

Financial Development and Income Inequality Relationship in Iran

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Abstract: This study examines the relationship between financial development and income inequality in Iran, using bounds testing approach and annual data over the period of 1973-2010. In this study the private credit provided by the banking sector as a share of GDP and the ratio of liquidity (M_2) to GDP are applied as proxies for financial development. The empirical results indicate that a negative and linear relationship between financial development and income inequality exists. Financial development significantly reduces income inequality in Iran. However, there is no evidence of an inverted-U shaped relation between financial sector development and income inequality, as suggested by Greenwood and Jovanovic (1990). The empirical findings also suggest that the institutional quality is statistically significant in reducing income distribution in Iran.

JEL Classification: G20, O15, D30

Key words: Financial Development • Income Inequality • Bounds Testing Approach

INTRODUCTION

One of the most important tasks of government is to control the income distribution; because according to distributional task, government should analyze how people's income varies by means of available tools in order to reduce income inequality. A variety of factors leads to income inequality and its increase. According to the previous studies one of the factors that can affect poverty and inequality in different societies, is the economic growth which is due to development of markets and financial institutions [1]. In addition, financial development can also directly effect on the pattern of income distribution. Beck *et al.* [1] as well as Claessens and Perotti [2] reveal that financial market development is not only pro-growth, but it is also a powerful driver of poverty reduction.

Almost a century ago, Schumpeter [3] argued that financial intermediation through the banking system played a pivotal role in economic development by affecting the allocation of savings and, thereby improving productivity, technical change and economic growth. Modern financial theory emphasizes the intermediation role performed by financial institutions in bridging the information asymmetries between borrowers and savers, thereby performing the functions of savings mobilization, capital fund allocation, monitoring of the use of funds and

managing risk, which together support the economic growth process [4]; and this economic growth due to financial development can be effective on income inequality.

Although a large literature finds that financial development produces faster average growth [4, 5], few studies investigate the distributional effects of financial development.

Theory provides conflicting predictions about the impact of financial development on the distribution of income. Some theoretical models suggest a linear relationship between financial development and income inequality that are classified into two influential hypotheses, namely: the inequality-widening hypothesis of financial development and the inequality-narrowing hypothesis of financial development.

The inequality-widening hypothesis, which states that financial development might benefit the rich and well connected, especially when institutional quality in the society is weak. According to this hypothesis, the rich are able to offer collateral and who might be more likely to repay the loan, while excluding the poor [6]. The poor, who do not have this, might, therefore, find it difficult to get loans even when financial markets are well developed. Therefore, it might worsen inequality and we would expect to see a positive relation between financial development and income inequality.

On the other hand, the inequality-narrowing hypothesis indicates that when financial sector grows, the poor, who were previously excluded from getting loans, might gain access to it. According to this hypothesis, income inequality will be lower when financial markets are better developed [7, 8]. These models provided by Banerjee and Newman [7] and Galor and Zeira [8], show that when investments are indivisible, financial market imperfections perpetuate the initial wealth distribution, resulting in a negative relationship between financial development and income inequality even in the long-run.

In contrast to the linear relationship between financial development and income inequality, Greenwood and Jovanovic's model [9] predicts that there is a nonlinear relationship between financial development and income inequality. According to this view, at early stages of development, only the rich can afford to access and directly profit from better financial markets. At higher levels of economic development, many people access financial markets, so that financial development directly helps a larger proportion of society. Thereby, this hypothesis suggests an inverted U-shaped relationship between finance and inequality.

While theories have provided different predictions, conducted empirical studies, have shown that in most cases, financial development has reduced income inequality.

For example Clarke *et al.* [10] examine the relationship between financial development and income inequality for 83 developed and developing countries over the period 1960 to 1995. The results of testing various hypotheses indicate that, inequality is lower in countries with better-developed financial markets and that inequality decreases as economies develop their financial intermediaries. Generally, their results provide some support for the inequality-narrowing hypothesis. Moreover, the cross-sectional do not provide much support for the inverted U-shaped hypothesis in long run.

