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Financial Development and Instability: A Theoretical Perspective

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Introduction

The financial sector mobilizes savings and allocates credit across space and time. It provides not only payment services, but more importantly products that enable firms and households to cope with economic uncertainties by hedging, pooling, sharing, and pricing risks. An efficient financial sector reduces the cost and risk of producing and trading goods and services and thus makes an important contribution to raising standards of living [1,2].

In view of the importance of the financial sector to economic performance, it is not surprising that both financial institutions and financial markets are subject to regulatory scrutiny. Regulation can be beneficial to those who issue direct claims as well as to those who invest. It also benefits financial intermediaries and their customers if it can reduce expenditures on information gathering and monitoring. Moreover, maintenance of confidence in the safety and soundness of financial institutions is critical to macroeconomic stability [3,4]. Even if the government attempts to maintain a stable macroeconomic environment, unanticipated shocks will inevitably occur, and so it is also important that the government foster a resilient financial infrastructure which can withstand volatility in financial market prices without amplifying the shocks to the real economy. This requires attention to the micro-economic structure of financial institutions and markets [5].

When financial institutions and financial markets are efficient, capital is allocated to the most promising projects which are expected to offer the highest, risk-adjusted returns. In addition, a wide array of financial instruments allows savers and investors to achieve their preferred trade-off between risk and return. Confidence in the financial system encourages investors to allocate their savings through financial markets and institutions rather than to invest in non-productive assets in order to hedge against inflation or the risk of financial collapse. As noted above such confidence requires not only some regulation, but also sufficient flexibility to adapt to market needs and opportunities. The financial instability and its spillover to the real sector have become a great challenge to macro-economic theory. The last few decades have seen major institutional changes which many have interpreted as the financialization of capitalism and the triumphant return of finance capital dominating industrial and commercial capital [6]. Critical comprehension of contemporary capitalism once again necessitates the development of a theory of finance capital both as an economic structure and as a more general social form of capitalism.

Capital Markets and Economic Development: Empirical Studies

The core of modern finance can be encapsulated in four components, namely: the efficient market hypothesis (EMH), the tradeoff between risk and return encapsulated in the Capital Asset Pricing Model (CAPM), the Modigliani-Miller Theorem (M and M) and the Black Scholes-Merton approach to option pricing. The efficient market hypothesis is the basis for the three other components of the core. It was formulated initially in its strong form stating that asset prices fully reflect all available information. This excludes the possibility that trading systems such as the stock market 'based only on current available information … have expected profits or returns in excess of equilibrium expected profit or return' [7].

Fama [7] defined 'efficient markets' as existing when trading systems based on available information fail to produce profits in excess of the market's overall rate of return. Fama reported on three different sets of tests of market efficiency: the weak form in which price behavior contains no information useful for predicting future price's behavior; the semi-strong form in which public information has already been impounded in prices; and the strong form in which all information, including inside information, has been impounded in prices. Fama changes the three categories of market efficiency to return predictability, event studies and private information. 'Return predictability' refers to whether future returns (or prices) can be predicted based on current information. If the market is efficient, future returns will be predictable. 'Event studies' refer to a particular method of testing whether asset prices reflect efficiently the information being released. If the market is efficient, asset price will quickly reflect the newly released information and trading based on private information will not yield abnormal profits.

In financial theory the relationship between risk and return focuses on the explanation of the risk premia (the difference between expected returns and the riskless rate of interest) analyzed by the Capital Asset Pricing Model (CAPM) which is an extension of Markowitz's [8] mean-variance portfolio model. Markowitz's model argues that, given the risk-averse characteristics of agents, they focus only on the mean and variance of their returns. In particular, investors chose portfolios to minimize the variance of returns, which is the measure of risk, for a given expected return and maximize expected returns for a given risk [9]. Markowitz showed that in a world in which the capitalist economies experience business cycles that are not synchronized with each other, a portfolio of financial investments may be stabilized by holding financial assets in markets whose cycles are not correlated with each other.

