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An Econometric Analysis of Exigent Determinants of Trade Balance in Finland: An Autoregressive Distributed Lag (ARDL) Approach

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ABSTRACT

A number of research papers analyzed the factors that may have impacts on the balance of trade for effective macroeconomic policies but the results of these studies have created ambiguity which implies that further research is needed as the worsening trade balance can limit the economic growth of any country. Hence the current paper is an effort to study the short-run and long-run relationships among trade balance, real effective exchange rate, GDP per capita, urbanization, unemployment and inflation rate for the Finnish economy. Autoregressive Distributed Lag (ARDL) bound testing approach to co-integration along with error correction mechanism is employed by using time series data from 1990 to 2019 for examining the existence of long-run equilibrium between explained variable and its various determinants. Empirical findings of ARDL show that the long-run relationship among the factors of the estimated model holds. The results indicate that real effective exchange rate, urbanization and inflation have a significant but negative impact on Finland's trade balance for both the short-run and long-run while the impacts of GDP per capita and unemployment are significant and positive on the Finish balance of trade. In addition to above, the structural stability of mean and variance of the error term for the estimated ARDL model is verified with the help of CUSUM and CUSUM square graphs. Therefore, a reliable policy measure to improve the balance of trade by encouraging the domestic production and curtailing the imports is suggested in Finland.

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1. Introduction

A considerable devotion has been seen to the analysis of trade balance for different economies as it is considered as an imperative indicator of macroeconomic stability and the competitiveness of a country which can be used to judge its relationships with other countries of the world (Akbas and Lebe, 2015; Kang and Shambaugh, 2016). The countries engage in international trade often face the problem of negative trade balance which is not associated with developing countries only rather some of the technologically advanced countries have also faced large trade deficits over time because these countries consume more than they produce and according to the economic literature, many factors are seemed to be responsible for the prolonged trade deficit in different economies ranging from inappropriate public policies, shocks in main trading countries, oil price hikes if the economy is highly dependent on oil imports, socioeconomic conditions of the residents to greater level of urbanization (Grupe and Rose, 2010; Manual and San, 2019). A great challenge for an economy facing the negative trade balance over the time is to formulate such policies which enhance domestic production competitive to the leading brands of the world and curtailing the imports.

Finland is a small open economy, where fluctuations in international trade have caused big developments in the economy. It showed a trade surplus for some time periods, however it is also witnessed that most of the time the Finnish economy has experienced a trade deficit. This sustained trade imbalance shows that re-investigating the factors that have been the possible main reason of the Finland's fluctuating trade balance is important for policy measures. Different economic policies, strategies and reforms have been adopted to improve the Finnish international trade and hence its trade balance. In the near past, Finland's economy have undergone large structural changes and these transformations have also affected its foreign trade. Consequently, it is essential to analyze its trade balance and to determine the factors that have affected it over time.

Moreover, the economic history of Finnish trade balance is lacking in empirics. There are very few empirical studies which are conducted with the analysis of international trade in this economy but we couldn't find any study specifically related to Finnish trade balance and its underlying determinants. The novelty of this research study is to utilize the modern econometric tools to discover different factors that have affected the Finnish balance of trade over time. After identifying these determinants, we would be able to use this information for determining the impacts of various policies that were implemented by the country over time. Therefore, understanding the both long-run and short-run impacts of different factors on trade balance and their implications would be useful for the explanation of different policy outcomes, and for devising the optimum policy for this economy.

Therefore, the goal of this paper is to examine the dynamic short-run and long-run impacts of different factors on Finnish trade balance and to derive possible implications for the improvement of this trade balance for Finland's economy. Determination of these factors will assist us to devise effective and sensible policies for the improvement of trade balance for Finnish economy.

The remaining of the study is designed as following: section 2 is reserved for reviewing the existing literature, section 3 provides data sources and methodology including model specification whereas empirical analysis and discussion of results of the study is done in section 4. Lastly, section 5 gives concluding notes of the study and policy implications on the basis of the results.