Liang [11, 12] investigated this relationship for rural and urban areas in China in two articles. The results show that, a linear and negative relationship between financial development and income inequality in both rural and urban area in China exists. But findings do not support for inverted U-shaped relationship in both studies. Beck *et al.* [1], Bacarreza and Rioja [13], Kappel [14] and Shahbaz and Islam [15] also achieved similar results in their studies. However, Law and Tan [16] concluded that financial development is insignificant in reducing the income inequality in Malaysia.

The relation between financial development and income distribution is important for policy makers. Because they want to know how policies affect inequality as well as how they affect growth. Understanding this relationship will allow policy makers to assess whether financial development will improve inequality and when it might be useful in doing so. If financial development could reduce income inequality, policy makers should focus their attention on the creation and promotion of modern financial institutions in delivering long-run income distribution benefits. Because different theoretical models give different predictions about the distributional impact of financial development on inequality, empirical investigation is needed to distinguish between the competing conjectures.

This paper analyzes the relationship between financial development and income inequality using annual data from Iran over the period of 1973-2010. The results based on bounds testing approach indicate that, there is a negative and linear relationship between financial development and income inequality in Iran. But, the paper does not find support for the inverted U-shaped relation hypothesis.

The rest of this paper is organized as follows. The next section explains the empirical model, econometric methodology and the data employed in the analysis. Section 3 reports and discusses the econometric results. The conclusion and proposed suggestion are presented in the last part.

Model, Data and Estimation Methodology: In order to test the effect of financial development on income inequality, the following log-linear equation for income inequality is specified:

$$\ln GINI_t = \alpha_0 + \alpha_1 \ln Fd_t + \alpha_2 \ln INS_t + \alpha_3 \ln Y_t + \alpha_4 INF_t + \varepsilon_t \quad (1)$$

where:

The gini coefficient (*GINI*) measures inequality in the distribution of income. *FD* represent financial development, *INS* is institutional quality, *Y* is income per capita, *INF* is inflation rate and ε is the error term. the subscript *t* represents time period and α_i are unknown parameters.

To measure financial development, the paper uses two indicators as proxies, namely: the private credit provided by the banking sector as a share of GDP (private credit) and the ratio of liquidity (M_2) to GDP. Financial development can occur in both banking and non-banking

sector. Whereas, in developing countries, financial development mainly happens in banking sector. So, the measures should be selected that represent the development of this sector. In this regard the private credit is used as a proxy for financial development in this study. Besides using this proxy, we also employ another measure in this analysis as robustness check of the empirical findings. Clearly, each of these two financial development indicators captures a different aspect of financial development and has its own strengths and weaknesses.

For INS, which shows institutional quality, the ICRG economic risk has been used. The quality of institutions has an important role on services provided by financial intermediaries. In a society where the quality of institutions is low, financial system might mainly channel money to the rich and well connected, who are able to offer collateral and who might be more likely to repay the loan, while excluding the poor. This matter, in turn, leads to increasing inequality even when financial markets are well developed. So the quality of institutions is recognized as an important factor in finance-inequality nexus.

As noted, this study utilizes the ICRG economic risk ratings, which has been defined by Political Risk Services group as a proxy for institutional quality. PRS group is an institute that since 1980 started to estimate the qualitative variables for more than 140 countries. Since the time period used in this paper is over the beginning of studies of this institute, the economic risk variable has been calculated using ICRG methodology.¹

The overall aim of the Economic Risk Rating is to provide a means of assessing a country's current economic strengths and weaknesses. These strengths and weaknesses are assessed by assigning risk points to a pre-set group of factors, termed economic risk components. The minimum number of points that can be assigned to each component is zero, while the maximum number of points depends on the fixed weight that component is given in the overall economic risk assessment. The 5 economic variables and the range of risk points assigned to each, are as follows:

- (i) GDP per Head (0-5); (ii) Real Annual GDP Growth (0-10); (iii) Annual Inflation Rate (0-10); (iv) Budget Balance as Percentage of GDP (0-10); (v) Current Account Balance as a Percentage of GDP (0-15).