The CAPM analyzes the relationship between risk and return under conditions of market equilibrium. In the CAPM model portfolio optimizing agents meet in the marketplace, their interaction drive prices to market equilibrium and they agree on the joint distribution of asset returns. The importance of CAPM is that it allows financial markets to quantify the risk of a portfolio. In the late 1970's, however, the validity of CAPM was seriously questioned, mainly Roll [10] both on conceptual and empirical grounds [11]. During the mid 1970's, Ross developed an alternative pricing model called Arbitrage Pricing Theory (APT). The core idea of Ross's APT is that only a small number of systematic influences affect the long-term average returns on securities. APT includes multiple factors that represent the fundamental risks in asset returns and thus the prices of securities. The final pillar of modern

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finance is the Black-Scholes-Merton option-pricing model. An option is defined as a contract between a buyer and a seller that gives the buyer the right but not the obligation to buy or sell a particular underlying asset within a certain time period at a specified price (i.e., the strike price or the price at which the contract can be exercised). The underlying asset in question can include common stock, property, or a physical commodity. Central to option pricing theory is the determination of the cost or value of the option. The value can depend on many factors including the current market price of the underlying asset, the exercise price of the option, the maturity date of the option contract, the speculative premium of the option (estimated deviation with respect to the price of the underlying asset over the life of the option), and the risk free interest rate. Using these variables, as noted by Taleb [12], Black, Scholes and Merton "improved on an old mathematical formula and made it compatible with Gaussian general financial equilibrium theories." The formula already existed, but was not compatible with the risk free general equilibrium environment, and that was the contribution of Black, Scholes and Merton. Their model showed that it was possible to construct a riskless portfolio through dynamic hedging, that is, by taking positions in bonds (cash), options, and the underlying stocks. According to their reasoning changes in the value of the option would be offset by equal changes in the value of the underlying stock and cash.

The four building blocks of modern finance were developed separately, at different stages of the thinking in financial economics, under different circumstances and for different purposes [13]. Nonetheless, these four theorems share, in the main, a common set of fundamental assumptions. These theorems assume some form of existence of perfect capital markets – no taxes, no transactions costs and even in case of M and M there would be no danger of bankruptcy – that agents have equal access to information and capital markets; agents and prices adjust rapidly and continuously to new information and that decisions are made solely on the basis of expected values and standard deviations of the returns on the portfolios and that all agents have homogenous expectations. Their conceptual similarity allows these to be articulated to form a coherent framework of analysis with definite implications for the practice of finance. However, over the years, the empirical evidence for the EMH has been shown to be less and less convincing, to the point that Eugene Fama, the high priest of market efficiency, suggested that markets produce consistent mistakes, even though that may not imply that a professional investor would be capable of beating the market. Shiller [14] has shown, for example, that even though financial theory argues that stock prices are the current value of expected dividends, the evidence shows that the former are considerably more volatile than the latter. The critiques of financial theory within the mainstream are based on what has been called behavioral finance. Behavioral finance argues that some features of asset prices are most plausibly interpreted as deviations from fundamental value, and that these deviations are brought about by the presence of traders who are not fully rational. A long-standing objection to this view that goes back to Friedman [15] is that rational traders will quickly undo any dislocations caused by irrational traders[1]. Friedman's

line of argument is initially compelling, but it has not survived careful theoretical scrutiny. In essence, it is based on two assertions. First, as soon as there is a deviation from fundamental value – in short, a mispricing – an attractive investment opportunity is created. Second, rational traders will immediately snap up the opportunity, thereby correcting the mispricing. Behavioral finance does not take up issue with the second step in this argument: when attractive investment opportunities come to light, it is hard to believe that they are not quickly exploited. Rather, it disputes the first step. When an asset is wildly mispriced, strategies designed to correct the mispricing can be both risky and costly, rendering them unattractive. As a result, the mispricing can remain unchallenged.

