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ECONOMIC GROWTH AND INTRA-INDUSTRY TRADE

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ABSTRACT

The purpose of this article is to investigate the impact of marginal intra-industry trade on economic growth. The results indicate that economic growth is a dynamic process. The change of intra-industry has a positive impact on economic growth. This paper confirms relevant theoretical hypothesis as foreign direct investment and globalization promote the economic growth.

Key Words: Endogenous models, Panel Data, and United States.

INTRODUCTION

The issue of convergence versus economic divergence has been a great debate in the literature over the past decades. In 1990s the endogenous growth models emerged. In fact, technological progress, innovation could not be analyzed outside the economic system, as demonstrated by exogenous growth models. The models of monopolistic competition (endogenous) showed that international trade, foreign direct investment and technological factors promoted the economic growth. Thus, it appears that it is more important to assess the growth perspective endogenous that exogenous. That is, more than studying the convergence versus the economic divergence between group of economies, it is important to evaluate the economic growth in a dynamic perspective. With the economic globalization the theoretical and empirical models were revisited.

This paper presents two contributions. We demonstrate that economic growth is a dynamic process; it is preferable to use dynamic estimators. Second, the changes in trade and globalization are the key to explaining economic growth.

LITERATURE REVIEW

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Theoretical models of economic growth are based on two schools: the exogenous growth and the endogenous growth. The exogenous theory, which stresses Solow, (1956) helps explain the convergence between the economies. However, this model does not explain the technological progress. According these assumptions the technology is obtained exogenously. The theory emphasizes endogenous (Romer, 1986; Lucas, 1988; Grossman and Helpman, 1991; Rebelo, 1991 and Aghion and Howitt, 1992) introduced the assumptions of monopolistic competition to explain economic growth. These models are based on the theoretical construction of Schumpeter, (1942). Technological progress, innovation is part of the economic system. Innovation is explained by endogenous factors.

In the 1980s and 1990s emerged some studies that introduced other concerns the theory of growth. These studies (Rodrik, 1998; Alesina et al. 1994; Dollar, 1992 and Frankel and Romer, 1996) introduced new determinants of economic growth as foreign direct investment (FDI), the degree of openness of economies, technology, globalization and immigration. It's not frequently used the indicator of marginal intra-industry trade (MIIT) in the estimation of models of economic growth.

The intra-industry trade (IIT) or two-way trade is defined as simultaneous exports and imports within country or a particular industry. Recently Leitão, (2012) examined the MIIT and its components horizontally (MHIIT) and vertical intra-industry trade (MVIIT) applied to the United States. The author shows that MIIT occurs more among countries that are similar demand.

In fact, the MIIT has been used very frequently on issues of adjustment and its implications on the labour market. This paper introduces the MIIT, to explain the economic growth. Moreover, the MIIT is a dynamic indicator. The growth is a dynamic phenomenon. It will be important to understand the relationship between marginal intra-industry trade and economic growth.

MEASURING INTRA-INDUSTRY TRADE AND MARGINAL INTRA-INDUSTRY TRADE

Traditional intra-industry trade index

The empirical literature use the index proposed by Grubel and Lloyd, (1975). The Grubel and Lloyd, (1975) is given by:

$$IIT = 1 - \frac{\left|X_i - M_i\right|}{\left(X_i + M_i\right)} \quad (1)$$

Where X_i and M_i are the exports and imports of a particular in industry i. The index is equal 1 if all trade is intra-industry trade (IIT). If IIT is equal 0 all trade is inter-industry trade. The Grubel and Lloyd index is a static measure and as Hamilton and Kniest, (1991) demonstrated the

changes of this index over time do not adequately reflects the changes in trade partners. Their measure did not eliminate the scale effect. For other words, their index did not allow the comparison between industries of different size. This problem was resolved by Brülhart, (1994) marginal IIT index (MIIT).