The institutions indicator is obtained by summing the above five indicators for each year.

The economic development, which is proxied by income per capita and inflation are another variables in this models. All of the data are used in this study, have been taken from the central bank of Iran.

Equation (1) provides a test of the inequality-widening hypothesis and the inequality-narrowing hypothesis of financial development. If α_1 is positive and significant then financial development will widen income inequality, Nevertheless, if α_1 is negative and significant then financial development will narrow the dispersion in income.

Moreover, to test the Greenwood-Jovanovic hypothesis [9] of an inverted U-shaped relationship between finance and inequality, the squared term of financial variable are added and included into Equation (1) and thus the regression model can be rewritten as follows:

$$\ln GINI_t = \alpha_0 + \alpha_{11} \ln FD_t + \alpha_{12} (\ln FD_t)^2 + \alpha_3 \ln INS_t + \alpha_4 \ln Y_t + \alpha_5 INF_t + \varepsilon_t \quad (2)$$

Equation (2) predict the inverted U-shaped hypothesis if $\alpha_{11} > 0$ and $\alpha_{12} < 0$.

To examine the relationships between variables, Bounds testing approach suggested by Pesaran *et al.* [17] has been used. This test is an approach to testing for the existence of a relationship between variables in levels which is applicable irrespective of whether the underlying regressors are purely I(0), purely I(1) or mutually cointegrated. The bounds test for cointegration is based on an estimation of the Unrestricted Error Correction Model (UECM) as follows:

$$\begin{aligned} \Delta \ln GINI_t = & c + \pi_1 \ln GINI_{t-1} + \pi_2 \ln FD_t + \\ & \pi_3 \ln INS_{t-1} + \pi_4 \ln Y_{t-1} + \pi_5 INF_{t-1} + \\ & \sum_{i=1}^p \lambda_i \Delta \ln GINI_{t-i} + \sum_{i=0}^q \gamma_i \Delta \ln FD_{t-i} + \\ & \sum_{i=0}^r \delta_i \Delta \ln INS_{t-i} + \\ & \sum_{i=0}^s \eta_i \Delta \ln Y_{t-i} + \sum_{i=0}^n \phi_i \Delta INF_{t-i} + \mu_t \end{aligned} \quad (3)$$

P, q, r, s and n are optimal lags order length and are determined by Schwarz Bayesian Criteria (SBC) which is suitable for small samples. To test the existence of long run relationship, we set $H_0: \pi_1 = \pi_2 = \pi_3 = \pi_4 = \pi_5 = 0$ versus $H_1: \pi_1 \neq \pi_2 \neq \pi_3 \neq \pi_4 \neq \pi_5 \neq 0$. According to Narayan [18], critical values which have been offered by Pesaran *et al.* [16], are not appropriate for small

¹http://www.prsgroup.com/ICRG_Methodology.aspx

sample sizes. So, we use critical values which provided by Narayan [18]. If the computed F-statistics is higher than the respective upper critical bounds value, the null hypothesis of no cointegration is rejected and the variables are cointegrated. If it is below the respective lower critical bounds, the null hypothesis cannot be rejected. If the F-statistics falls between its upper and lower critical bounds values, inference is inconclusive.

In case of being cointegration between the variables, Bardson's [19] method is used to compute the long run coefficients as follows:

$$\beta_i = -\frac{\pi_i}{\pi_1} \quad i = 2, 3, 4, 5 \quad (4)$$

Empirical Results: Before conducting the bounds test, the time series properties of the variables are examined using unit root tests. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests are employed to determine the order of integration of the variables. The ADF results indicate that all series, except for institutions and inflation are stationary after first differencing, that is, they are at I(1) variables. Such a mixed result is suggested by the PP test statistics.²

After unit root tests, bounds testing approach has been conducted for linear and nonlinear models with both indicators of financial development.

