationary panel data approach. *Applied Economics*, **34**(**7**), 819-829.
- Miron, D., & Alexe, I. (2014). Capital flows and income convergence in the European Union. A Fresh Perspective in View of the Macroeconomic Imbalance Procedure. *Procedia Economics and Finance*, 8, 25-34.
- Mokyr, J. (2005). Long-term economic growth and the history of technology. Handbook of Economic Growth, 1, 1113-1180.

- Moosa, I. A., & Cardak, B. A. (2006). The determinants of foreign direct investment: An extreme bounds analysis. *Journal of Multinational Financial Management*, 16(2), 199-211.
- Nelson, C. R., & Plosser, C. R. (1982). Trends and random walks in macroeconomic time series: some evidence and implications. *Journal of Monetary Economics*, 10(2), 139-162.
- Neto, D. G., & Veiga, F. J. (2013). Financial globalization, convergence and growth: The role of foreign direct investment. *Journal of International Money and Finance*, 37, 161-186.
- Nikoloski, Z. (2010). Financial Sector Development and Income Inequality: Is there a Financial Kuznets Curve? SSRN Papers 1703224.
- Noorbakhsh, F., Paloni, A., & Youssef, A. (2001). Human capital and FDI inflows to developing countries: New empirical evidence. *World Development*, **29**(**9**), 1593-1610.
- Oxley, L., & Greasley, D. (1995). A Time-series perspective on convergence: Australia, UK and USA since 1870. *Economic Record*, **71(3)**, 259-270.
- Oxley, L., & Greasley, D. (1999). A Nordic convergence club? Applied Economics Letters, 6(3), 157-160.
- Parikh, A., & Shibata, M. (2004). Does trade liberalization accelerate convergence in per capita incomes in developing countries? *Journal of Asian Economics*, 15(1), 33-48.
- Perron, P. (1989). The great crash, the oil price shock, and the unit root hypothesis. *Journal of the Econometric Society*, **57(6)**, 1361-1401.
- Pesaran, M. H. (2007). A pairwise approach to testing for output and growth convergence. *Journal of Econometrics*, **138**(1), 312-355.

- Quah, D. (1993). Galton's fallacy and tests of the convergence hypothesis. *The Scandinavian Journal of Economics*, **95(4)**, 427-443.
- Quah, D. (1994). Exploiting cross-section variation for unit root inference in dynamic data. *Economics Letters*, **44**(1), 9-19.
- Quah, D. T. (1996). Empirics for economic growth and convergence. *European Economic Review*, **40(6)**, 1353-1375.
- Ram, R. (1986). Government size and economic growth: A new framework and some evidence from cross-section and time-series data. *The American Economic Review*, **76(1)**, 191-203.
- Rey, S. J., & Montouri, B. D. (1999). US regional income convergence: A spatial econometric perspective. *Regional Studies*, 33(2), 143-156.
- Rodríguez-Pose, A., Psycharis, Y., & Tselios, V. (2012). Public investment and regional growth and convergence: Evidence from Greece. *Papers in Regional Science*, 91(3), 543-568.
- Romer, P. (1993). Idea gaps and object gaps in economic development. Journal of Monetary Economics, 32(3), 543-573.

Sala-i-Martin, X. (1990). On growth and states. Ph.D. Dissertation, Harvard University.

- Sala-i-Martin, X. (1994). Cross-sectional regressions and the empirics of economic growth. *European Economic Review*, 38(3), 739-747.
- Sala-i-Martin, X. X. (1996). Regional cohesion: Evidence and theories of regional growth and convergence. *European Economic Review*, **40**(**6**), 1325-1352.
- Sargan, J. D. (1958). The estimation of economic relationships using instrumental variables. *Econometrica*, 28, 393-415.
- Sargan, J. D. (1975). Asymptotic theory and large models. *International Economic Review*, 16, 75-91.

- Sarno, L., & Taylor, M. P. (1998). Real exchange rates under the recent float: Unequivocal evidence of mean reversion. *Economics Letters*, *60*(2), 131-137.
- Siano, R., D. & D'Uva, M. (2006). Club convergence in European regions. *Applied Economics Letters*, **13(9)**, 569-574.
- Silvestriadou, K., & Balasubramanyam, V. N. (2000). Trade policy, foreign direct investment, and convergence. *Review of Development Economics*, **4**(**3**), 279-291.
- Slaughter, M. J. (1997). Per capita income convergence and the role of international trade. *The American Economic Review*, **87(2)**, 194-199.
- Slaughter, M. J. (2001). Trade liberalization and per capita income convergence: A difference-in-differences analysis. *Journal of International Economics*, 55(1), 203-228.
- Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, **70**(1), 65-94.
- Strazicich, M. C., Lee, J., & Day, E. (2004). Are incomes converging among OECD countries? Time series evidence with two structural breaks. *Journal of Macroeconomics*, 26(1), 131-145.
- Stroomer, C., & Giles, D. E. (2008). Real output convergence and trade openness: Fuzzy clustering and time series evidence. *The International Trade Journal*, 22(2), 115-155.
- Su, J. J. (2003). Convergence clubs among 15 OECD countries. *Applied Economics Letters*, **10**(2), 113-118.
- United Nations (2001). Development in Africa: Performance, prospects and policy issues. United Nations Conference on Trade and Development (UNCTAD/GDS/AFRICA/1TD/B/48/12).

- United Nations Economic Commission for Europe. (2000). Catching up and falling behind: Economic Convergence in Europe. In *Economic Survey of Europe*, 155-187).
- Veugelers, R., & Cassiman, B. (2004). Foreign subsidiaries as a channel of international technology diffusion: Some direct firm level evidence from Belgium. *European Economic Review*, 48(2), 455-476.
- Weeks, M., & Yudong Yao, J. (2003). Provincial conditional income convergence in China, 1953–1997: a panel data approach. *Econometric Reviews*, 22(1), 59-77.
- Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. MIT Press: USA.
- Xu, B. (2000). Multinational enterprises, technology diffusion, and host country productivity growth. *Journal of Development Economics*, **62**(2), 477-493.
- Xu, B., & Wang, J. (2000). Trade, FDI, and international technology diffusion. *Journal of Economic Integration*, 15(4), 585-601.
- Yamamura, E. (2011). Decomposition of the effect of government size on growth. *Economics Letters*, **112(3)**, 230-232.
- Zhang, Z. (2001). Trade liberalization, economic growth and convergence: Evidence from East Asian economies. *Journal of Economic Integration*, *16*(2), 147-164.