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HAS EXCHANGE RATE VOLATILITY PRODUCED ANY EFFECTS ON BILETERAL AND SECTORAL EXPORTS IN EUROPE? NEW EVIDENCE FROM THE UNITED KINGDOM

This paper examines the effect of exchange rate volatility to sectoral- bilateral exports for a set of eleven European countries to a exports during the period of 1973 -2008. Our investigation on the topic has examined one very important aspect. In other words, it is possible for the same set of countries to produce different results when different trade flows are examined. Further more the results of these trade flows used to examine the overall aggregate effects. Our investigation on bilateral sectorial trade flows has been preformed in two ways. The first incorporated the utilization of total U.K. to E.U. -14 exports for each sector while the second incorporated each of the U.K.'s to E.U.-14 sectoral flows. Overall our results suggest the existence (for some countries and products) of a mixed relationship which is consistent with our previews empirical work.

1. Introduction

Since the collapse of the Bretton Wood system which resulted in the adoption of a flexible exchange rate system in 1973, there has been some concern about the potential effects of exchange rate volatility to exports. Despite the various formal policy regimes such as the European Currency Snake (1972–1978) and the European Exchange Rate Mechanism (1979–1999) which tried to coordinate intervention among the member states in order to limit variation among exchange rates, the switch to floating exchange rates has been characterised by a greater degree of volatility. This larger fluctuation among exchange rates stimulated empirical research as to the true effects of volatility on exports. Motivated by the fluctuation in the exchange rates and our previous examination of aggregate exports for a total of 18 European countries (Serenis 2006; Serenis, Cameron and Serenis 2008; Serenis and Serenis 2010) has produced insignificant relationships of volatility to exports. Our analysis has turned to potential sectoral - bilateral. The purpose of this paper is to investigate the effects of exchange rate volatility to the U.K.'s bilateral exports to the traditional E.U. member countries for a variety of sectors.

Some economic models suggest that exchange rate variability creates uncertainty with regard to the prices the exporters would have to pay and receive in the future. More specifically, since most trade contracts incorporate payment lags to allow time for delivery or to provide trade credit, they produce uncertainty over the future price of foreign currency and the importers' own profits. As a result some producers will prefer the possibility of certain profits to the possibility of uncertain ones. Therefore, uncertain revenue will encourage producers to switch away from foreign markets to domestic ones, which in turn will cause a reduction in the level of international trade. Even though some models such suggest that exchange rate volatility might reduce exports it is possible in some models to estimate positive effect since future exchange rate fluctuations might create an incentive for more profits, as well as indeterminate or no effect from volatility to ex-

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ports since exporters often are able to hedge part of the risk by investment in the future markets. As a result the potential effects of exchange rate volatility on exports is one of the most controversial areas of economics.

Our paper is motivated by the following issues. Empirical evidence will shown the potential effects of exchange rate volatility to the level of exports is mixed and therefore do not indicate a clear relationship. Therefore with this research we would like to provide some additional evidence which will aid in the clarification of the potential relationship of volatility to exports. Second, the majority of the empirical work does utilize a sample which contains either a mixture of countries or developing countries. As a result, there is little examination of samples containing E.U. countries which has motivated the utilization in this study of a sample containing only E.U. countries.

Finally, in addition to the differences among general frameworks of thought there are some issues derived from the implementation of such models which can alter some of the results. These include: different variables as well as different measures of these variables, the different sample sizes as well as sample periods and finally different methodological approaches that researchers often employ in their economic models. One other important difference among empirical researchers relates to the types of export flows examined. Most of the empirical researchers examine aggregate exports while a smaller amount of researchers examines bilateral and sectoral exports. We therefore would like to provide some additional investigation on the potential bilateral and sectoral effects of volatility to exports.

This paper is organized as follows. First we will present a review of the literature as well as a discussion of the data for both of the two types of bilateral trade flow cases examined. We will continue with a presentation of the methodological framework as well as the results and analysis of our main empirical findings. Finally in the last section we present some policy implications, a brief summary and our conclusions.

2. Literature review

In the early 1980's a variety of empirical studies as well as results emerged. Most of the researchers used the OLS method and their range of results include positive and negative as well as indeterminate or no relationship between volatility and exports. For the most part, empirical researchers examine aggregate exports although some have started to examine bilateral trade. Furthermore, the utilized samples consist and mainly to the developing countries or a mixture of various countries in the world. In addition to the differences among trade flows, researchers incorporate different aspects in their models. Some of these aspects include mainly different time periods, types of exchange rates, different variables incorporated in the estimated equations and volatility measures. Cushman published a series of studies (Cushman, 1983, 1986, 1988) which examined exchange rate volatility to bilateral trade. In his 1983 study he examined exchange rate volatility for bilateral trade flows between the US and Germany. In his later work he expended his model by adding additional countries as well as different measures of exchange rate volatility. Even though new developments had started to appear in the field of econometrics in the late 80's (1987-1989) most researchers tended to utilize OLS in order to estimate the export quantity equation. One representative study which examined bilateral trade in the late 1980's is by De Grauwe, 1988.