Theories based on asymmetric information have flourished extensively in the literature and address the labor and consumer goods as well as capital markets. Asymmetric information leads to problems of adverse selection ('sorting effects') and moral hazard ('incentive effects'). As noted above, Keynes recognized these effects as a source of lender's risk. They are well illustrated in Akerlof's celebrated example of the market for second-hand cars [16]. The market price of a car known by the seller to be in perfect condition is discounted to the price of the average car because the buyer cannot be sure of its quality. Conversely the seller who knows he has a 'lemon' has an incentive to withhold this information. In this case asymmetric information provides an economic basis for the costs of expert inspection and purchased warranties to overcome the asymmetry. If such counter-measures are not available, high-quality sellers may stay out of the market and the poor quality of the remaining supply may lead ultimately to complete market failure. This insight has been applied extensively in the theoretical finance literature. Stiglitz and Weiss [17] had developed a theory of credit rationing based on lemons when lenders share in the risk of default. Such 'risky debt' contracts are the optimal investment contract under asymmetric information, compared with either equity or secured debt. The proposition is that the price (interest rate) affects the nature of the transaction and therefore may not also clear the market. The interest rate affects the riskiness of the loan portfolio through adverse selection[2] and moral hazard[3]. Consequently the lender treats the willingness to pay a higher interest rate as a signal of poor loan quality and prefers to ration credit rather than raise interest rates to a market clearing level. In these circumstances a firm with adequate cash flow may make an investment where a firm dependent on external finance (and unable to issue new equity) will not. Financial quantities such as cash flow can therefore influence real investment decisions and the price mechanism cannot clear the market. In summary, asymmetry of information offers one explanation of the new equity issue discount and thereby creates a potential role for finance as an influence on investment.

Further, Benoit Mandelbrot, father of fractal geometry, indeed first discovered the distinctive characteristics of fractals in financial time series[4]. Mandelbrot used his fractal theory to explain the presence of extreme events in Wall Street. The basic idea that relates fractals to financial markets is that the probability of experiencing extreme fluctuations (like the ones triggered by herd behavior) is greater than what conventional wisdom wants us to believe. This of course delivers a more accurate vision of risk in the world of finance. The importance of Mandelbrot's discovery is that it highlights that under the apparent disorder of capital markets; there are some "stylized facts" that can describe the behavior of capital markets. Chaos Theory and the Science of Fractals characterize financial markets as systems sensitive to initial conditions that progress in a non-linear behavior due to feedback mechanisms. In addition, it conceptualizes agents as having limited cognition capabilities, and most important, behaving irrationally in the market. For risk management this is important because it

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[1] Irrational traders are often known as "noise traders", rational traders are typically referred to as "arbitrageurs".

[2] Adverse selection means that lenders are unable to discriminate between borrowers in terms of the riskiness of their projects.

[3] Moral hazard means borrowers undertake higher risk projects with borrowed funds than they would with their own money, since the lender bears part of the cost of failure.

[4] Later, as many economist refused to accept his ideas, he started losing interest in financial fractals, and hence turned to physics. In this field, he would be able to develop the fractal geometry of nature.

describes markets not as efficient and stable, but turbulent and volatile. Essentially, it recognizes the risky nature of financial markets. However, today's methods to control and price risk are still based on the neoclassical assumptions of normal distributions and Brownian motions. This is probably one of the reasons that explains the failure of risk management systems in times of crisis.

Shifting attention to the empirical front, it is found that plenty of literatures are recognized relating economic growth with different financial sectors. Financial development creates enabling conditions for growth through either a supply leading (financial development spurs growth) [18] or a demand following (growth generates demand for financial products) channel. This is due to the fact that the anticipation of future growth in the equity market is possible when the present value of future growth opportunities is capitalized in the equity market [18].

The literature on finance and economic development has taken a new form by incorporating endogenous growth and endogenous financial institutions referred to as second generational growth models [19-21]. In particular, the literature on finance in endogenous growth models suggests various rationales for the existence of financial institutions. The main components are some form of uncertainty, costly information, transaction costs, and economies of scale in information collection. But none of these can explain the emergence and spread of financial intermediaries during the process of economic development. The endogenous growth literature, associated with the work of Romer [22]) and Lucas [23], constructs models in which agents make decisions that fully determine the economy's steady state of growth rate. Later on, emphasis shifted towards the increasing role of stock markets in the process of economic development. The first comprehensive study on the relationship between stock market development and economic growth was made by the World Bank research group [24-26]. They investigated the compatibility of stock market development with economic growth and the compatibility of stock market development with financial intermediaries. They estimated cross country growth regressions and observed that the predetermined component of stock market development is positively and robustly associated with long-run growth. They also observed that, the level of stock market development is positively correlated with the development of financial intermediaries and while stock market development induces substitution of equity finance for debt finance in developing countries it facilitates more debt finance in developing countries. This suggests that the stock market and the financial institutions are generally complementary to each other and grow simultaneously. Kyle [27] and Holmstrom and Tirole [28] show that a liquid stock market increases incentives for getting information about firms and leads to improved corporate governance. A growing theoretical literature suggests that a well-developed stock market may promote risk diversification, liquidity, information processing, and capital mobilization and that these services may accelerate long-run growth [29,30].