Marginal intra-industry trade index

$$MIIT = 1 - \frac{\left|\left(X_t - X_{t-n}\right) - \left(M_t - M_{t-n}\right)\right|}{\left|X_t - X_{t-n}\right| + \left|M_t - M_{t-n}\right|} \quad (2)$$

This index could be rewritten in the following manner:

$$MIIT = 1 - \frac{\left|\Delta X - \Delta M\right|}{\left|\Delta X\right| + \left|\Delta M\right|} \quad (3)$$

The Brülhart index is a transformation of Grubel and Lloyd, (1975) index. The MIIT index takes the values 0 and 1. The value 0 indicates that the marginal trade in the industry is exclusively of the inter-industry trade and the value 1 represents that the marginal trade is entirely of the intra-industry.

PANEL DATA APPROACH

This research uses a panel data. In the static panel, we estimated by means of pooled OLS, fixed effects (FE) and random effects (RE), the F statistic tests and the null hypothesis of the same specific effects for all individuals. If we accept the null hypothesis, we could use the OLS estimator. The Hausman test can decide which model is better: random effects (RE) or fixed effects (FE). The static panel data have some problems in serial correlation, heteroskedasticity and endogeneity of some explanatory variables. The estimator GMM-system (GMM-SYS) permits the researchers to solve the problems of serial correlation, heteroskedasticity and endogeneity for some explanatory variables. These econometric problems were resolved by Arellano and Bond, (1991); Arellano and Bover, (1995) and Blundell and Bond, (1998, 2000) who developed the first differenced GMM (GMM-DIF) estimator and the GMM system (GMM-SYS) estimator. The GMM-SYS estimator is a system containing both first differenced and levels equations. The GMM- SYS estimator is an alternative to the standard first differenced GMM estimator. To estimate the dynamic model, we applied the methodology of Blundell and Bond, (1998, 2000) and Windmeijer, (2005) to small sample correction to correct the standard errors of Blundell and Bond, (1998, 2000). The GMM system estimator that we report was computed using STATA. The GMM- system estimator is consistent if there is no second order

serial correlation in the residuals (m2 statistics). The dynamic panel data model is valid if the estimator is consistent and the instruments are valid.

ECONOMETRIC MODEL

The dependent variable is the real GDP per capita of US[1] for the period 1995 and 2008. The data are taken from World Development Indicators, the World Bank.

EXPLANATORY AND TESTING OF HYPOTHESIS

Based on endogenous economic models, we formulate the following hypotheses:

Hypothesis 1: There is a negative correlation between initial level of GDP per capita and economic growth.

According to the assumptions of growth models, the hypothesis 1 reflects economic convergence. Barro, (1991) and Dreher, (2006), showed that economic growth has been negatively correlated by initial level of GDP per capita

Hypothesis 2: Marginal intra-industry trade promotes the economic growth.

According to the literature the expected sign for MIIT is positive (Grossman and Helpman, 1991; Rebelo, 1991).

Hypothesis 3: There is a positive (dominant paradigm) correlation between FDI and growth.

FDI - is the stocks inward foreign direct investment each country. The data are collected from UNCTAD, FDI database.

The studies of Kai and Hamori, (2009); Damijan and Rojec, (2007); Campos and Kinoshita, (2002); Badinger and Tondl, (2002); Mileva, (2008) and Onaran, (2007) show that foreign direct investment influences the economic growth. However De Mello, (1999) and Ayanwale, (2007) defend a negative impact of FDI on growth.

Hypothesis 4: Globalization encourages the economic growth.

[1] We select the following trade partners: Australia, Belgium, Brazil, Canada, China, Denmark, France, Germany, Netherlands, Spain, Portugal, Japan, Korea, Thailand, Italy, United Kingdom, and Russia.

The index of globalization (KOF) proposed by Dreher, (2006) represents three dimension of globalization: economic; social and political (see Dreher, 2006; Dreher and Gaston, 2008). There is a positive relationship between KOF and economic growth.

ECOKOF- this is economic globalization. The index is composed by two categories: Actual flows and Restrictions.

