HOW DOES NATIONAL FOREIGN TRADE REACT TO THE EUROPEAN CENTRAL BANK'S POLICY?

Giovanni Tria, Dipartimento CEIS, Università di Roma Tor Vergata
Giuseppe Galloppo, Dipartimento CEIS, Università di Roma Tor Vergata

ABSTRACT

This paper examines how external foreign trade reacts to the European Central Bank's (ECB) Official Discount Rate, considering exports to the US and Japan in EU27 and in four European countries. Although many previous studies have measured the cointegration and causality among exchange rate, exports, and imports, to date, no research has considered these relationships while introducing monetary variables into the analysis. The objective of this article is to fill this gap in the literature. We use the bounds testing approach to cointegration and error-correction modelling to test relations between monetary policy, exports, and terms of trade, making the distinction between short and long-run effects possible. Our datasets include quarterly data on exports, imports, income, relative price, and the official ECB discount rate. The quarterly data starts from the first quarter of 1999 and ends in the last quarter of 2008. The results show that a long-run relationship exists between real exports, real foreign income, real bilateral cross rates and interest rates for a large part of these countries. Also long run parameter estimates are consistent with economic theory in most of the cases. More importantly the statistically significant error-correction term corroborates the results of the long-run parameter.

KEYWORDS: Cointegration Analysis, Export, Central Bank Policy

JEL: G11

INTRODUCTION

Taking a prompt from the work of Aristotelous (2002), Arize et al. (2000), and Singh, J.P. and Kónya, L. (2006), among others, this article examines the existence of short and long-run dynamic association between interest rate and trade performance in some European countries. In this study we evaluate the short-run impacts of interest rates on exports by estimating long-run function demand and error-correction (EC) models. Along with the interest rate, GDP of the importing country and real bilateral exchange rates are also employed as explanatory variables of real export volumes.

Cointegration methods are able to show whether there is a long-run relationship among the relevant variables, as well as to estimate their short-run dynamics. Cointegration is especially useful because many times series are non stationary, or "integrated," so they need differencing for standard regression procedures to be valid. A set of integrated time series can be "cointegrated" if there is a stationary relationship among them. In other words the variables might move together in the long run, never deviating far from each other, even if they are all continually increasing.

More emerging countries are fixing their currencies to a strong currency (either dollar or euro) to revamp their economies as export platforms. Recently crises in large parts of the world, primarily the emerging markets, which are dangerously dependent on exports, and their economies based on this export model, are crash landing. The collapse of emerging markets could have consequences far beyond their borders particularly if it involves a major European bank crash as a result of massive defaults on Europe's trillions of dollars of emerging-market trade financing.

The remainder of this paper is organized as follows. The next section presents the relevant literature. This section is followed by a discussion of the data and methodology used in the paper. Next, the results of the empirical tests are presented. The paper closes with some concluding comments.

LITERATURE REVIEW

Although the relationship between exchange rate volatility and the foreign exchange markets have been studied extensively, co-movements between export and interest rates have received no attention. A body of literature in international finance includes studies that concentrate on assessing the impact of exchange rate uncertainty or fluctuation on trade flows. Economists indeed have explored the relationship between exchange rate volatility and trade volume but they have not reached an agreement among themselves. While theoretical arguments for the positive effects of exchange rate uncertainty on the trade flows is provided by De Grauwe (1988), most of the studies in the literature are empirical and provide support for negative or no effects.

Coric and Pugh (2006) and Bahmani-Oskooee and Hegerty (2007) provide the latest review of the literature. Particularly the theoretical and empirical literature, reviewed by Bahmani-Oskooee and Hegerty (2007), shows both justification for and evidence supporting decreases, increases, or no change at all as a result of increased exchange-rate risk. Among the articles reviewed by the authors Aristotelous (2002) uses the popular cointegration technique of Johansen and Juselius (1990) and finds that Japanese imports from the U.S were reduced in the long run because of exchange-rate volatility. Because of this, floating exchange rates are said to introduce volatility into the foreign exchange market and in this way could deter trade flows. De Vita and Abbott (2004) apply the autoregressive distributed lag (ARDL) approach of Pesaran et al. (2001) to assess U.S. exports to its five main markets. While short-run results are not given, the long-run coefficient for the volatility term is significantly positive.

One common feature of the studies mentioned above is that they all used aggregate trade data, yielding empirical results that could suffer from aggregation bias. Disaggregating trade data by commodities could provide useful insights about which commodities are affected by exchange rate risk. Rapp and Reddy (2000) look at monthly U.S. exports to its G-7 partners, also at the 1-digit level. The results from the Johansen cointegration procedure show a negative volatility coefficient for all but one sector, which is positive but insignificant. Peridy (2003) develops a sectoral theoretical model (which includes such "micro" variables as differentiation and returns to scale), and then tests it empirically on the Japannese market. Volatility is proxied both as a moving standard deviation and with GARCH; at least one measure is significantly negative for Japan for each sector—with the exclusion of non ferrous metals and other transport equipment. GARCH does produce more positive coefficients than the standard-deviation method, highlighting the debate in the literature over the "correct" proxy for risk.

A summary of the results of these studies produces something of a 'mixed bag'. While some studies have assumed that exchange rate volatility impedes trade, other studies disagree. This is because an increase in exchange rate risk has a substitution and an income effect. The substitution effect leads traders to substitute away from foreign trade towards domestic trade, while the income effect leads to increased foreign trade. In addition, some studies have reported no significant relationship between exchange rate volatility and exports.

The objective of this article is to fill the gap in the literature by examining the impact of ECB Official Discount Interest Rate on some European country's exports with their most important trading-partner offset UE. Considering the dominant roles of the USA and Japan as trading partners of European countries, this article focuses on exports from European countries to the US and to Japan for the period from 1999 to 2008. One of the most frequently cited constraints that firms and smallholders encounter in taking advantage of new opportunities that emerge in foreign markets is finance. In many developing countries, financial systems work poorly in performing their basic function of intermediating savings into worthy financial investments including export investments. Of course there is also very different local situations. The Chinese financial systems role in supporting the whole economy as export driven is illustrative. In the period 2002 to 2004, the total assets of foreign banks in China increased to RMB516 billion from RMB288 billion (see Li et al., 2006). By the end of October 2005, the total assets of foreign banks in China reached US$84.5 billion, accounting for 2% of the total of China's banking industry assets. At the same time, 71 foreign banks from twenty countries established 238 business firms in China's twenty-three cities, forty-three more than before China's WTO accession, where businesses operated in twenty-five Chinese cities. In Shanghai, the total assets of foreign banks accounted for 12.4%, and foreign currency credits accounted for 54.8%. The number of foreign insurance companies reached forty-one, accounting for 50% of the total number of insurance companies in China by the end of 2005.