The empirical results show that between financial development, institutional quality, real GDP per capita, inflation and inequality, UECM (0,0,1,0,0) and UECM (2,1,1,0,0) are the best models which define relations between this variables, where the finance indicator is proxied by private credit and the ratio of liquidity to GDP. Respectively. The computed *F*-statistics for models above are 4.8574 and 5.4334 respectively, which are greater than the upper critical bound value provided by Narayan [18]. Therefore, there exists a steady state long-run relationship amongst income inequality, financial development, institutions, real GDP per capita and inflation. The long-run coefficients based on Brdsen's method [19] are reported in Table 1.

The obtained coefficients in linear models indicate that financial development is statistically significant in reducing income inequality, irrespective of applied financial development indicators. Also, the negative correlation between institutional quality and inequality implies that, better institutional quality leads to reducing income inequality. But real GDP per capita is a positively significant determinant of income inequality. In this study, inflation's coefficient is not statistically significant.

Table 1: Long-run Estimated Coefficient in linear model

Variables	Model 1 FD=Private Credit	Model 2 FD = Liquidity to GDP
FD	-0.212***	-0.129***
INS	-0.412***	-0.168***
Y	0.354***	0.123**
INF	-0.002	-0.001

Notes: ** and *** indicate significant at 10%, 5% and 1% levels, respectively. Source: research findings

For nonlinear models, UECM (3,3,3,2,1,2) and UECM (0,3,3,0,0,3) have been estimated based on bounds testing approach by private credit and liquidity indicators. Respectively. The results suggest that there are cointegration at 1% level in the models above. To investigate the existence of an inverted U-shaped relationship between financial development and income inequality, it is required to calculate coefficients of financial development and square of this variable in nonlinear models. The estimated coefficients of these variables in the first model, which obtained with private credit are -0.392 and -0.170 respectively. Both of them are negative and significant. So, the existence of an inverted U-shaped relationship is rejected in this model. In other estimated non-linear model by liquidity indicator of financial development, the coefficient of lagged squared term of financial variable in UECM model is not significant and therefore the mentioned long-run coefficients cannot be obtained in this case. Thus in both models, the existence of an inverted U-shaped hypothesis is rejected.

CONCLUSIONS AND RECOMMENDATIONS

This article examines the effect of financial development on income inequality in Iran during 1973-2010, using bounds testing approach. In this study the private credit provided by the banking sector as a share of GDP and the ratio of liquidity (M_2) to GDP are applied as proxies for financial development.

The empirical results demonstrate that a negative and linear relationship between financial development and income inequality exists. Thus we can confirm the narrowing-inequality hypothesis in Iran. So if the policy makers should focus their attention on the creation and promotion of modern financial institutions, income distribution will be better in long-run. Also, the results from nonlinear specification do not lend support for Greenwood-Jovanovic [9] hypothesis.

²The unit root results are not reported but are available upon request.

The research findings also suggest that, the institutional quality is statistically significant in reducing income distribution in Iran. Thus, the improvement of institutional quality in the society by reducing economic and financial risk and also Improvement of rule of law so that, economic condition can be predictable in Future, helps reducing inequality.

On the other hand there is a positive relationship between real GDP per capita and income inequality. This relation may imply that economic development is not pro-poor growth. Thus Increasing income per capita has led to worsen inequality. So the policies related to economic development should lead to move money to people with low income more than people with high income.

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APPENDIX

Note: in all tables, ?, **, *** denote significance at 10%, 5% and 1% level.

unrestricted intercept and unrestricted trend(k=4 and T=40) for linear models and (K=5 and T=40) for non-linear models from Narayan(2005).

Table 2: The estimated UECM for linear model Financial Indicator: Private Credit Dependent variable: $\Delta \ln GINI_t$

Independent variables	Coefficients	t-statistics
Intercept	-3.5099	-3.7246***
Trend	-0.0019018	-1.2529
$\ln GINI_{t-1}$	-0.73470	-3.8149***
$\ln FD_{t-1}$	-0.15636	-3.5343***
$\ln INS_{t-1}$	-0.30329	-3.3985***
$\ln Y_{t-1}$	0.26030	4.1517***
$\ln F_{t-1}$	-0.0015801	-1.5172
$\Delta \ln FD_t$	-0.10847	-1.2428
$\Delta \ln INS_{t-1}$	-0.13173	-1.9816*
$\Delta \ln INS_{t-1}$	0.056476	1.7394*
$\Delta \ln Y_t$	0.76618	3.7572***
$\Delta \ln F_t$	0.2742E-3	0.31084
Bounds test F-statistics:		4.8574
Critical bounds	Lower	Upper
1%	5.376	7.092
5%	3.958	5.226
10%	3.334	4.438