The actual flows involve the following components: trade in percentage of GDP; foreign direct investment in percentage of GDP; portfolio investments in percentage of GDP, and income payments to foreign nationals in percentage of GDP. In restriction, the components consider are hidden import barriers, mean tariff rate, taxes on international trade and capital account restrictions.

CULTKOF- Cultural globalization is interpreted as the domination of American products (Dreher, 2006). The data on cultural proximity are the number of McDonald's restaurants per capita.

POLTKOF- Political globalization is measured by embassies country and membership in international organizations.

MODEL SPECIFICATION

$$Growth_{it} = \beta_0 + \beta_1 X_{it} + \delta t + \eta_i + \varepsilon_{it} \quad (4)$$

Where $Growth_{it}$ is the real GDP per capita, X is a set of explanatory variables. All variables are in the logarithm form; ηi is the unobserved time-invariant specific effects; δt captures a common deterministic trend; ε_{it} is a random disturbance assumed to be normal, and identical distributed (IID) with E (ε_{it})=0; Var (ε_{it}) = $\sigma^2 \succ 0$.

The model can be rewritten in the following dynamic representation:

$$Growth_{it} = Growth_{it-1} + \beta_0 + \beta_1 X_{it} - \rho\beta_1 X_{it-1} + \delta t + \eta_i + \varepsilon_{it} \quad (5)$$

Where $Growth_{it}$ is per capita GDP growth at constant prices, X is a set of explanatory variables.

All variables are in the logarithm form.

EMPIRICAL RESULTS

In Table-1 presents summary statistics for each variable. LogECOKOF, LogCULTKOF, and LogPOLTKOF appear to have only little differences. However, this is not the case for the LogGrowth, LogGDP, LogMIIT and LogFDI.

Table-1: Summary Statistics

Variables	Mean	Std. dev.	Min	Max
LogGrowth	-1.20	0.27	-1.47	-0.32
LogGDP	7.01	0.08	6.87	7.15
LogMIIT	-0.35	0.37	-2.99	-0.01
LogECOKOF	1.82	0.01	1.79	1.84
LogCULTKOF	1.94	0.01	1.94	1.95
LogPOLTKOF	1.97	0.01	1.97	1.98
LogFDI	5.18	0.25	4.76	5.51

Before estimating the panel regression model, we have conducted a test for unit root of the variable. In the following tables, we present the results of panel unit root test ADF- Fischer Chi square.

Table-2: Panel unit root test results :(LogGrowth) ADF-Fischer Chi square Regression 1 lag

ADF-Fischer Chi square	Intercept and trend Statistic	Probability
Inverse chi-squared	70.08	0.00
Inverse normal	-2.27	0.002
Inverse logit	-3.02	0.00
Modified inv. chi-squared	4.01	0.00

Table-2a: Panel unit root test results: (LogMIIT) ADF-Fischer Chi square Regression 1 lag

ADF-Fischer Chi square	Intercept and trend Statistic	Probability
Inverse chi-squared	52.82	0.03
Inverse normal	-1.25	0.11
Inverse logit	-1.56	0.06
Modified inv. chi-squared	1.99	0.02

Table-2b: Panel unit root test results: (LogECOKOF) ADF-Fischer Chi square Regression 1 lag

ADF-Fischer Chi square	Intercept and trend Statistic	Probability
Inverse chi-squared	58.02	0.01
Inverse normal	0.04	0.52
Inverse logit	-0.84	0.20
Modified inv. chi-squared	2.60	0.00

Table-2c: Panel unit root test results: (LogCULTKOF) ADF-Fischer Chi square Regression 1 lag

ADF-Fischer Chi square	Intercept and trend Statistic	Probability
Inverse chi-squared	105.29	0.00
Inverse normal	-5.74	0.00
Inverse logit	-6.27	0.00
Modified inv. chi-squared	8.17	0.00

Table-2d: Panel unit root test results: (LogPOLTKOF) ADF-Fischer Chi square Regression 1 lag