There are some papers providing evidence of an additional comparative advantage channel based on the level of financial development. Manova (2005) find that countries with better-developed financial systems tend to export relatively more in highly external capital dependent industries and in sectors with fewer tangible assets that can serve as collateral. Establishing causality in a panel of 107 countries and 27 industries in 1985-1995, the author find that equity market liberalizations increase exports disproportionately more for sectors more reliant on outside funding or characterized by softer assets. This effect is more pronounced in countries with initially less active stock markets, suggesting that foreign equity flows may substitute for an underdeveloped domestic financial system.

DATA AND METHODOLOGY

A plethora of studies have evolved after the seminal works of Granger (1969) and Sims (1972) on discovering causality among macro variables, such as money, income and interest rates; money, output and inflation; output, exports and exchange rates; output, consumption and prices; etc. Though relationships between exchange rate volatility and foreign exchange market have already received attention, researchers have generally ignored monetary variables. Indeed, the aim of this paper is to find out how the trade performance in some European countries (Spain, France, Italy and German) reacts to the ECB’s policy on the official discount interest rate. In this sense this article studies the long-run relationship between exchange rate volatility and exports by performing long-term demand function. We also evaluate the short-run impact of interest rates on exports by estimating EC models, as in the studies of Arize et al. (2000) and Bahmani-Oskooee and Ardalani (2006) among the others. Many of the studies that have assessed the effects of exchange-rate uncertainty have modelled the quantity of exports or imports as a function of the importing country’s income, a measure of relative price, and a proxy for volatility. The former two variables capture income and substitution effects; higher income and lower price increase demand. The relative price of competing domestic goods to traded goods is usually expressed as either the trading country’s real exchange rate or its terms of trade.

To analyse the impact of interest rates on each European country’s exports, we tend to estimate simpler, reduced-form models. Typically in these formulas exports or imports are a function of income, some measure of relative price, and the official ECB discount rate, specifically the following long-run real exports demand function:

$$X_{ijt} = \lambda_1 + \lambda_2 Y_{ijt} + \lambda_3 RE_{ijt} + \lambda_4 IR_t + \varepsilon_{ijt} \quad (1)$$

where X_{ijt} marks real exports from a country i (a European country) to a country j (either the US or Japan); Y_{jt} the GDP of an importing country j; RE_{ijt} the real bilateral exchange rate, reflecting the price competitiveness; IR_t the official discount ECB’interest rate; and εijt a disturbance term.

Economic theory suggests that an increase in real foreign income should lead to an increase in the demand for exports. A rise (fall) in relative export prices, proxied by real bilateral exchange rate, would cause domestic goods to become less (more) competitive than foreign goods, therefore exports would fall (increase). In other words one would expect that increases in real GDP of trading partners to result in a greater volume of exports toward to those partners. In addition, the real exchange rate depreciation (an increase in the directly quoted exchange rate) may lead to an increase in exports due to the relative price effect. In this sense the coefficients for income, $\lambda 2$, should be positive, implying that the higher the economic activity in the importing country, the higher the demand for export. Also a higher real exchange rate implies a lower relative price and so the value for $\lambda 2$ is also expected to be positive. Since this study focuses on the coefficient $\lambda 3$, the expectations for the sign of $\lambda 3$ are explained further in somewhat more detail.

We use quarterly data in this article. The quarterly data starts from the first quarter of 1999 and ends in the last quarter of 2008. The ECB monetary policy and macroeconomic variables data come from Eurostat. Specifically real GDP and Consumer price indices (CPI) come from Eurostat–National Accounts section. Data export trade data are drawn from Eurostat–External trade section and exchange rates and interest rate were collected from the Eurostat–Finance section.

The list of variables is as follows. The real export from country i to country j is defined as follows:

$$X_{ijt} = \ln\left(\frac{EX_{ijt}}{EXUV_{it}} \times 100\right) \tag{2}$$

where X_{ijt} stands for the log value of the real exports of country i to country j; EXijt is the quarterly nominal exports of country i to country j, measured in term of Euros. The real GDP of the importing country (country j) is commonly used as a proxy measure for economic activity of the importing country in much of the literature dealing with quarterly or annual data. Therefore, the variable Yjt in Equation 1 is defined to be the natural logarithm of the real GDP of an importing country j in time t.

$$Y_{ijt} = \ln\left(GDP_{it}\right) \tag{3}$$

The bilateral trade between two countries depends on, among other factors, exchange rates and the two trading partner's relative price. Without commodity price data, we follow Bahmani-Oskooee (2002), and use the (CPI-based) real bilateral exchange rate (P_{ijt}), as proxy of the relative price level. From here, the real exchange rates included in the export equations of this article is calculated from a purchasing power parity relationship expressed as follows:

$$P_{ijt} = \ln\left(RER_{ijt} \times \frac{CPI_{jt}}{CPI_{it}}\right) \tag{4}$$

where $RERt$ is the effective nominal exchange rate, CPI_{it} and CPI_{jt} show the quarterly consumer price index of an exporting country i and an importing country j, respectively. In this sense an increase in $RERt$ signals a depreciation of the foreign cross rate.

$$Y_{ijt} = \ln\left(GDP_{it}\right) \tag{5}$$

According to our list of variables, Equation (1) becomes:

$$X_{ijt} = \lambda_1 + \lambda_2 Y_{ijt} + \lambda_3 P_{ijt} + \lambda_4 \ln IR_{ijt} + \varepsilon_{ijt} \tag{6}$$

Descriptive statistics of all variables are shown in Table 1.

Table 1 – Descriptive Statistics

	EXJDE	EXJES	EXJEU27	EXJFR	EXJIT	EXUSDE	EXUSES
Mean	1,050,000,000	97,705,225	3,580,000,000	452,000,000	361,000,000	5,540,000,000	518,000,000
Median	1,070,000,000	96,387,230	3,600,000,000	452,000,000	371,000,000	5,620,000,000	513,000,000
Maximum	1,200,000,000	138,000,000	4,210,000,000	536,000,000	433,000,000	6,920,000,000	675,000,000
Minimum	805,000,000	69,691,591	2,730,000,000	312,000,000	256,000,000	3,740,000,000	325,000,000
Std. Dev.	92,598,237	15,696,168	285,000,000	45,177,200	35,563,840	618,000,000	89,697,621
Skewness	-0.9	0.4	-1.0	-0.8	-1.2	-0.7	0.0
Kurtosis	3.8	2.9	5.3	4.5	4.9	3.9	2.2
Jarque-Bera	6.7	1.1	15.8	8.1	15.8	4.2	1.1
Probability	0.0	0.6	0.0	0.0	0.0	0.1	0.6