In the early part of the 1990's empirical research mostly examined aggregate trade although there are some researches which examine bilateral exports. Researchers began to estimate statistical properties that their samples might have (such as cointegration and unit roots) and upon determination of such properties they used more advanced methods to estimate their equations. These methods consist mainly of ECM, ARCH-GARCH and VAR models. Some of these researchers utilizing the ECM framework

have identified a positive relationship (Asseery A. and Peel D. 1991) while others identify negative (Arize 1995, 1996, 1999, 2000) or in some cases no relationship at all (Arize 1999). Mackenzie (1998) estimates a positive effect on bilateral trade flows between two countries utilizing the ARCH methodology. These countries are Germany and the U.S.. The range of the estimated results still remains the same as in the previous periods (positive negative and no or indeterminate relationship). The samples include mainly developing countries or a mixture of various countries in the world only a small amount of the empirical research examines only E.U. countries.

From 2000 and onwards there is some variation in the empirical research (Abbott, Darnell and Evans 2001; Doganlar 2001; Du and Zhu 2001; Bredin, Fountas and Murphy 2003). This variation is with regard to the different sample countries, time periods as well as different volatility measures and different types of exchange rates used. With regard to the empirical estimation of the equations the bulk of the research utilizes mainly either ECM or ARCH-GARCH estimation techniques. The variation with regard to the sample countries consists of four categories. These countries are: developed countries, a mixed sample containing European as well as other countries and finally a sample containing only European countries. For the most part the literature seems to examine developing countries although there is some empirical work containing a mixture of various countries of the world. Finally the smallest part of the literature examines only European countries. With regard to the different types of effects the bulk of the literature examines aggregate (Benson and Godwin 2010; Cheong, Mehari, Willims 2006; Du, Zhu and Zhen 2001; Lihan, Huseyin 2009) effects of volatility on exports leaving a very small number of empirical work estimating bilateral (Baum and Ozkan 2004; Bahmani, Mohsen, Goswami and Gour 2004; Chit, Moe, Marian and Willenbockel 2008; Choudhry and Taufiq 2005; siregar and Rajian 2004) and sectoral effects (Doyle D. 2001; Awokuse and Yuan 2006; Kargbo 2006; siregar and Rajian 2004). The range of the estimated relationships between exports and exchange rate volatility remains the same as in the previous periods.

3. The data
The selected sample countries and time periods

As we have mentioned our previous empirical work on the effects of exchange rate volatility to aggregate exports (Serenis 2006; Serenis, Cameron and Serenis 2008; Serenis and Serenis 2008; Serenis and Serenis 2010) has not been able to identify a significant relationship between exports and exchange rate and volatility. However our empirical work on exchange rate volatility to sectoral trade seems to suggest that for some countries and some products it is possible to estimate a significant relationship (Serenis 2006; Serenis 2009). We therefore would like in this paper to examine bilateral export flows for various sectors and for one country of the E.U. with the remaining traditional member countries of the E.U. In other words we will examine the total sectoral export flows (for each of the sectors examined here) of the U.K. to the total sum of the traditional E.U.-14 member countries. We will also examine sectoral exports of the U.K. for each of thirteen E.U. countries (Austria Belgium, Denmark, France, Finland, Italy, Portugal, Greece, Netherlands and Sweden) separately for the time period of 1973-2008. All the data will be derived from OECD (Organization For Economic Co-operation and Development) with the exception of GDP figures which will be derived form Eurostat and the real effective exchange rates which will be derived from the IFS (International Financial Statistics).

The selected sectors and products

The selection of the specific sectors as well as the products that will be utilized for all these countries is not an easy choice. There are many sectors and many products that are exported and therefore a huge variety of combinations between products and countries which one can use. As a result of this we will examine export flows for one product out of the eight sectors utilized here. In addition to the variety of combinations among sectors and countries the issue becomes more complex in the event that we take under consideration the various sub- sectors of each product. Due to the large amount of subdivisions we have selected products belonging to only the same level of subdivision (products belonging to three digit analysis as classified on the OECD). The selected sectors as well as the selected products are presented in table 1.