2. Literature Review

While conducting research on any issue, reviewing the existing literature on the subject is essential in order to highlight the research work that has already been done. Keeping in line with the objectives of the paper, this section presents some literature regarding the determinants of trade balance.

Bahmani-Oskooee and Wang (2006) established a strong linkage between trade balance and real effective exchange rate but Duasa (2007) found a weak correlation between trade balance, exchange rate money supply, and income for Malaysian economy. By using ARDL bound testing approach, he was unable to establish a relationship in long-run between the trade balance and real effective exchange rate. However, he concluded that the long-run equilibrium between income and trade balance holds. Khan and Hossain (2012) have conducted panel data study for determining the trade balance of Bangladesh by using variables like real exchange rate, relative GNI, import weighted index and real GDP. The short-run findings showed that all variables have significant impact except import weighted index.

Nienga (2010) examined the determinants of balance of trade by using OLS for Kenya. He concluded that government's consumption expenditure, domestic income, money supply, and real exchange rate are the main significant determinants in Kenya. Waliullah et al. (2010) examined the determinants of trade balance for the Pakistan economy by employing ARDL to co-integration approach for the period 1970-2005 and found that the trade balance and exchange rates, money supply and income have stable long-run relation. Moreover, the impact of exchange rate endorsed the marshal learner condition based on the empirical results. Besides these studies, Hassan et al. (2017) also confirmed that depreciation in real effective exchange rate reduces the trade deficit of Bangladesh and Pakistan significantly during 1972 to 2013. But according to Shahzad et al. (2017), marshal learner condition does not fulfill for south Asian economies and no improvement in the balance of trade has been seen in response to the depreciation of exchange rate.

Banday and Aneja (2019); Manual and San (2019) reinvestigated the linkage of exchange rate, inflation and domestic income with trade balance in case of Chinese and Malaysian economies using ARDL approach for the time span of 1985-2016 and 2000- 2015 respectively. Their findings confirmed the significant impact of exchange rates, income and inflation on trade balance during short and long-term. Shawa and Shen (2013) explored the major elements affecting trade balance of Tanzanian economy from 1980-2012. The results of OLS show that inflation, foreign direct investment, trade liberalization, domestic and public expenditures are the most influencing elements of trade balance. Pham (2012) also highlighted that initial depreciation in real exchange rate worsens trade balance of Vietnam but mends it in long-run.

Hassan et al. (2015) selected the transitional economy of Pakistan to test the effect of unemployment, urbanization, economic growth, money supply and foreign direct investment on trade deficit by applying ARDL method for period 1972-2011. The findings show the significant and positive impact of unemployment and urbanization on trade deficit during short and long term. Ozturkler and Colak (2010) also exposed that trade deficit and unemployment significantly and positively cause each other in Turkey for the period of 1960 to 2009. In addition, Hassan et al. (2012) authenticated the significant positive impact of unemployment on value of trade using ARDL for the sample period of 1975-2010 for Pakistan. The empirical findings also reveal that urbanization is responsible for significantly reducing trade value.

Bahmani-Oskooee (2019) employed the linear and nonlinear ARDL approach to examine the J-curve phenomenon between Korea and its 14 trading partner economies and prove the existence of short-run and long-run asymmetric impacts of exchange rate changes on the bilateral trade balance in most cases. Some other studies examine the impact of oil price fluctuations, real effective exchange rate and real domestic and foreign incomes on the balance of trade in different economies and found the heterogeneous and asymmetric responses of the concerned economies to the fluctuations in oil price and changes in other variables (Baek and Kwon, 2019; Ahad and Anwer, 2020; Baek and Choi, 2020; Faheem et al., 2020).