	EXUSEU27	EXUSFR	EXUSIT	GDPJP	GDPUS	RER_JP	RER_USD
Mean	20,100,000,000	2,180,000,000	2,000,000,000	977,607.4	2,530,252.0	116.2	1.2
Median	20,500,000,000	2,120,000,000	1,990,000,000	935,884.6	2,543,128.0	116.9	1.2
Maximum	23,100,000,000	2,910,000,000	2,390,000,000	1,323,740.0	2,946,983.0	139.8	1.6
Minimum	13,400,000,000	1,740,000,000	1,460,000,000	779,904.5	2,020,908.0	93.8	0.9
Std. Dev.	2,020,000,000	251,000,000	198,000,000	145,320.4	217970.9	10.4	0.2
Skewness	-1.3	0.8	-0.2	0.7	0.0	-0.1	0.2
Kurtosis	4.9	3.5	3.1	2.7	2.4	2.6	2.1
Jarque-Bera	16.5	4.6	0.3	3.3	0.5	0.3	1.6
Probability	0.0	0.1	0.9	0.2	0.8	0.9	0.4

This table reports descriptive statistics of all data considered in this paper. The list of variables is as follow: EXJDE stands for German export to Japan, EXJES is Spain export to Japan, EXJEU27 represent EU27 export to Japan, EXJFR is France export to Japan, EXJIT stand for Italian export to Japan, EXUSDE stand for German export to USA , EXUSES is Spain export to USA, EXUSEU27 represents EU27 export to USA, EXUSFR is France export to USA, EXUSIT stand for Italian export to USA, GDPJP represent USA GDP, GDPUS is US GDP, RER_JP is real bilateral cross rate Euro-Yen as computed following expression (2), RER_USD is real bilateral cross rate Euro-Yen as computed starting from expression (4).

A study of co-movements or cointegration poses the following questions, which should first be addressed: Are the exports and relative exchange rate integrated of order one? Is the official discount rate also integrated of order one? Are all these variables cointegrated? To provide valid empirical evidence on long-run relationships between variables it is highly important to test the time series properties of the variables in question. Since the data used in this study are time series data, they could change over time and do not have fixed or stationary means. Unit root tests identify whether the variables are stationary or non stationary. There are several tests developed in the time series econometrics for testing for the presence of unit roots. This study uses two most popular tests, namely the augmented Dickey–Fuller (ADF) and the Phillips–Perron (PP) tests in testing for unit roots in exports, real exchange rate and interest rate. The DF test is based on the regression:

$$\Delta X_t - \mu + \beta X_{t-1} \tag{7}$$

Where, X_t means the variable of interest and Δ marks the difference operator; μ and β are parameters to be estimated. The null hypothesis (H_0) is: X_t is not $I(O)$. The ADF test is based on the regression:

$$\Delta X_t - \mu + \beta X_{t-1} + \sum_{i=1} \gamma_i \Delta X_{t-1} + \varepsilon_i \tag{8}$$

Where *t* is selected such that ε_i is white noise; μ, β and γ_i are parameters to be estimated. The ADF and the ADF statistics are calculated by dividing the estimates of β by its standard error. If the calculated DF and ADF statistics are less than their critical values from Fuller's Table, then the null hypothesis (H_0) is rejected and the series are stationary or integrated or order one, i.e $I(1)$. The lengths of the lags included in the tests were determined by the Akaike Information Criterion (AIC).

These tests are applied to the log of the variables as well as their first and second differences (to check for the presence of an order of integration higher than 1). We also calculate the test statistics without the constant and trend. According to the results of Tables 2 and 3, all data pertinent to US foreign trade, in logarithmic form, contain at least one unit root, at 5% of confidence. In reverse, all data involving Japanese financial and macroeconomic data flows are seemingly trend-stationary (also if the Perron test on first difference on the real Japan cross rate and Japan GDP appears ambiguous). Thus, the results show the null unit roots hypothesis cannot be rejected for variables involving the USA, meaning that these variables are non stationary in their level forms. Besides ADF and PP tests exceed their corresponding critical values at 5% level of significance when the variables are first differenced, which implies that these variables are stationary in first differences and therefore integrated in order 1, i.e. I(1).

Table 2: Unit Root Statistics

	LIREU	LEXJDE	LEXJES	LEXJEU27	LEXJFR	LEXJIT	LEXUSDE	LEXUSES
Level ADF Test Statistic	-0.279	-0.279	-2.790	-5.097	-5.619	-5.604	-2.979	-1.988
First Difference ADF Test Statistic	-1.926	-1.926	-6.669	-6.038	-7.261	-6.102	-4.495	-4.395
Level PP Test Statistic	-0.420	-0.420	-3.682	-3.923	-4.019	-5.297	-3.974	-3.060
First Difference PP Test Statistic	-3.260	-3.260	-12.249	-5.639	-7.847	-10.074	-6.574	-15.714

Table 2 reports unit root statistics following ADF and Philips Perron Test. The list of variables is as follow: LIREU represent natural logarithm of ECB Offical Discount Rate, LEXJDE stand for natural logarithm of German export to Japan, EXJES is natural logarithm of Spain export to Japan, EXJEU27 represent natural logarithm of EU27 export to Japan, EXJFR is natural logarithm of France export to Japan, EXJIT stand for natural logarithm of Italian export to Japan, EXUSDE stand for natural logarithm of German export to USA , EXUSES is natural logarithm of Spain export to USA. MacKinnon critical values for rejection of hypothesis of a unit root are: -3.612 - 1% Critical Value, -2.940 - 5% Critical Value and , -2.608 - 10% Critical Value for ADF test (-3.617, -2.942, -2.609 respectively for first difference test). -3.607 - 1% Critical Value, -2.9385 - % Critical Value and , -2.607 - 10% Critical Value for PP test both for level and first difference.