Table 1

Selected sectors and products

Sector	Product
Animal & vegetable oils, fats & waxes	Animal oils and fats (411)
Mineral, Fuels, Lubricates and Related Materials	Coal, lignite and peat (322)
Crude materials	Hides and skins (211)
Chemical and Related Products	Hydrocarbons nes, & their halogen.& etc.derivatives (511)
Manif. Goods Classified by Material	Leather (611)
Miscellaneous manufactured articles	Sanitary heating ad cooling equipment and parts (812)
Machinery and Transport Equipment	Steam and other vapour generating boilers and parts (711)
Beverages and tobacco	Tobacco unmanufactured ; tobacco refuse(121)

The U.K.'s exports flows

For the year 2008 the amount exported to the EU-14 countries from the U.K. accounts for 53 percent of the total U.K.'s exports. However that amount can vary among different sectors. The amount of variance among each sector can be from 50-80 percent (for the sectors examined here). More specifically 81 percent of the total U.K. tobacco exports were exported to the E.U-14, while 70 percent of the total mineral fuels exports were exported to the E.U-14. In addition to the previous sectors 68 percent of the total animal products were exported to the E.U.-14 and 60 percent of the total organic chemical exports were exported to the E.U.-14 Lastly the sectors with the smaller percentage of exports to the E.U.-14 were: miscellaneous articles with 52.1 percent exported to the E.U.-14 and manufacturing products with 51 percent exported to the E.U.-14

4. Methodology

Our research will utilize a reduced form equation similar to that of Arize. More specifically:

$$log(X)= \lambda_0 + \lambda_1*log(PX/Pw) + \lambda_2*log(GDP) + \lambda_3 + \lambda_4*(V) + \omega$$

Where:
- X is export quantities,
- PX/Pw the relative prices,
- GDP real domestic GDP
- V volatility (defined as the standard deviation of the moving average of the logarithm of real exchange rate).
- ω an error term

Our bilateral analysis will consist of two parts. For the first part we will undertake a more aggregate approach by using the U.K. to total E.U. (of the fourteen E.U. countries) exports for each of the selected sector as more of aggregate - sectoral export approach. While in the second part we will adopt a more bilateral approach to the topic. We therefore will continue by examining bilateral U.K. trade flows for each one of the E.U. sample countries to each of the previously presented sectors as a more in depth measure of biliateral – sectoral exports. The resulting consequences pertaining to the utilization of these two approaches will effect the calculations of some of the utilized variables. The calculation of most of the variables here will be preformed in a similar fashion as in Makenzie 1998. More specifically for the aggregate- secotral approach a measure or real exports will be utilized while for the bilateral – sectoral cases the actual amounts of exported material will be utilized. In addition to the previous differences among the calculated variables one other difference relates to the relative price calculation. For the aggregate-sectoral case the ratio of the country price to the world prices will be utilized while for the bilateral aggregate cases the ratio of the country price to an index of fourteen E.U. member countries will be used.

If the index of domestic capacity raises the country's capacity to produce increases and so will exports. We would therefore, expect $\lambda 2$ to be positive, on the other hand if the relative prices rise the demand for exports will fall so we would expect $\lambda 1$ to be negative (Goldstein and Khan, 1976). With regard to the effects of exchange rate volatility the expected result could be either positive, negative, or will have no effect. Our estimation of the equations for each product of our sample countries will be consistent with the error correction methodology (E.C.M.)

5. Unit root and co-integration
Unit root

Since we are interested in only examining the various degree of integration of each series we use the classical unit root test which is the augmented Dickey Fuller test. The test is based on the null hypothesis that a unit root exists in the time series against the alternative that there is no integration. In other words in the event that a unit root is present we continue to test for a higher order of integration until we reach a point on which integration is not present. The order of integration according to the augmented Dickey Fuller unit root test for each of the two trade flows is presented in table 2

Table 2

Augmented Dickey Fuller unit root test results for U.K. to E.U.-14 export flows

VEX		GDP	P	V2
Animal oils and fats	I(2)	I(2)	I(1)	I(0)
Coal, lignite and peat	I(0)	I(2)	I(1)	I(0)
Hides and skins	I(1)	I(2)	I(1)	I(0)
Hydrocarbons nes, & their halogen.& etc.derivatives	I(2)	I(2)	I(1)	I(0)
Leather	I(1)	I(2)	I(1)	I(0)
Sanitary heating ad cooling equipment and parts	I(0)	I(2)	I(1)	I(0)
Steam and other vapour generating boilers and parts	I(1)	I(2)	I(1)	I(0)
Tobacco unmanufactured ; tobacco refuse	I(0)	I(2)	I(1)	I(0)