The notion of financial liberalization has also been under criticism from Neo-structuralist [31-33] as well as modern economists because it has implicit assumptions about perfect information and perfect markets. These models feature curb markets of developing economies, indigenous banks intermediate between savers and investors. Neo-Structralists view these markets as 'often competitive and agile'

[31,34]. Thus new literature on corporate finance looked at the neo-liberal approach and financial liberalization on the basis of the cost disadvantages of external finance due to asymmetric information. McKinnon-Shaw [35] argued that financial repression not only depresses savings but also leads to inefficient allocation of resources and, therefore, financial sector reforms have been advocated. As a result, a series of measures have been initiated towards financial sector reforms (including stock market reforms) since early 1990s. McKinnon-Shaw argument of financial liberalization underwent many changes in recent years[5].

Another facet of criticism related to financial liberalization is the volatile financial markets in developing countries. Financial institutions and markets have become principal channels through which national sovereignty is being challenged. Corporate finance system has been vulnerable to speculative investments creating huge problems of non-performing loans and vanishing of listed companies from stock markets. Moreover, many developing countries are increasingly under surveillance of international financial institutions that is creating impediments to their national and societal developing goals.

Although the arguments on the potential negative impact of volatility on growth appear to be very convincing, Levine and Zervos [24] do not find any significant relationship between volatility and growth in the sample countries over the period considered. They measure volatility as a 12-month rolling standard deviation estimated on stock returns and compare this estimate on the rate of growth and obtained no significant results. As theory suggests, international financial integration, by bringing about a greater degree of portfolio and risk diversification, may boost the propensity to save and invest and, through this channel, can foster growth [30,36]. Mayer [37] points out that those large stock markets in general are unimportant sources of corporate finance. Shleifer and Summers [38] suggest that stock market development may hurt economic growth by easing counterproductive corporate takeovers. However, the failed liberalization attempts in many developing countries forced the neo-liberal school to reconsider the question of financial liberalization.

Following the seminal works of Johansen and Juselius [39], numerous studies beginning with Taylor and Tonks, Kasa [34,40] and, subsequently, several others in the applied finance literature, have used the cointegration hypothesis to assess the international integration of financial markets. Until Taylor and Tonks and Kasa [34,40], studies were relied on correlation and regression analyses to gauge the nature of price convergence and international portfolio diversification across markets [41]. Taylor and Tonks [34] showed that the cointegration technique is useful from the perspective of the international capital asset price model. Even, cointegration approach is applied for examining the relationships between economic variables and stock markets from an empirical viewpoint. Chen et al. [42] provided the basis for the view that a long-term equilibrium relationship exists between stock prices and macroeconomic variables, and Granger [43] verified this notion through cointegration analysis. A simple statement of the cointegration approach is that a set of time series variables is said to be cointegrated if they are integrated of the same order and a linear combination of them is stationary [44]. Such linear combinations would then point to the existence of a long-term relationship between the variables [39]. The advantage of cointegration analysis is that through building an error correction model, the dynamic co-movement among variables and the adjustment process towards long-term equilibrium can be examined. Granger causality analysis, cointegration test, factor analysis and the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) models have been widely employed in empirical studies of

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[5] The most basic tenet of economics is that market equilibrium entails supply equaling demand; that if demand should exceed supply, prices should rise; decreasing demand and/or increasing supply until demand and supply are equated at the new equilibrium price. So if prices do their job, rationing should not exist. However, credit rationing in the fact exist. They seem to imply an excess demand for loanable funds [17].

stock market integration. Wavelet analysis constitutes a very promising tool as it represents a refinement in terms of analysis in the sense that both time and frequency domains are taken into account. The pioneer work of Ramsey and Lampart [45,46] draws on wavelets to study the relationship between several macroeconomic variables [47]. In particular, wavelet analysis provides a unified framework to measure co-movement in the time-frequency space.