The review of literature shows that real effective exchange rate, income growth, urbanization, unemployment and inflation are the main determinants of trade balance. The contribution of all mentioned studies among many others is useful in analyzing the performance of trade balance for different economies. Most of the research on the determinants of trade balance has been conducted for developing nations while some research for developed countries also exists but we could not find any study on the determinants of the trade balance considering developed country like Finland by using suitable econometric technique. Hence, the rationale of this research paper is to study the determinants of trade balance for Finland by using time series analysis.

3. Data source and Methodology

To conduct this study, we have employed time series data from 1990 - 2019. The data on all variables (exports and imports of goods and services, real effective exchange rate, GDP per capita, urbanization, unemployment and inflation) are taken from the World Development Indicators (WDI).

3.1 Model Specification

To construct a model for examining the determinants of Finnish trade balance, the following model is specified:

$$TB_t = f(REER_t, GDPPC_t, UB_t, UN_t, INF_t) \dots (i)$$

The econometric model in order to estimate our results can be written as following:

$$TB_t = \beta_0 + \beta_1 REER_t + \beta_2 GDPPC_t + \beta_3 UB_t + \beta_4 UN_t + \beta_5 INF_t + \mu_t \dots (ii)$$

We have used the double log form of the above model in this study which can be written as:

$$\ln TB_t = \beta_0 + \beta_1 \ln REER_t + \beta_2 \ln GDPPC_t + \beta_3 \ln UB_t + \beta_4 \ln UN_t + \beta_5 \ln INF_t + \mu_t \dots (iii)$$

Where t stands for the time period and the composition and description of all the variables has been given in Table 1. Reason of using the double log model is that the results can be interpreted and compared easily as compare to other forms. Different studies confirmed that double log models provide more consistent and reliable results as compare to the results of simple form models (Layson, 1983; Cameron, 1994; Hassan et al., 2017).

Table 1. Variables: Their Representation and Construction

Variable	Variable Representation	Variable Proxy	Transformation of the Variable	Data Source
Trade Balance	$\ln TB_t$	Exports/Imports	$\ln(X/M)$	WDI; The World Bank, 2019
Exchange Rate	$\ln REER_t$	Real Effective Exchange Rate Index	$\ln(\text{Real Effective Exchange Rate Index})$	WDI; The World Bank, 2019
GDP per capita	$\ln(GDPPCt)$	GDP per capita (constant 2010 US\$)	$\ln(GDP/Population)$	WDI; The World Bank, 2019
Urbanization	$\ln UB_t$	Urban population (% of total population)	$\ln(\text{Urban Population/Total Population})$	WDI; The World Bank, 2019
Unemployment	$\ln UN_t$	Unemployment, total (% of total labor force)	$\ln(\text{No. of Unemployed/Total Labor Force})$	WDI; The World Bank, 2019
Inflation	$\ln INF_t$	Inflation, consumer prices (annual % change)	$\ln(\text{Inflation, consumer prices (annual \% change)})$	WDI; The World Bank, 2019

3.2 Estimation Methodology

Testing for unit root is the primary step in analyzing time series (Asim and Akbar, 2019). Based on stationarity of data, estimation technique is decided as most of the time series contain unit root; so, traditional OLS can't be useful for these series because it provides misleading results in such circumstances. So, we have employed three tests of unit-root; augmented Dickey and Fuller (ADF), Kwiatkowski-Phillips-Schmidt-Shin (KPSS) and Ng-Perron (NP) proposed by Dickey and Fuller (1981), Kwiatkowski et al. (1992) and Ng and Perron (2001) respectively along with graphical analysis. The t-statistic for ADF, LM-statistic for KPSS and four test statistics for Ng-Perron are utilized to accept or reject the null hypothesis of non-stationary time series for ADF and NP, and null hypothesis of stationarity for KPSS.