Another way to distinguish the short-run effects from the long-run effects, involve the incorporation of the short-run adjustment mechanism into Eq. 1 by specifying it in an error-correction format. The specification that we adopt in this paper is based on the ARDL error-correction model of Pesaranet al. (2001):

$$\Delta \ln X_{i,t} = a_i + \sum_{j=1}^{n1} b_j \Delta \ln X_{i,t-j} + \sum_{j=o}^{n2} c_j \Delta \ln Y_{t-j} + \sum_{j=0}^{n3} d_j \Delta \ln ER_{t-j} + \sum_{j=0}^{n4} e_j \Delta \ln IR_{t-j} + \lambda_1 \ln X_{i,t-j} + \lambda_2 \ln Y_{t-j} + \lambda_3 \ln ER_{t-j} + \lambda_4 \ln IR_{t-j} + v_{i,t} \quad (9)$$

Table 3: Unit Root Statistics

	LEXUSEU27	LEXUSFR	LEXUSIT	LGDPJP	LGDPUS	LRERJP	LRERUSD
Level ADF Test Statistic	-4.116	-1.444	-2.617	-1.525	-2.449	-2.353	-0.965
First Difference ADF Test Statistic	-3.296	-3.891	-3.929	-2.537	-2.932	-2.457	-2.979
Level PP Test Statistic	-4.874	-2.569	-4.589		-2.829	-2.542	-0.679
First Difference PP Test Statistic	-8.434	-7.642	-11.338	-3.115	-4.250	-3.808	-4.154

Table 3 reports unit root statistics following ADF and Philips Perron Test. The list of variables is as follow: EXUSEU27 represent natural logarithm of Eu27 export to USA, EXUSFR is natural logarithm of France export to USA, EXUSIT stand for natural logarithm of Italian export to USA, GDPJP represent natural logarithm of USA GDP, GDPUS is natural logarithm of Us'GDP, RER_JP is natural logarithm of real bilateral cross rate Euro-Yen as computed following expression (2), RER_USD is natural logarithm of real bilateral cross rate Euro-Yen as computed following expression (4). . MacKinnon critical values for rejection of hypothesis of a unit root are: -3.612 - 1% Critical Value, -2.940 - 5% Critical Value and , -2.608 - 10% Critical Value for ADF test (-3.617, -2.942, -2.609 respectively for first difference test). -3.607 - 1% Critical Value, -2.9385 - % Critical Value and , -2.607 - 10% Critical Value for PP test both for level and first difference.

These equations allow us not only to test for a long-run cointegrated relationship among the variables, they provide both short-run and long-run coefficient estimates within a single equation. In addition, this modelling approach has been shown to have superior small-sample properties (see Pesaran and Shin (1998) and Panopoulou and Pittis (2004)), which makes it a good choice for our sample (small size) of other cointegration techniques. Testing for cointegration is also simpler than in other procedures. The "bounds testing" ARDL approach has been shown to be valid for both $I(0)$ (stationary) as well as $I(1)$ (first-difference stationary) variables. Thus, there is no need for pre-unit-root testing. This is one of the main advantages of the bounds testing approach which makes it relatively more applicable to our topic because in our sample we have some stationary measures whereas other variables could be non-stationary.

The underlying idea behind combining both stationary and non-stationary variables within a single equation involves the fact that the variables together can form a stationary combination. If there is a stationary relationship among them in a long-run steady state, we can say they are cointegrated. Cointegration is shown with a single F -test for the joint significance of the long-run variables. They show that for cointegration, the calculated F statistic should be greater than the upper bound critical value. The critical value for this test, see Banerjee et al. (1998) and based on our sample size and the number of regressors, is 3.77. In an equilibrium state, all the short-run variables (first differences) in Eqs. (9) are zero. The only terms remaining are the lagged level terms. Thus, in equilibrium, if these terms are all nonzero, we can say there is a long-run relationship among trade flows, income, prices, and interest rate in the long run. If at least one term is insignificant, however, then there is no long-run relationship.

The procedure is under taken as follows. First, the lag lengths of lagged terms are chosen to minimize the Akaike Information Criterion (AIC), and the equations are estimated. The F -test is then used to test the null hypothesis of $\lambda_1 = 0$, $\lambda_2 = 0$, $\lambda_3 = 0$, $\lambda_4 = 0$, against the alternative of at least one equal to zero.

As there is an "intermediate" range between these bounds, we perform a secondary cointegration test. We take the fitted values of the long-run variables, $\lambda_1 \ln Xi,_{t-1}$, $\lambda_2 \ln Y._{t-1}$, $\lambda_3 \ln ER_{t-1}$, $\lambda_4 \ln IR_{t-1}$ for Eq. (9) to form a single error-correction term for each as follows:

$$\Delta \ln X_{i,t} = \lambda_1 + \lambda_2 EC_{ijt-1} + \sum_{j=1}^{n1} \lambda_3 \Delta \ln Y_{t-j} + \sum_{j=1}^{n1} \lambda_4 \Delta \ln ER_{t-j} + \sum_{j=1}^{n1} \lambda_5 \Delta \ln IR_{t-j} + \varepsilon_{t\,i} \quad (10)$$

If the variables in Equation 1 are not cointegrated, the EC term, EC_{ijt-1}, is removed from Equation 10.

If, when each equation is re-estimated, the coefficient for ECM_{t-1} is negative and significant, this suggests the variables are moving together towards equilibrium and there is a long-run relationship among them. Note that this will be verified only if the adjustment dynamics performing through the dependent variable over the next quarterly is strong enough. This term, ECM_{t-1}, then replaces the individual variables in an equation that then agrees to the traditional specification of Engle and Granger (1987). Granger (1988) claims that a precondition for two variables to fix a long-run equilibrium relationship is the existence of a dynamic causal relationship between them. Such a dynamic causal association of variables is a reflection of their short-run relationship.

Engle and Granger (1987) show that if two variables are cointegrated then the variables follow a well-specified error-correction model. The error correction term in this model stands for the short-run adjustment to long-term equilibrium trends. Therefore, the error-correction model provides a means of testing the dynamic relationship between the variables. The coefficient λ_i represents the proportion of the disequilibrium in real exports in one period corrected in the next period. In addition, many estimation experiments are performed to find a parsimonious structure of Equation (10). In other words, we rely on information criteria and look at the statistical significance of the lagged variables in the model. Variables which are insignificant and do not produce, even though omitted, any noticeable difference in the estimation results are eliminated from Equation (10).

RESULTS AND INTERPRETATIONS

We calculated long run impacts using the model provided from the Equation (6) for European country exports to the United States and to Japan. After reaching for a good specification by choosing a combination of lags that minimizes the AIC, for the period January 1999 through December 2008, we produced estimated results. Evidence reported in Table 4-5, suggest that in 3 cases of 5 for US exports and in 5 cases of 5 for Japanese Exports, when the coefficients on the long-run relationship are significantly different from zero at least at the 10% level, they show the expected signs in GDP (with the sole exceptions of France in the equation that relates export and US macroeconomic and finance variables) and the bilateral exchange rate (except two cases matching to German and Spain). In this sense the estimated coefficients of the explanatory variables show the effects of the variables clearly as is the case in other studies in this research area. Since the GDP measures the economic activity of an importing country and the increase of the bilateral exchange rate means the decrease of exporting prices, both variables are expected to have positive impacts on exports. Indeed the tables show that an increase in the bilateral exchange rate, i.e. depreciation of the exporting country's currency value, leads to an increase in exports. Again, this confirms the importance of the exchange rate in trade flows, which influences a country's competitiveness.