Stock market integration dynamics should be nonlinear and asymmetric. Nonlinearity and asymmetry can be justified differently by the presence of information barriers, asymmetries and other sources of market segmentation [48], heterogeneous transaction costs [49], the coexistence of different shareholders, and noise trading [50]. It is true that the possibility of nonlinear forms of financial market integration has received some attention in the finance literature. Brietung [51] showed that residual-based linear cointegration tests are inconsistent for some classes of nonlinear functions [52,53]. To overcome this problem, he thus proposed cointegration test based on rank transformation of the time series. Two studies are worth mentioning here: Okunev and Wilson [54] use nonlinear tests to examine integration between real estate and stock markets, and Lin, et al. model nonlinear cointegrating relationships among several exchange rates in currency markets. Harrison and Moore [55] investigated co-movement between the CEEC markets on one side and the UK and German ones on the other allowing for non-linear cointegration as well as time variation. They found no evidence of cointegration for the full sample, but did conclude that co-movement between the Czech Republic, Hungary, Poland, Romania and Western Europe is increasing over time.

Kanas [56] provided an empirical investigation of volatility spillovers across the three largest European stock markets using the multivariate exponential GARCH model. He found evidence of volatility spillovers between these stock markets. The study found that spillovers were asymmetric in the sense that bad news in one market had a larger effect on the volatility of another market in comparison to that of good news. Thus, many researchers investigated asymmetric effects in conditional covariances [57,58] for individual stocks, equity portfolios, and stock market indices using different approaches.

Concluding Remarks

Free-enterprise capitalism was inherently unstable and could be stuck at less than full employment indefinitely unless the government intervened to increase "effective demand" and restore its vitality. As James Tobin put it, the "invisible" hand of Adam Smith required the "visible" hand of Keynes [59]. Friedman concluded differently: "The fact is that the Great Depression, like most other periods of severe unemployment, was produced by government mismanagement rather than any inherent instability of the private economy". Furthermore, he wrote: "Far from the depression being a failure of the free-enterprise system, it was a tragic failure of government".

In recent decades, financial innovation, perverse bonus-driven compensation systems, rising leverage and global integration led to reckless financial market expansion and excessive risk-taking that generated a series of dangerous financial crises. Government intervention to shorten and limit the depth of these crises in turn created moral hazard that induced even greater risk-taking that accelerated the long-term financial explosion. Nevertheless, there is no doubt that radical financial market deregulation was a necessary condition for the generation of a secular financial expansion this long and this strong, and for the creation of a global crisis as severe as the one we are still living through.

The mainstream approach to theory suggests that the resulting policy issue be addressed in terms of moral hazard: the unintended effect of insurance as encouraging the taking on of increased risk (where there is some limit on the scope for monitoring that risk) [60]. In spite of the term 'moral', the issue is one of rational optimizing behavior, under asymmetric information. Because such behavior is not 'other-regarding', it is opportunism. It may be regarded implicitly as immoral because, by impeding markets from finding the social optimum, the outcome is a reduction in social welfare; but because this outcome is an unintended consequence, it may not be regarded as immoral. Finally, since some social conventions involve moral judgment, e.g. as to standards of fairness, it is important for economic theory also to be able to address such considerations. Notions of fairness effectively fall outside the realm of rationality in the mainstream framework [61]. Nevertheless, much of the public policy discourse surrounding the crisis has focused on issues of fairness. This is the evidence of the other-regarding behavior analyzed by Adam Smith. Neo-Keynesians have contributed extensively to the new field of "behavioral economics," which questions the efficiency/rational expectations model of the Chicago school, and proposes ways to counter the tendency of individuals to make financial mistakes, such as under-saving, over-consuming, and underperforming the stock market averages [62,63].

At the broadest level, new Keynesian economics suggests—in contrast to some new classical theories—that recession is a departure from the normal efficient functioning of markets. The elements of new Keynesian economics—such as menu costs, staggered prices, coordination failures, and efficiency wages—represent substantial deviations from the assumptions of classical economics, which provides the intellectual basis for economists' usual justification of *laissez-faire*. In new Keynesian theories recessions are caused by some economy-wide market failure. Thus, new Keynesian economics provides a rationale for government intervention in the economy, such as countercyclical monetary or fiscal policy. This part of new Keynesian economics has been incorporated into the new synthesis that has emerged among macroeconomists.

References

1. Copeland MA (1955) A Study of Money flows in the United States. National Bureau of Economic Research, New York, USA.

2. Goldsmith RW (1965) The Flow of Capital Funds in the Postwar Economy. National Bureau of Economic Research, New York, USA.