After checking for the unit root, next stage is to establish short-run and long-run relations among the explained variable and the regressors as shown in equation (iii) and to find the adjustment speed for stable equilibrium in long run. Hence, this study employed ARDL technique to co-integration proposed by Narayan et al. (2000) for estimating parameters in long-run and short-run because this technique is utilized for the variables having mixed order of integration. The main advantage of this approach is that, apart from providing robust results in small sample sizes, it needs no a priori knowledge about the integration properties of the variables. Moreover, it can be employed for the simultaneous evaluation of the short-run and long-run dynamic forces of the model with the avoidance of endogeneity and autocorrelation problems created by time series having a unit root. Furthermore, an ARDL approach can produce the efficient and unbiased results even for the small samples.

Narayan et al. (2000) submitted that for co-integration to exist, the computed F-statistic must

exceed the upper critical bound. Furthermore, if F-statistic is lower than the lower critical bound, it will be a sign of no co-integration between the response and predictors. Moreover, the F-test will turned to be inconclusive if calculated value of F-test lies in the middle of lower & upper critical bounds which means that we are not able to infer any decision in this situation. Thus, the equations below will assist us to observe the co-integration amongst the trade balance and its determining factors in Finland. We will also use this equation to calculate the effect of regressors on the dependent variable in long run for the Finland.

$$\Delta \ln TB_t = \phi_0 + \phi_1 \ln TB_{t-1} + \phi_2 \ln REER_{t-1} + \phi_3 \ln GDPPC_{t-1} + \phi_4 \ln UB_{t-1} + \phi_5 \ln UN_{t-1} + \phi_6 \ln INF_{t-1} + \phi_7 \sum_{i=1}^p \Delta \ln TB_{t-i} + \phi_8 \sum_{i=0}^p \Delta \ln REER_{t-i} + \phi_9 \sum_{i=0}^p \Delta \ln GDPPC_{t-i} + \phi_{10} \sum_{i=0}^p \Delta \ln UB_{t-i} + \phi_{11} \sum_{i=0}^p \Delta \ln UN_{t-i} + \phi_{12} \sum_{i=0}^p \Delta \ln INF_{t-i} + \varepsilon_t \text{ --- (vi)}$$

In the same way, short-run equations of ARDL approach have been outlined as followings.

$$\Delta \ln TB_t = \phi_0 + \phi_8 \sum_{i=0}^p \Delta \ln REER_{t-i} + \phi_9 \sum_{i=0}^p \Delta \ln GDPPC_{t-i} + \phi_{10} \sum_{i=0}^p \Delta \ln UB_{t-i} + \phi_{11} \sum_{i=0}^p \Delta \ln UN_{t-i} + \phi_{12} \sum_{i=0}^p \Delta \ln INF_{t-i} + \psi_1 ecm_{t-1} + \delta_1 \text{ --- (vii)}$$

Where Δ denotes the first difference, ϕ_0 is called drifting component, optimal number of lags are represented by p and ψ_1 gives the coefficient of speed of adjustment. The first period lagged error term (ecm_{t-1}) is introduced for capturing the adjustment speed to attain stable equilibrium in long-run. If the coefficient of ecm_{t-1} is significant and negative, it represents the valid convergence hypothesis for the study. At the end, diagnostic tests will be applied to check health of the model.

4. Results and Discussion

This section is reserved for the presentation of empirical findings of the estimated model, interpretation and discussion. First of all, we have estimated the correlation matrix and matrix of variance inflation factor (VIF). These results are given in the Table 2.

Table 2. Correlation Matrix and Matrix of Variance Inflation Factor (VIF)

	lnTBt	lnREERt	lnGDPPCt	lnUBt	lnUNt	lnINFt
lnTBt	-	-	-	-	-	-
lnREERt	-0.6006 (1.5644)	-	-	-	-	-
lnGDPPCt	0.2816 (1.0861)	-0.6330 (1.6686)	-	-	-	-
lnUBt	0.1736 (1.0311)	-0.7735 (2.4891)	0.8890 (4.7676)	-	-	-
lnUNt	0.5236 (1.3777)	-0.2612 (1.0732)	-0.4709 (1.2850)	-0.2582 (1.0715)	-	-
lnINFt	-0.07267 (1.0053)	0.2936 (1.0944)	-0.2509 (1.0672)	-0.3559 (1.1451)	0.0423 (1.0018)	-