ADF-Fischer Chi square	Intercept and trend Statistic	Probability
Inverse chi-squared	46.92	0.10
Inverse normal	-2.11	0.02
Inverse logit	-1.96	0.02
Modified inv. chi-squared	1.29	0.09

Table-2f: Panel unit root test results: (LogFDI) ADF-Fischer Chi square Regression 1 lag

ADF-Fischer Chi square	Intercept and trend Statistic	Probability
Inverse chi-squared	75.43	0.00
Inverse normal	-3.82	0.00
Inverse logit	-4.05	0.00
Modified inv. chi-squared	4.65	0.00

In Table-3 we can observe the determinants of growth using GMM-system estimator. The model presents consistent estimates, with no serial correlation (the Arellano and Bond test for Ar(2)). The specification Sargan test shows that there are no problems with the validity of instruments used. The Windmeijer, (2005) finite sample correction is used.

The model presents all significant variables ($LogGrowth_{t-1}$, LogGDP, LogMIIT, LogFDI, LogECOKOF, LogCULTKOF, and LogPOLKOF).

The lagged variable of real GDP per capita ($LogGrowth_{t-1}$) is statistically significance with a positive sign. This result shows that economic growth is a dynamic progress. Our results confirm the empirical studies of as in Barro, (1991); Kai and Homori, (2009); Dreher, (2006) and Dreher and Gaston, (2008).

Table-2: GMM-System

Dependent variable : LogGrowth(real GDP per capita **)**		
Independent Variables	**Coefficient**	**Expect Signs**
$LogGrowth_{-1}$	0.30 (4.276)***	(+)
LogGDP	-1.29 (-6.85)***	(-)
LogMIIT	0.01 (3.58)***	(+)
LogFDI	1.21 (10.01)***	(+)
LogECOKOF	18.30 (12.35)***	(+)
LogCULTKOF	11.64 (17.57)***	(+)
LogPOLKOF	5.11 (12.00)***	(+)
C	9.08 (8.38)***	
Arellano-Bond test for Ar(2)	0.372	
Sargan test	0.89	
N	207	

The null hypothesis that each coefficient is equal to zero is tested using one-step robust standard error. T-statistics (heteroskedasticity corrected) are in round brackets. P-values are in square brackets; *** - statistically significant at the 1 per cent level. Ar(2) is tests for second–order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null hypothesis of no serial correlation (based on the efficient two-step GMM estimator). The Sargan test addresses the over-identifying restrictions, asymptotically distributed X^2 under the null of the instruments' validity (with the two-step estimator).

The initial per capita GDP (LogGDP) is statistically significance with a positive sign. Our results confirm the empirical studies of as in Barro, (1991); Kai and Homori, (2009); Dreher, (2006); Dreher and Gaston, (2008) and Leitão, (2011). A positive effect of marginal intra-industry trade (LogMIIT) on economic growth was expected and the results confirm this, showing that changes of trade encourage growth. This result is according to Grossman and Helpman, (1991) and Rebelo, (1991).

Our results show that the economic growth is positively correlated with all components of the index of globalization (LogKOF). This result is according to previous studies (Dreher, 2006; Dreher and Gaston, 2008; Kai and Hamori, 2009). The coefficient of foreign direct investment flows (LogFDI) is positive with significant. So we can conclude that FDI promotes the economic growth.

CONCLUSIONS

This paper analyses the link between economic growth and monopolistic competition. To this purpose it was introduced new explanatory variables as in marginal intra-industry trade, foreign direct investment and globalization. The last variable was analyzed consider three dimensions: economic, social and political. The results indicate that the endogenous models have a greater potential to explain economic growth. Drawing from the relationship between economic growth and marginal intra-industry trade, we presented the GMM-system estimator.

Our findings suggest that the economic growth is a dynamic process. The study confirms that the exchange of MIIT promotes the growth. The globalization process also contributes to explaining the economic growth. Finally we can refer that foreign direct investment promotes the economic growth.

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