Conclusion: Cointegrated

Adjusted R-squared: 0.58642; F-Statistic: 5.2537[0.000]; Ramsey RESET(1): 10.6955[0.001]; Breusch–Godfrey LM test (1): 2.3461[0.126]; ARCH test (1): 0.17102[0.679]

Table 3: The estimated UECM for linear model Financial Indicator: liquidity Dependent variable: $\Delta \ln GINI_t$

Independent variables	Coefficients	t-statistics
Intercept	-2.9542	-2.1434*
Trend	-0.0070243	-2.9734***
$\ln GINI_{t-1}$	-1.4373	-3.8114***
$\ln FD_{t-1}$	-0.18624	-4.4976***
$\ln INS_{t-1}$	-0.24193	-3.2413***
$\ln Y_{t-1}$	0.17697	2.3679**
$\ln F_{t-1}$	-0.0014022	-1.5684
$\Delta \ln GINI_{t-1}$	0.48034	1.6374
$\Delta \ln GINI_{t-2}$	0.46744	2.2394**
$\Delta \ln FD_t$	0.047257	0.49896
$\Delta \ln FD_{t-1}$	0.10593	1.4740
$\Delta \ln INS_t$	-0.091120	-1.6625
$\Delta \ln INS_{t-1}$	0.060882	1.8803*
$\Delta \ln Y_t$	0.78366	4.0860***
$\Delta \ln F_t$	0.4550E-3	0.57230
Bounds test F-statistics:		4.8574
Critical bounds	Lower	Upper
1%	5.376	7.092
5%	3.958	5.226
10%	3.334	4.438

Conclusion: Cointegrated

Adjusted R-squared: 0.66838; F-Statistic: 5.7509[0.000]; Ramsey RESET(1): 0.010927[0.917]; Breusch–Godfrey LM test (1): 2.0234[0.155]; ARCH test (1): 0.39737[0.528]

Table 4: The estimated UECM for non-linear model Financial Indicator: private credit Dependent variable: $\Delta \ln GINI_t$

Independent variables	Coefficients	t-statistics
Intercept	-23.4138	-6.1183***
Trend	-0.028074	-5.1994***
$\ln GINI_{t-1}$	-4.9596	-5.7005***
$\ln FD_{t-1}$	-1.9489	-6.4465***
$(\ln FD_{t-1})^2$	-0.84325	-5.2803***
$\ln INS_{t-1}$	-0.16758	-1.7445
$\ln Y_{t-1}$	1.2504	6.0238***
INF_{t-1}	-0.0024260	-0.98651
$\Delta \ln GINI_{t-1}$	3.1372	4.6966***
$\Delta \ln GINI_{t-2}$	1.9920	4.2705***
$\Delta \ln GINI_{t-3}$	0.89293	3.3242**
$\Delta \ln FD_t$	-0.48057	-1.7231
$\Delta \ln FD_{t-1}$	0.74991	2.7709**
$\Delta \ln FD_{t-2}$	1.4144	3.8149***
$\Delta \ln FD_{t-3}$	0.99623	2.6647**
$\Delta (\ln FD_t)^2$	-0.37314	-2.4742**
$\Delta (\ln FD_{t-1})^2$	0.16930	1.4637
$\Delta (\ln FD_{t-2})^2$	0.63767	3.8360***
$\Delta (\ln FD_{t-3})^2$	0.48564	3.1094**
$\Delta \ln INS_t$	-0.020016	-0.45042
$\Delta \ln INS_{t-1}$	0.23326	4.4946***
$\Delta \ln INS_{t-2}$	0.14077	4.6769***
$\Delta \ln Y_t$	1.2013	5.9669***
$\Delta \ln Y_{t-1}$	-0.69453	-3.7360***
ΔINF_t	0.0013194	1.7672
ΔINF_{t-1}	0.0029699	2.0473*
ΔINF_{t-2}	0.0038534	4.3408***
Bounds test F-statistics:		10.7771
Critical bounds	Lower	Upper
1%	4.885	6.550
5%	3.577	4.923
10%	3.032	4.213