*Values in parenthesis represents VIF, Source: authors' own calculation

The results given in Table 2 show that the value of VIF among all the pairs of variables is less than 10 and it indicates that the explanatory variables have insignificant relationship with each other. So, we can conclude that there is no problem of multicollinearity in the data. After checking

for the problem of multicollinearity, graphical representation of data is important in order to comprehend the features and trends of the data.

4.1 Graphical Presentation of Data

Inspecting the data graphically is the first step in analyzing any time series to comprehend the characteristics of the data such as trend, direction of trend, existence of unit root and structural breaks. Therefore, the data for all the variables of the model in their natural log form is presented graphically in Figure 1 which illustrates that the key variables, namely the real GDP per capita ($\ln\text{GDPPC}$) and the urbanization ($\ln\text{UB}$) show a linear distinctive pattern of increasing and deterministic trend while the trade balance ($\ln\text{TB}$) and unemployment ($\ln\text{UN}$) exhibit a linear and slightly rising trend with little volatile behavior. In contrast, the real effective exchange rate ($\ln\text{REER}$) is having downward and linear trend while the series of inflation ($\ln\text{INF}$) is relatively smooth with little explosive behavior in last. The visual examinations specify that most of variables included in our model may have a unit root. So, the next step is reserved to check the possible occurrence of the unit-root in the data series of the study.

Figure 1. Graphical representation of the variables used in model

The problem of unit root has been checked by applying ADF, KPSS and NP tests of unit root as the level of stationarity determines estimation technique for the model. These results have been given in Table 3.

Table 3. Results of Unit Root Testing

	LNTBt	LNREERt	LNGDPPCt	LNUBt	LNUNt	LNINFt
ADF						
Level	-2.1246 (0.2375)	-1.2910 (0.6181)	-0.6708 (0.8388)	-0.8488 (0.7892)	-2.4099 (0.1482)	-1.9094** (0.0557)
difference	-3.6192* (0.0127)	-4.5708* (0.0014)	-3.8055* (0.0076)	-3.0187** (0.0458)	-4.9906* (0.0004)	-
NP						
Level	-1.1551	-1.5934	-1.1710	-0.3476	-2.0418	-6.5386***
difference	-7.4700***	-13.4148**	-11.7035**	-8.7067**	-10.0775**	-
KPSS						
Level	1.2330	0.9354	1.3445	1.5497	2.6740	0.4412**
difference	0.4472**	0.2066*	0.1555*	0.2864*	0.3040*	-
Order of Integration	I(1)	I(1)	I(1)	I(1)	I(1)	I(0)
Critical Values						
Level of Significance						
	1%		5%		10%	
NP	-13.8000		-8.1000		-5.7000	
KPSS	0.73900		0.46300		0.34700	

*, **, and *** represents level of significance at 1%, 5%, and 10% respectively whereas the results in () represents the P- values (probability values), Source: authors' own calculation.

Results presented in above table show that the dependent variable (trade balance) and four of the explanatory variables are first differenced stationary while the last independent variable (lnINF) is stationary at level, so we can say that variables included in our study are of mix integration order. Therefore, ARDL is the suitable estimation technique in this case among the available options. The results of ARDL model have been presented in table 4.

Table 4. ARDL Bounds Testing Approach

Estimated Model		TBt = f(REERt, GDPPCt, UBt, UNT, INFt)
Optimum lags		(1,0,0,0,0)
F-statistic		4.1545**
Significance Level	Critical Bounds for F-Statistic	
	Lower Critical Bound	Upper Critical Bound
5%	2.86	4.01
10%	2.45	3.52
R2		0.4793
Adjusted - R2		0.3434
F-Statistic		3.5281[0.0127]
DW-Statistic		1.8481

*, **, and *** shows the significance level at 1%, 5% and 10% respectively, The value within parenthesis denotes P- Value, Source: authors' own calculation.