3. Guttentag JM, Herring RJ (1987) Emergency Liquidity Assistance for International Banks. Threats to International Financial Stability, Cambridge University Press, Cambridge, UK.

4. Santomero A (1992) The Evolving View of Banking Theory and Regulation. Regulating Commercial Banks: Australian Experience in Perspective, Cambridge University Press, Cambridge, UK.

5. Santomero A (1991) Monetary Policy and Bank Regulation. Handbook of Monetary Policy, Greenwood Press, CT, USA.

6. Wehinger G (2011) Fostering Long-term investment and Economic growth Summary of a High-level OECD Financial Roundtable. OECD Journal: Financial Market Trends 2011: 1-21.

7. Fama EF (1970) Efficient capital markets: A review theory: macro variables vs derived factors. J Financ 25: 383-417.

8. Markowitz HM, Todd GP, Sharpe WF (1987) Mean-Variance Analysis in Portfolio Choice and Capital Markets. Blackwell, NJ, USA.

9. Fama EF, French KR (2004) The Capital Asset Pricing Model: Theory and Evidence. J Econ Perspect 18: 25-46.

10. Roll R (1977) A Critique of the Asset Pricing Theory's Tests' Part I: On Past and Potential Testability of the Theory. J Financ Econ 4: 129-176.

11. Roll R, Ross SA (1980) An Empirical Investigation of the Arbitrage Pricing Theory. J Financ 35: 1073-1103.

12. Taleb NN (2007) The Black Swan: The Impact of the Highly Improbable. The Random House Publishing, NY, USA.

13. Fox J (2009) The Myth of Rational Markets: A History of Risk, Reward, and Delusion on Wall Street. Harper Collins, New York, USA.

14. Shiller RJ (1981) Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends? Am Econ Rev 71: 421-436.

15. Friedman M (1953) The Methodology of Positive Economics. Essays in Positive Economics, University of Chicago Press, Chicago, USA.

16. Akerlof GA (1970) The market for ''Lemons'': Quality Uncertainty and the market Mechanism. Q J Econ 84: 488-500.

17. Stiglitz JE, Weiss A (1981) Credit rationing in Markets with Imperfect Information. Am Econ Rev 71: 393-410.

18. Rajan RC, Zingales L (1998) Financial dependence and growth. Am Econ Rev 88: 559-586.

19. Greenwood J, Jovanovic B (1997) Financial Development, Growth, and the Distribution of Income. J Polit Econ 98: 1076-1107.

20. Bencivenga VR, Smith BD (1991) Financial Intermediation and Endogenous Growth. Rev Econ Stud 58: 195-209.

21. Roubini N, Sala-i-Martin X (1992) Financial Repression and Economic Growth. J Dev Econ 39: 5-30.

22. Romer PM (1990) Endogenous Technical Change. J Polit Econ 98: S71-S102.

23. Lucas Jr RE (1988) On the Mechanics of Economic Development. J Monetary Econ 22: 3-42.

24. Levine R, Zervos S (1996) Stock Market Development and Long-Run Growth. World Bank Econ Rev 10: 323-339.

25. Demirguq-Kunt A, Vojislav M (1996) Stock market development and firms' financing choices. World Bank Econ Rev 10: 341-369.

26. Dermiguc-Kunt A, Levine R (1996) Stock Market Development and Financial Intermediaries: Stylized Facts. World Bank Econ Rev 10: 291-321.

27. Kyle AS (1984) Market Structure, Information, Futures Markets, and Price Formation. International Agricultural Trade: Advanced Readings in Price Formation, Market Structure, and Price Instability, Westview, Colorado, USA.

28. Holmstrom B, Tirole J (1993) Market Liquidity and Performance Monitoring. J Polit Econ 101: 678-709.

29. Levine R (1991) Stock Markets, Growth, and Tax Policy. J Financ 46: 1445-1465.

30. Obstfeld M (1994) Risk-Taking, Global Diversification, and Growth. Am Econ Rev 84: 1310-1329.

31. Taylor L (1983) Structuralist Macroeconomics: Applicable models for the third world. Basic books, New York, USA.

32. Van Wijnbergen S (1983) Interest rate management in LDCs. J Monetary Econ 12: 433-452.

33. Lim J (1987) The new structuralist critique of the Monetarist theory of inflation. J Dev Econ 25: 45-61.

34. Taylor MP, Tonks I (1989) The internationalization of stock markets and abolition of UK exchange control. Rev Econ Stat 71: 332-336.