Conclusion: Cointegrated

Adjusted R-squared: 0.91170; F-Statistic: 14.1053[0.001]; Ramsey RESET(1): 4.8283[0.028]; Breusch–Godfrey LM test (1): 23.7624[0.000]; ARCH test (1): 0.89799[0.343]

Table 5: The estimated UECM for non-linear model Financial Indicator: liquidity Dependent variable: $\Delta \ln GINI_t$

Independent variables	Coefficients	t-statistics
Intercept	-0.52349	-0.044645
Trend	-0.0034526	-2.0884
$\ln GINI_{t-1}$	-0.87632	-4.3844***
$\ln FD_{t-1}$	-0.73177	-2.1090*
$(\ln FD_{t-1})^2$	-0.44006	-1.5408
$\ln INS_{t-1}$	-0.080051	-0.75380
$\ln Y_{t-1}$	-0.035772	-0.41687
INF_{t-1}	-0.0026099	-2.0173*
$\Delta \ln FD_t$	-0.45961	-1.1593
$\Delta \ln FD_{t-1}$	-0.10904	-0.39548
$\Delta \ln FD_{t-2}$	0.24305	1.0516
$\Delta \ln FD_{t-3}$	0.60908	3.2042***
$\Delta (\ln FD_t)^2$	-0.27593	-0.83721
$\Delta (\ln FD_{t-1})^2$	-0.23999	-1.1412
$\Delta (\ln FD_{t-2})^2$	0.15116	0.75114
$\Delta (\ln FD_{t-3})^2$	0.38758	2.5818**
$\Delta \ln INS_t$	-0.057217	-0.79893

Table 5: Continued

$\Delta \ln Y_t$	0.23533	0.85025
$\Delta \ln F_t$	-0.1430E-3	0.16522
$\Delta \ln F_{t-1}$	0.0023375	1.9446*
$\Delta \ln F_{t-2}$	0.0022059	2.4749**
$\Delta \ln F_{t-3}$	0.0014121	1.5961
Bounds test F-statistics:		7.7420
Critical bounds	Lower	Upper
1%	4.885	6.550
5%	3.577	4.923
10%	3.032	4.213

Conclusion: Cointegrated

Adjusted R-squared: 0.71755; F-Statistic: 4.9922[0.003]; Ramsey RESET(1): 4.9387[0.026]; Breusch–Godfrey LM test (1): 3.9655[0.046]; ARCH test (1): 0.0031062[0.956]

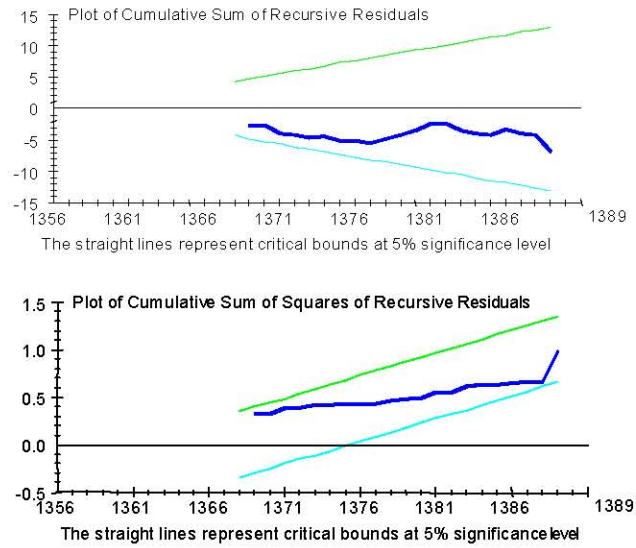


Fig. 1: Respectively plots of CUSUM and CUSUM of squares statistics for the estimated UECM for linear model (FD: private credit)