Table 5: Results of Diagnostic Testing

Problem	Test	Null hypothesis (Ho)	Test-Statistic	P-value	Decision
Serial Correlation	Breusch-Godfrey LM Test	No problem of serial correlation	0.2836 F(2,21)	0.7559	Unable to reject Ho
Heteroscedasticity	Breusch-Pagan-Godfrey test	Homoscedasticity	0.1881 F(6,23)	0.9771	Unable to reject Ho
Model specification	Ramsey RESET Test	Model has no omitted variables	0.1361 F(1,22)	0.7157	Unable to reject Ho
Normality	Jarque-Bera test	Errors are normally distributed	0.7158	0.6991	Unable to reject Ho
Multicollinearity	VIF		2.5607 (Mean VIF)		There is no multicollinearity in the model
Stability of Parameters	CUSUM and CUSUM square	Parameters of the model are stable			Ho can't be rejected at 5% critical bounds (Figure 3)

The values within [] represents Probability Values

We have employed ARDL model to determine the co-integration among the explained and the predictor variables of the model. Estimated results given in Table 4 confirm that a long-run relation exist among trade balance, and its determining factors because F-statistic at 5% and 10% significance level exceeds upper critical bounds, hence, we can say that co-integration holds between the dependent variable and its determining factors such as real effective exchange rate, GDP per capita, urbanization, unemployment and inflation rate. The P-values of test-statistic for all diagnostic tests are insignificant which is an indication no problem of serial correlation, multicollinearity, heteroscedasticity, non-normality of error term, misspecification of model and parameter instability in the estimated model. After establishing the co-integration, we have estimated the long-run and short-run elasticities for our model. Results are reported in Table 6.

The estimated results for long-run and short-run elasticities presented in Table 6 illustrate that real effective exchange rate is having a statistically significant but negative impact on trade balance both in short and in long-run for Finnish economy. It means that if the index of REER decreases, there will be depreciation of local currency with respect to the foreign currencies. This will increase the competitiveness of Finnish exports and hence trade balance will improve. The long-run and short-run coefficients of real effective exchange rate shows that trade balance increases by 78.63% and 45.30% on average with every 1% depreciation of domestic currency respectively. This indicates that real effective exchange rate effects the trade balance negatively in Finland, the finding is consistent with Khan and Hossain (2012) and Vural (2016).

Table 8 also indicates that economic growth measured by GDP per capita is influencing the

Finnish trade balance positively and significantly in short and long-run for the selected sample. It shows that when income of the people increases, they save and invest more. Such investments in manufacturing and other sectors raises the country's exports which helps in improving the trade balance of the economy. It means that economic growth is seemed to be a helpful factor for the management of trade balance in both short and long-run in Finland. Waliullah et al. (2010) and Tufail et al. (2014) have also established the same relationship among the economic growth and trade balance.

Both the short and long-run coefficients of urbanization are negative and significant which means that trade balance decreases with growing urbanization in the country as the rise in the urban population places more pressure on the aggregated demand and induces the imports to grow which in turn worsen balance of trade and stimulate trade deficit in country as indicated by Hassan et al. (2015).