As is seen from Tables 4 and 5, the coefficients of the GDP are almost all positive and significant at least at the 10% significance level. One exceptional case is France's exports to the US, in which the effect of GDP is negative. The coefficients of bilateral exchange rates are also positive in most cases. The estimated coefficients for the long run relationships with regard to the ECB official Interest Rate are significant for the same country for which there are consistent and reasonable result parameters of long run elasticity to GDP and foreign term of trade. In general the signs of these coefficients are negative for the equation when explanatory variables are US exports (German represented the only deviation from the expected sign) and Japanese exports (with Italian export as the single exception). An interpretation of these findings could lie in the macroeconomic implications of interest rate, GDP and bilateral real exchange rates. Indeed it would be reasonable to think that a high official discount rate has a depressive effect on real GDP and in that way on export flow too, as obtained in many studies in literature. It is also widely accepted that an increase in interest rate causes an appreciation of real exchange rates and this could lead to a fall in exports because of the relative price effects.

Table 4: Long run Export Demand Function Estimate - Export to Japan

Spain			**EU27**			**Italy**			**German**			**France**		
LGDPJP (-1)	Coeff	2.85	LGDPJP (-1)	Coeff	0.74	LGDPJP (-1)	Coeff	0.29	LGDPJP (-1)	Coeff	1.98	LGDPJP (-1)	Coeff	0.56
	Dev.St	-0.76		Dev.St	-0.09		Dev.St	-0.10		Dev.St	-0.96		Dev.St	-0.07
	T-stat	-3.77		T-stat	-8.11		T-stat	-2.84		T-stat	-2.07		T-stat	-7.88
LRER_JP (-1)	Coeff	4.80	LRER_JP (-1)	Coeff	1.07	LRER_JP (-1)	Coeff	0.75	LRER_JP (-1)	Coeff	5.93	LRER_JP (-1)	Coeff	0.94
	Dev.St	-1.38		Dev.St	-0.15		Dev.St	-0.18		Dev.St	-3.35		Dev.St	-0.13
	T-stat	-3.47		T-stat	-7.02		T-stat	-4.12		T-stat	-1.77		T-stat	-7.07
LIREU(-1)	Coeff	-9.37	LIREU(-1)	Coeff	-0.59	LIREU(-1)	Coeff	2.01	LIREU(-1)	Coeff	-1.11	LIREU(-1)	Coeff	-1.55
	Dev.St	-2.72		Dev.St	-0.36		Dev.St	-0.37		Dev.St	-1.78		Dev.St	-0.32
	T-stat	-3.44		T-stat	-1.65		T-stat	-5.40		T-stat	-0.62		T-stat	-4.89
C		-36.95	C		-34.51	C		-36.63	C		-71.12	C		-24.93

Table 4 shows coefficient estimate of long run export to Japan demand function as we have in equation (6) . All intercepts are statistically significant.

A country-by-country analysis reveals some interesting differences. In Germany, the interest rate is not significant in the long-term relationship with export to Japan as an explanatory variable, the coefficient of the interest rate is negative but insignificant. This is in stark contrast with the rest of the countries considered in our sample. In the EU27, France, Italy and Spain, the interest rate is significant at least at the 10% significance level in the cointegration equation with Japanese exports. As it could be seen from result showed in Table 5 in the long-run equilibrium equation for US exports interest rate is not significant when Italy is considered. Meantime, GDP turns out to have a significantly positive impact on the exports of all countries, except France, whether the importing country is Japan or the USA. We obtain the same evidences about bilateral cross rate. Indeed the impact of cross rate is positive and significant in the exports both from European countries to the USA and to Japan.

Table 5 – Long run Export Demand Function Estimate - Export to USA

France			EU27			German			Italy			Spain		
LGDPUS (-1)	Coeff	-0.94	LGDPUS (-1)	Coeff	1.40	LGDPUS (-1)	Coeff	1.32	LGDPUS (-1)	Coeff	2.09	LGDPUS (-1)	Coeff	1.42
	Dev.St	-0.18		Dev.St	-0.07		Dev.St	0.02		Dev.St	0.58		Dev.St	0.09
	T-stat	-5.12		T-stat	-19.08		T-stat	-68.76		T-stat	-3.63		T-stat	-16.24
LRER_USD (-1)	Coeff	0.16	LRER_USD (-1)	Coeff	0.40	LRER_USD (-1)	Coeff	-0.54	LRER_USD (-1)	Coeff	0.00	LRER_USD (-1)	Coeff	-0.84
	Dev.St	-0.04		Dev.St	-0.03		Dev.St	-0.01		Dev.St	-0.06		Dev.St	-0.03
	T-stat	-4.29		T-stat	-13.69		T-stat	-83.44		T-stat	-0.08		T-stat	-25.63
LIREU(-1)	Coeff	-1.64	LIREU(-1)	Coeff	-0.62	LIREU(-1)	Coeff	1.02	LIREU(-1)	Coeff	-6.90	LIREU(-1)	Coeff	-2.69
	Dev.St	-0.58		Dev.St	-0.24		Dev.St	-0.14		Dev.St	-2.13		Dev.St	-0.69
	T-stat	-2.82		T-stat	-2.65		T-stat	-7.07		T-stat	-3.25		T-stat	-3.87
			C		-5.61	C		-7.59	C		41.53	C		13.468

Table 5 shows coefficient estimate of long run export to USA demand function as we have in equation (6) . All intercepts are statistically significant.

The effects of interest rates are more complicated. The estimated results, suggest the long-term elasticity of the Export to the ECB official discount rate ranged (as an absolute value) between 9.37 of Spain and 0.6 of the EU27 when Japan is considered as commercial partner. Long-term elasticity when the US is considered ranged between 2.69 and 1.01 (without considering Italy since it does not show a significant long run linkage). These results point out that Spanish external trade is the most sensitive to changing ECB official interest rate level. In other words, a 1% deviation in ECB interest rate decreases Spanish international commerce more than other European countries. Whereas the long-term elasticity of export to foreign GDP, when Japan is considered, is included with an interval of 2.85 (Spain) and 0.29 (Italy). Some parameters range between 1.42 (Spain) and 0.94 (France) when US GDP is considered, highlighting the Spanish sensitive to change in foreign GDP. The estimated results also suggest the long-term elasticity of the export for the Yen exchange rate amounts to 4.8 for Spain, 1.07 for Ue27, 0.75 for Italy and 0.94 for France. These results stress, once again, the extreme value of Spanish long-term elasticity. This particular evidence is confirmed once the analysis is focused on long-term elasticity versus US dollar, the highest value, 0.84, is pertinent, once more, to Spain. Interestingly enough, the whole sample medium term of long-term elasticity of the export to interest rate is larger than both bilateral cross rate and GDP ones. Instead the mean long-term of elasticity of export to cross rate is similar in that GDP showed underlying a relative major sensitivity of European external trade flow to changing interest rates relative to changing cross rate or foreign GDP.