35. McKinnon RI (1973) Money and capital in economic development. Brookings Institution, Washington, DC, USA.

36. Devereux MB, Smith GW (1994) International Risk Sharing and Economic Growth. Int Econ Rev 35: 535-550.

37. Mayer C (1988) New Issues in Corporate Finance. Eur Econ Rev 32: 1167-1188.

38. Shleifer A, Summers, LH (1988) Breach of Trust in Hostile Takeovers. Corporate takeovers: Causes and consequences. University of Chicago Press, Chicago, USA.

39. Johansen S, Juselius K (1990) Maximum Likelihood Estimation and Inference on Cointegration - with Application to the Demand for Money. Oxford B Econ Stat 52: 169-210.

40. Kasa K (1992) Common Stochastic Trends in International Stock Markets. J Monetary Econ 29: 95-124.

41. Levy H, Sarnat M (1970) International diversification of investment portfolios. Am Econ Rev 60: 668-675.

42. Chen N-F, Roll R, Ross SA (1986) Economic forces and the stock market. J Bus 59: 383-403.

43. Granger CWJ (1986) Developments in the Study of Cointegrated Economic Variables. Oxford B Econ Stat 48: 213-228.

44. Maysami RC, Koh TS (2000) A Vector Error Correction Model of the Singapore Stock Market. International Review of Economics and Finance 9: 79-96.

45. Ramsey J, Lampart C (1998a) Decomposition of economic relationships by time scale using wavelets. Macroecon Dyn 2: 49-71.

46. Ramsey J, Lampart C (1998b) The decomposition of economic relationships by time scale using wavelets: expenditure and income. Stud Nonlinear Dyn E 3: 23-42.

47. Crowley P (2007) A guide to wavelets for economists. Journal of Economic Surveys 21: 207-267.

48. Bekaert G, Harvey C (1995) Time Varying World Market Integration. J Financ 50: 403-444.

49. Anderson HM (1997) Transaction Costs and Nonlinear Adjustment towards Equilibrium in The US Treasury Bill Markets. Oxford B Econ Stat 59: 465-484.

50. De Grauwe P, Grimaldi M (2005) Heterogeneity of Agents, Transaction Costs and the Exchange Rate. Journal of Economic Dynamics and Control 29: 691-719.

51. Breitung J (2001) Rank tests for nonlinear cointegration. Journal of Business and Economic Statistics 19: 331-340.

52. Sargan JD, Bhargava A (1983) Testing residuals from least squares regression for being generated by the Gaussian random walk. Econometrica 51: 153-174.

53. Phillips PCB, Oularis S (1990) Asymptotic properties of residual based tests for cointegration. Econometrica 58: 165-193.

54. Okunev J, Wilson P (1997) Using non-linear tests to examine integration between real estate and stockmarkets. Real Estate Econ 25: 487-503.

55. Harrison B, Moore W (2009) Non-linear stock market co-movement in Central and East European countries. CICM Conference on 20 Years of Transition in Central and Eastern Europe: Money, Banking and Financial Markets, London Metropolitan Business School, London, UK.

56. Kanas A (1998) Volatility Spillovers across Equity Markets: European Evidence. Applied Financial Economics 8: 245-256.

57. Koutmos G, (1995) Asymmetric Volatility Transmission in International Stock Markets. J Int Money Financ 14: 747-762.

58. Filetti JdeP, Hotta LK, Zevallos M (2008) Analysis of Contagion in Emerging Markets. Journal of Data Science 6: 601-626.

59. Breit W, Spencer RW (1986) Lives of the Laureates: Seven Nobel Economists. MIT Press, MA, USA.

60. Dow SC (2011) Heterodox economics: history and Prospects. Camb J Econ 35: 1151-1165.

61. Akerlof GA, Shiller RJ (2009) Animal Spirits: How Human Psychology Drives the Economy, and Why it Matters for Global Capitalism. Princeton University Press, NJ, USA.

62. Thaler RH, Bernartzi S (2004) Save More Tomorrow: Using Behavioral Economics in Increase Employee Savings. J Polit Econ 112: S164-S187.

63. Shiller RJ (2005) Irrational Exuberance. Princeton University Press, NJ, USA.