Table 6: Long Run and Short Run Elasticities Using ARDL Approach

Estimated Long Run Coefficients		Error Correction Representation	
Dependent Variable: LNTBt		Dependent Variable: ΔLNTBt	
Variables	Coefficient	Variables	Coefficient]
lnREERt	-0.7863[0.0039]	Δ lnREERt	-0.4530[0.0005]
lnGDPPCt	0.6670[0.0001]	Δ lnGDPPCt	0.3843[0.0085]
lnUBt	-6.6074[0.0000]	Δ lnUBt	-3.8067[0.0000]
lnUNt	0.1397 [0.0065]	Δ lnUNt	0.08050[0.0400]
lnINFt	-0.0310[0.0832]	Δ lnINFt	-0.0179[0.0648]
C	25.5445[0.0000]	C	14.7168[0.0000]
		ECMt-1	-0.5761[0.0000]
Diagnostics for ECM Model			
R ²	0.9557	Adjusted R ²	0.9441
Mean Dependent Variable	0.0160	S.D. of Dependent Variable	0.0886
S.E. of Regression	0.0210	Sum of Squared Residual	0.0110
Akaike Information Criterion	-4.6921	Schwarz Bayesian Criterion	-4.3652
F-statistic	82.6466	Prob. Value (F-statistic)	[.0000]
Log Likelihood	77.3820	Durbin-Watson Stat	2.1858

*Values in [] denote P-values

Moreover, the short-run coefficient of unemployment along with the long-run coefficient are showing the significant and positive impact on Finnish trade balance for selected sample. It is a fact that the purchasing power of the individuals deteriorates with the expansion in unemployment level; as a result, aggregated demand drops, which causes the overall prices to fall domestically in the country. Consequently, the decline in the domestic prices causes the exports to increase and therefore increases the size of trade balance of the economy.

On the other hand, it is evident that inflation in domestic economy of Finland is significantly deteriorating the trade balance in both long-term as well as short-term. The transmission mechanism of this result can be explained as an economy experiences the rise in general price level, the price of exportable commodities increases and ultimately reduces the exports and hence it causes the trade balance to be lower in the country. This result collaborates with Shawa and Shen (2013).

The long-run adjustment factor (ecm_{t-1}) for Finnish trade balance is negative, significant, and less than one; which is an indication of long-run stable equilibrium between the trade balance and real effective exchange, GDP per capita, urbanization, unemployment and inflation rate for Finnish economy. The value of ecm_{t-1} is -0.5761 which indicates that the speed of adjustment towards long-run equilibrium is 57.61% per annum in case of any shock because we have used annual data and the time towards this adjustment would be almost 1.74 years.

After the discussion of short and long-run coefficients, we have also studied the “structural stability” graphically. All the recursive estimates (figure-2) confirm that no structural break is evident in the model, which shows that model is structural stable. Fitness of the model is also verified with the help of plot of the fitted and actual values of trade balance and residuals (figure-3). Moreover, we have also employed the structural stability of mean and variance of the error term for the selected ARDL model with the help of CUSUM and CUSUM square graphs. From these, we can conclude that both of the mean and variance of error term are structurally stable and there is no problems of structural break in the model for the selected period.

Figure 2: Recursive estimates of elasticities for the ECM and test of structural instability

Figure 3: Graph of Fitted and Actual Values along with Residuals

Figure 4: Plots of CUSUM and CUSUM Square

5. Conclusion

The findings of the study show that although the Finland has experienced trade surplus for some time periods, however it is also witnessed that most of the time the Finnish economy has faced a trade deficit. Attaining equilibrium into both exports and imports is a highly difficult job for any economy. The aim of this study is to examine the impact of different factors on trade balance in Finland from 1990 to 2019 using ARDL approach and its results prove that the long-run relationship between the variables of the estimated model exists. The empirical findings of the study on the determinants of Finland's trade balance indicate that real effective exchange rate, urbanization and inflation are having a significant but negative impact on Finland's trade balance for both short-run and long-run while the impact of GDP per capita and unemployment are significant and positive on the Finnish trade balance. The plots of recursive estimates and both CUSUM and CUSUM square confirm the nonexistence of any structural break in the model.

In the light of the results of this study, we can conclude that the depreciation of real effective exchange rate, growth in GDP per capita and controlling the urbanization and inflation will be helpful for the improving the trade balance in Finland. Thus, targeting the per capita income, real

effective exchange rate, and urbanization and inflation would prove to be favorable for improving the trade balance in Finland.

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