The size of long-run income elasticity found here does not agree with Riedel's observation (Riedel,(1988)). He finds that most estimates of income elasticity in export demand, functions whether for developed or developing countries, or for country aggregates or in individual countries, generally lie in the range between 2.0 and 4.0. We think that this low elasticity to GDP (sample mean elasticity amounts to approximately 1.5) occurs because most parts of external trade for a European country flow internal to the EU. When a long run relationship is proven true, by analysing the significance of all the coefficients in equation (6), EC models (ECM) were estimated to see the short-run dynamics of the export equations. The ECM shows how the system converges to the long-run equilibrium implied by the export demand function provided by Equation 1. The estimated coefficient values for the error corrected models (EC terms) were calculated by the cointegration equations, for those country for which the long-term is statistically significant. They are reported in Table 6 for the exports to Japan and in Table 7 for the exports to the USA. In the same tables we also report estimates for countries for which the long relationship is not proven.

When the adjustment speed coefficients are significantly different from zero, they also show the expected signs in all cases. As is seen from the tables, the coefficient values of the EC terms (EC_{t-1}) are all negative and primarily significant at the 10% significance level. This result further confirming the variables are cointegrated and reconfirming the presence of a long-run equilibrium relationship among the variables in each export function. In this sense the absolute value of the coefficient of the error-correction term shows how much of the disequilibrium in real export demand is offset by short-run adjustment in each quarter. In other words, the extent of the error correction terms mark the change in real exports per quarter that is assigned to the disequilibrium between the actual and equilibrium levels. Analyzing the results we note large variability in our sample since we have obtained small absolute values, suggesting a slow dynamic adjustment. We have also found some bigger values, meaning a fast riequilibrium, and others that involve an overreaction (typically coefficients large then 1). Adjusting speed to the last period's disequilibrium varies across countries. Substantially implying that, for exports to Japan while 24% of the adjustment occurs in one quarter, for Spain, 66% of the adjustment occurs in one quarter for the EU27. Instead for US Export, for example 67% of the adjustment occurs in one quarter for the EU27, 77% of the adjustment occurs in one quarter for France.

To summarize, the estimates of the short-run dynamics of the ECM point out that interest rates have a significant short-run negative effect on export demand, as well as a long-run effect. The results of the various diagnostic tests carried out on the error-correction model of real exports demand are reported in the lower panel of Tables 6 and 7. The coefficient of determination (Adjusted R^2) that measures the goodness-of-fitness of the model are quite near 0.8 for exports to Japan, and above 0.7 for EC model with

US exports as regressor. These findings show that more than 70% of variations in real export demand are explained by the fundamentals.

Table 6: Error Correction Model Estimate – Export to Japan

SPAIN Error Correction:	D(LEXJES)	EU27 Error Correction:	D(LEXJEU27)	ITALY Error Correction:	D(LEXJIT)
ErrCorr (EC)	-0.31	ErrCorr (EC)	-0.66	ErrCorr (EC)	-2.36
	-0.14		-0.23		-0.36
	(-2.22)		(-2.82)		(-6.51)
D(LEXJES(-1))	-0.35	D(LEXJEU27(-1))	-1.34	D(LEXJIT(-1))	0.83
	-0.16		-0.32		-0.28
	-2.15		(-4.22)		(-2.97)
D(LGDPJP(-1))	7.57	D(LGDPJP(-1))	1.74	D(LGDPJP(-1))	-2.61
	-3.19		-0.99		-1.31
	(-2.37)		(-1.76)		(-1.99)
D(LRER_JP(-1))	5.71	D(LRER_JP(-3))	1.63	D(LRER_JP(-2))	-2.45
	-2.89		-0.92		-1.07
	(-1.98)		(-1.76)		(-2.29)
D(LIREU(-1))	-10.53	D(LIREU(-1))	11.80	D(LIREU(-1))	12.58
	-8.45		-3.87		-4.88
	(-1.24)		(-3.05)		(-2.58)
C	0.07	C	0.06	C	-0.09
	0.03		-0.02		-0.02
	(-2.01)		(-2.78)		(-4.08)
R-squared	0.34	R-squared	0.78	R-squared	0.87
Adj. R-squared	0.23	Adj. R-squared	0.64	Adj. R-squared	0.80
Sum sq. resids	0.74	Sum sq. resids	0.02	Sum sq. resids	0.05
S.E. equation	0.15	S.E. equation	0.03	S.E. equation	0.05
F-statistic	3.24	F-statistic	5.87	F-statistic	11.73
Log likelihood	21.04	Log likelihood	80.29	Log likelihood	68.26
Akaike AIC	-0.79	Akaike AIC	-3.68	Akaike AIC	-3.01
Schwarz SC	-0.53	Schwarz SC	-3.07	Schwarz SC	-2.40
Mean dependent	0.01	Mean dependent	0.00	Mean dependent	0.00
S.D. dependent	0.17	S.D. dependent	0.06	S.D. dependent	0.10

GERMAN Error Correction:	D(LEXJDE)	FRANCE Error Correction:	D(LEXJFR)
ErrCorr (EC)	-0.15	ErrCorr (EC)	-2.28
	-0.09		-0.59
	(-1.64)		(-3.85)
D(LEXJDE(-1))	-1.04	D(LEXJFR(-1))	1.03
	-0.23		-0.44
	(-4.63)		(-2.31)
D(LGDPJP(-2))	5.01	D(LGDPJP(-1))	3.09
	-1.68		-1.54
	(-2.97)		(-2.00)
D(LRER_JP(-2))	3.84	D(LRER_JP(-1))	3.66
	-1.49		-1.55
	(-2.56)		(-2.36)
D(LIREU(-2))	8.35	D(LIREU(-2))	8.70
	-6.06		-4.81
	(-1.37)		(-1.81)
C	0.09		
	-0.04		
	(-2.16)		
R-squared	0.81	R-squared	0.84
Adj. R-squared	0.63	Adj. R-squared	0.75
Sum sq. resids	0.04	Sum sq. resids	0.04
S.E. equation	0.05	S.E. equation	0.04
F-statistic	4.38	F-statistic	9.11
Log likelihood	69.51	Log likelihood	69.59
Akaike AIC	-2.94	Akaike AIC	-3.09
Schwarz SC	-2.14	Schwarz SC	-2.47
Mean dependent	0.00	Mean dependent	0.00
S.D. dependent	0.08	S.D. dependent	0.09

Table 6 shows coefficient estimate and summary statistics of the ECM model for export to Japan following equation (10) .Numbers in parenthesis are t-statistic. D in every variable label stands for difference.