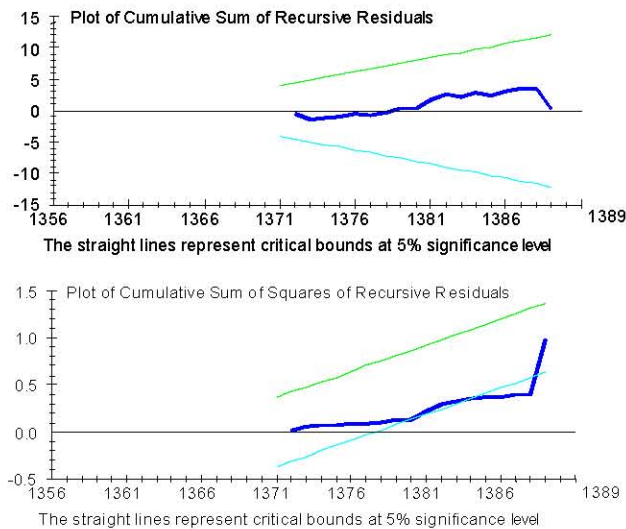


Fig. 2: Respectively plots of CUSUM and CUSUM of squares statistics for the estimated UECM for linear model (FD: liquidity)

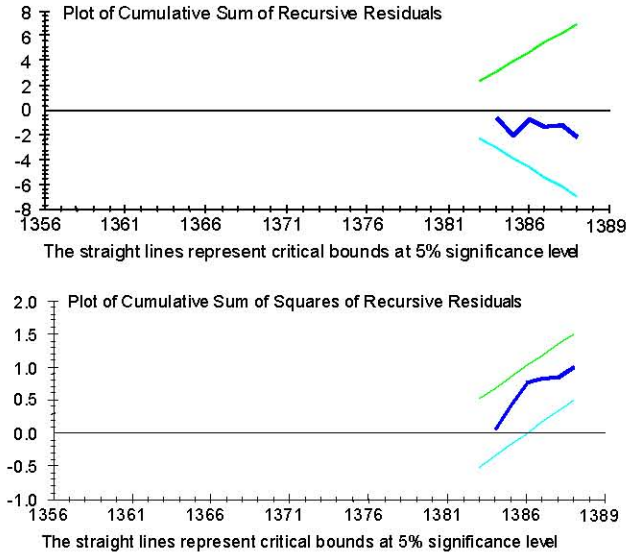


Fig. 3: Respectively plots of CUSUM and CUSUM of squares statistics for the estimated UECM for non-linear model (FD: private credit)

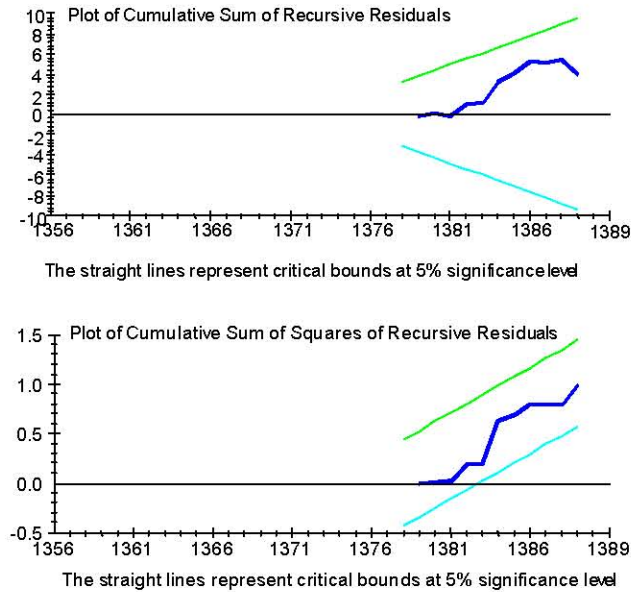


Fig. 4: Respectively plots of CUSUM and CUSUM of squares statistics for the estimated UECM for non-linear model (FD: liquidity)