Table 7: Error Correction Model Estimate – Export to USA

FRANCE Error Correction:	D(LEXUSFR)	GERMAN Error Correction:	D(LEXUSDE)	ITALY Error Correction:	D(LEXUSIT)
ErrCorr (EC)	-1.35	ErrCorr (EC)	-0.87	ErrCorr (EC)	0.37
	-0.63		-0.23		-0.21
	(-2.14)		(-3.78)		(-1.76)
D(LEXUSFR(-2))	0.90	D(LEXUSDE(-1))	0.31	D(LEXUSIT(-1))	-1.21
	-0.48		-0.18		-0.31
	(-1.89)		(-1.67)		(-3.95)
D(LGDPUS(-1))	-0.73	D(LGDPUS(-1))	2.63	D(LGDPUS(-1))	-0.90
	-2.52		-0.77		-2.76
	(-0.29)		(-3.43)		(-0.32)
D(LRER_USD(-1))	-0.66	D(LRER_USD(-1))	2.83	D(LRER_USD(-2))	-3.52
	-2.31		-0.82		-2.76
	(-0.28)		(-3.47)		(-1.27)
D(LIREU(-1))	-0.34	D(LIREU(-1))	2.66	D(LIREU(-1))	3.74
	-7.13		-1.35		-4.23
	(-0.04)		(-1.97)		(-0.88)
				C	0.10
					-0.07
					-1.44
R-squared	0.70	R-squared	0.33	R-squared	0.69
Adj. R-squared	0.25	Adj. R-squared	0.24	Adj. R-squared	0.50
Sum sq. resids	0.04	Sum sq. resids	0.07	Sum sq. resids	0.09
S.E. equation	0.06	S.E. equation	0.05	S.E. equation	0.07
F-statistic	1.55	F-statistic	3.99	F-statistic	3.74
Log likelihood	65.53	Log likelihood	64.84	Log likelihood	55.82
Akaike AIC	-2.62	Akaike AIC	-3.15	Akaike AIC	-2.32
Schwarz SC	-1.68	Schwarz SC	-2.93	Schwarz SC	-1.71
Mean dependent	-0.01	Mean dependent	0.01	Mean dependent	0.00
S.D. dependent	0.07	S.D. dependent	0.05	S.D. dependent	0.09

SPAIN Error Correction:	D(LEXUSES)	EU27 Error Correction:	D(LEXUSEU27)
ErrCorr (EC)	-0.81	ErrCorr (EC)	-0.67
	-0.19		-0.32
	(-4.21)		(-2.08)
D(LEXUSES(-1))	-0.48	D(LEXUSEU27(-2))	0.60
	-0.12		-0.23
	(-4.09)		(-2.66)
D(LGDPUS(-1))	-4.67	D(LGDPUS(-2))	3.25
	-1.89		-1.21
	(-2.46)		(-2.68)
D(LRER_USD(-1))	-4.92	D(LRER_USD(-2))	3.46
	-1.76		-1.19
	(-2.78)		(-2.90)
D(LIREU(-1))	12.29	D(LIREU(-2))	2.46
	-4.10		-1.16
	(-3.00)		(-2.12)
		C	-0.06
			-0.02
			(-2.63)
R-squared	0.79	R-squared	0.63
Adj. R-squared	0.77	Adj. R-squared	0.51
Sum sq. resids	0.14	Sum sq. resids	0.04
S.E. equation	0.06	S.E. equation	0.04
F-statistic	31.67	F-statistic	5.15
Log likelihood	52.92	Log likelihood	73.74
Akaike AIC	-2.52	Akaike AIC	-3.45
Schwarz SC	-2.31	Schwarz SC	-3.01
Mean dependent	0.01	Mean dependent	0.01
S.D. dependent	0.13	S.D. dependent	0.06

Table 7 show coefficient estimate and summary statistics of ECM model for export to Usa following equation (10). Numbers in parenthesis are t-statistic. D in every variable label stands for difference.

CONCLUSION AND BANKING SYSTEM IMPLICATIONS

The purpose of this article was to explore the impact of the ECB official discount rate on exports in the EU27 and in four European countries namely: Spain, France, German and Italy. Considering the dominant roles of the US and Japan as trading partners of these European countries, this article has focused on the quarterly export volumes of European countries to the US and Japan. Specifically, this article has tried to explain the exports of European countries to Japan and the US using three economic variables, the GDP of an importing country, the bilateral exchange rate and the ECB official discount rate. The time series methodology used in this paper, after considering the time series properties of our data, is based on the bounds testing approach to cointegration and error-correction modelling.

Applying the ARDL cointegration technique to quarterly data from 1999:01 to 2008:04, we are able to produce some further empirical evidence about the dynamic relationships between exports, trade and Official Interest Rates. In this way we assess the short-run and long-run impact of export to the ECB Official Discount Rate. This goal represents the primary interest of this article and so represents an effort to partially fill the gap in the literature.

The results of the cointegration analysis, in a so-called indirect approach or Amended Granger Causality Test, reveal that there exists a long-run equilibrium relationship among the variables of the real exports demand function. The results of the long run parameter estimates are consistent with economic theory in the most of the cases. Meanwhile (except with France's exports to the US) increase in real foreign income has a significantly positive impact on real exports demand; while improvement in the terms of trade (declines in the real exchange rate) was found to encourage exports in the most cases. Therefore, given the existence of a stable long-run export-interest rate relationship in the data for some European countries, this study then provides some tests of the short-run dynamics underlying the export-growth relationship using a Error-Correction (EC) framework. The statistically significant error-correction term confirms that a long-run cointegration relationship exists between real exports, real foreign income, relative prices, proxied by real cross rate and interest rate for these countries.

The short-run estimates of the error correction model corroborate the results of the long-run parameter estimates and suggest that overlooking the cointegration relationship among the variables would have introduced misspecification in the underlying dynamic structure. Such knowledge of whether monetary policy depresses exports should result in policies that aid to attain interest rate stability, which in turn, promote economic growth. Further, this may help to lessen the potential adverse effects of ECB monetary policy actions. More identification of causality can help policy makers to gain a better insight of economic growth in every country and to develop effective economic policies and development strategies. Therefore, the size of relationship has significant policy implications. For example, the finding of linkage running from interest rate to export represents that this economy has to search to carry out a monetary policy based on certain interest rate levels. This means that export can be supported by specific monetary policy strategy. Export growth might affect output growth by forming positive externalities on other sectors of the economy via more efficient management styles, improved production techniques and economies of scale. The recent literature on "endogenous" growth theory also highlights the role of increasing returns to scale, dynamic spill-over effects and the complementarities between physical capital (both foreign and domestic) and human capital in boosting the long-run growth rate because of greater allocate efficiency, the use of new technology and dynamic competitiveness.

It is also important to examine the financial system role. Usually banking is the first financial sector that is opened to foreign firms, followed by insurance and the securities markets. Export transactions normally pass through the commercial banking system. This is the most convenient way for both exporters and importers to transact their business and the most important potential source of funds for the export sector. Banks have strong preference for short-term loans and are basically collateral-oriented. Commonly-accepted collateral are real estate mortgage and deposits/placements of exporters with the bank. Having a good credit track record with banks simply means that the borrowers can easily obtain a loan, but regardless, they are still required to present collateral.

Banks provide a number of facilities for current exporters with instruments as: Documentary letter of credits, CounterTrade, Factoring , Pre-Shipping and Post-Shipping Financing, Buyers and Suppliers' credits) as well as hands-on practical exercises on Export Credit Insurance (to protect exporters and mitigate the financial impact of risks on the exporter) and Export Credit Guarantees (to protect export financing banks from losses that may occur from providing funds to exporters). The export credit guarantee (ECG) facility contributes to the growth and diversification of an export base by providing collateral support through guarantees to the banks extending pre- or post-shipment financing to enterprises for non-traditional export production and sales. The facility will help such exporters to secure financing and the facility will increase confidence among foreign buyers that exporters can fulfil their contractual commitments as reliable suppliers. More the facility is expected to be financially self-supporting in the long run. Hence, a proactive Government and Central Bank Institution role worldwide in trade finance, with assistance and support in terms of export financing would contribute to trade expansion and facilitation. Surely in the long term, the first best solution is to encourage the growth and development of a vibrant and competitive financial system, preferably with strong private sector players.

REFERENCES

K. Aristotelous, (2002), "The impact of the post-1972 floating exchange-rate regime on US exports", *Journal of Applied. Econometrics*, Vol. 34, Issue 13, p. 1627–1632.

A. C. Arize, T. Osang, T., D. J. Slottje, (2000) "Exchange rate volatility and foreign trade: evidence from thirteen LDC", *Journal of Business & Economic Statistics*, Vol.18, p.10–17.

M. Bahmani-Oskooee, (2002). "Does black-market exchange rate volatility deter the trade flows?", *Journal of Applied Econometrics*, Vol. 34, Issue 13, p. 2249–2555.

M.Bahmani-Oskooee, Z.Ardalani (2006), "Exchange rate sensitivity of U.S. trade flows: evidence from industry data", *South Economic Journal*, Vol.72, p. 542–559.

M. Bahmani-Oskooee, W. Hegerty, Scott., (2007), "Exchange rate volatility and trade flows: A review article", *Journal of. Economic. Studies*, Vol. 34, Issue 3, p. 211–255.

A. Banerjee, J.Dolado, R. Mestre, (1998), "Error-correction mechanism tests in a single-equation framework", *Journal of Time Series Analysis*, Vol. 19, Issue 3, p. 267–285.

B.Coric, G. Pugh, (2006), "The effects of exchange rate variability on international trade: a meta regression analysis", *Institute for Environment & Sustainability Research, Working Paper.*

P. De Grauwe, (1988), "Exchange rate variability and slowdown in growth of international trade", *IMF Staff Papers*, Vol. 35, p. 63–84.

G. De Vita, A. Abbott, (2004), "Real exchange rate volatility and US exports: An ARDL bounds testing approach", *Econometrica*, Vol.1, Issues 9, p. 69–78.

R. F. Engle, W. J. Granger, (1987), "Cointegration and error correction: representation, estimation, and testing", *Econometrica*, Vol. 55, p. 251–76.

W. J. Granger (1988), "Some Recent Developments in a Concept of Causality", *Journal of Econometrics,* Vol. 39, Issue (1/2), p. 199- 211.

W. J. Granger (1969), "Investigating causal relationshipby econometric models and cross-spectral methods", *Econometrica*, Vol. 37, p. 424–38.

S. Johansen, J. Katarina, (1990), "Maximum likelihood estimation and inference on cointegration with applications to the demand for money", *Oxford Bull Economic Statistics*, Vol. 52, Issue 2, p. 169–210.

Y.W. Li, W. Guogang, W. Songqi (2006), "China: Financial Development", *Beijing: Social Sciences Academic Press*, Vol.3.

K. Manova, (2005), "Credit Constraints in Trade: Financial Development and Export Composition", *SSRN Working Paper Series*.

E. Panopoulou, N. Pittis, (2004), "A comparison of autoregressive distributed lag and dynamic OLS cointegration estimators in the case of a serially correlated cointegration error", *Journal of Econometrics*, Vol.7, Issue 2, p. 585–617.

N. Péridy, (2003), "Exchange rate volatility, sectoral trade, and the aggregation bias", *Review of Worlds Economics,* Vol.139, p. 389–418.

H. Pesaran, Y. Shin, (1998), "An autoregressive distributed-lag approach to cointegration analysis", in: *Econometrics and Economic Theory in the 20th Century*. *The Ragnar Frisch Centennial Symposium*. Cambridge University Press, p. 371–413.

M.H Pesaran, Y. Shin., R.J.Smith, (2001), "Bounds testing approaches to the analysis of level relationships", *Journal of Applied. Econometrics,* Vol. 16, Issue 8, p 289–326.

T. Rapp, A. Reddy, N. Nallapu, (2000), "The effect of real exchange rate volatility on bilateral sector exports", *Journal of Economics,* Vol. 26, p. 87–103.

J.Riedel, (1988), "The demand for LDC exports of manufactures: estimates from Hong Kong", *The Economic Journal*, Vol. 98, p.138–48.

A. C. Sims (1972), "Money, income and causality", *American Economic Review*, Vol.62, p.540–52.

J.P. Singh, L. Kónya, (2006), "Cointegration and causality between Indian export, import, and GDP", *Asia Pacific Journal of Economics and Business*, Vol. 10, p. 20–35.

BIOGRAPHY

Giovanni Tria, Dipartimento CEIS, Università di Roma Tor Vergata

Giuseppe Galloppo – Phd Banking and Finance, is researcher in statistics method for finance at Tor Vergata University of Rome, Faculty of Economics, he is a specialist in applying statistical techniques and methods for analyzing financial instruments and portfolio models. Recently he has dealt with an innovative way of estimate financial parameters, in order to try to contain input errors and obtain best out of sample performances. He can be reached at giuseppe.galloppo@uniroma2.it