*All tests are performed using the 5% level of significance*Vex the export quantity, GDP represents the real gross domestic product, V2 volatility and P is the relative prices of the each country to the world price *All tests are performed to a maximum of three lags using the Akaike info criterion

Augmented Dickey Fuller test for U.K. to each of the E.U. countries export flows

U.K. exports to:	Animal oils and fats		Coal, lignite and peat		Hides and skins		Hydrocarbons nes, & their halogen.& etc.derivatives		Leather	
	Variables		Variables		Variables		Variables		Variables	
	Vex	P	Vex	P	Vex	P	Vex	P	Vex	P
Austria	I(1)	I(2)	I(0)	I(1)	I(2)	I(2)	I(0)	I(2)	I(0)	I(2)
Finland	I(0)	I(0)	I(0)	I(3)	I(1)	I(2)	I(0)	I(0)	I(0)	I(0)
France	I(1)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(1)	I(1)
Greece	I(0)	I(0)	I(1)	I(2)	I(0)	I(0)	I(0)	I(0)	I(1)	I(0)
Ireland	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(0)
Netherlands	I(0)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
Italy	I(1)	I(1)	I(0)	I(1)	I(1)	I(2)	I(1)	I(0)	I(1)	I(1)
Portugal	I(0)	I(1)	I(1)	I(1)	I(0)	I(0)	I(1)	I(1)	I(1)	I(0)
Sweden	I(0)	I(0)	I(0)	I(1)	I(0)	I(1)	I(1)	I(1)	I(0)	I(0)
Germany	I(1)	I(1)	I(0)	I(1)	I(0)	I(1)	I(1)	I(0)	I(1)	I(0)
Denmark	I(1)	I(0)	I(0)	I(1)	I(1)	I(3)	I(0)	I(1)	I(0)	I(0)
Spain	I(1)	I(1)	I(1)	I(1)	I(1)	I(3)	I(1)	I(1)	I(2)	I(1)

U.K. exports to:	Sanitary heating and cooling equipment and parts		Steam and other vapour generating boilers and parts		Tobacco unmanufactured tobacco refuse	
	Variables		Variables		Variables	
	Vex	P	Vex	P	Vex	P
Austria	I(0)	I(1)	I(1)	I(0)	I(1)	I(1)
Finland	I(0)	I(1)	I(0)	I(0)	I(1)	I(1)
France	I(1)	I(1)	I(1)	I(0)	I(1)	I(0)
Greece	I(1)	I(1)	I(1)	I(2)	I(1)	I(0)
Ireland	I(1)	I(1)	I(0)	I(0)	I(1)	I(0)
Netherlands	I(1)	I(1)	I(0)	I(0)	I(0)	I(1)
Italy	I(1)	I(1)	I(1)	I(1)	I(0)	I(0)
Portugal	I(0)	I(0)	I(0)	I(0)	I(3)	I(1)
Sweden	I(1)	I(0)	I(0)	I(0)	I(0)	I(1)
Germany	I(0)	I(0)	I(0)	I(0)	I(1)	I(2)
Denmark	I(1)	I(1)	I(0)	I(0)	I(2)	I(0)
Spain	I(0)	I(1)	I(0)	I(0)	I(1)	I(2)

*All tests are performed using the 5% level of significance*Vex the export quantity, GDP represents the real gross domestic product, V2 volatility and P is the relative prices of the each country to the world price *All tests are performed to a maximum of three lags using the Akaike info criterion . For U.K. –Austria exports for hides and skins we used fur skins exports due to unavailability of data. For U.K. –Austria exports for coal lignite we used petroleum products exports due to unavailability of data. For U.K. to Austria, U.K. to Portugal, U.K. to Sweden and U.K. to Finland exports for umanufactured tobacco we used manufactured exports due to unavailability of data.

As we can see the results of the unit root tests indicate that most of the countries in our sample contain at least one unit root.

Engle Granger Co-integration test

In addition to the augmented Dickey Fuller unit root test we will also examine the results of the Engle Granger cointegration test. The test examines the null hypothesis that cointegration is not present against the alternative that a cointegrating relationship does exist. The results of the cointegration test for each of the two different trade flows are presented in table (3).

Table 3

Engle Granger cointegration test test results for U.K. to E.U.-14 export flows

Sector	Relationship
Animal oils and fats	no cointegration
Coal, lignite and peat	no cointegration
Hides and skins	no cointegration
Hydrocarbon& their halogen.& etc.	cointegration
Leather	no cointegration
Sanitary heating and cooling equipment and parts	no cointegration
Steam and other vapour generating boilers and parts	no cointegration
Tobacco unmanufactured tobacco refuse	no cointegration

Engle Granger cointegration test test results for U.K.
to each of the E.U. countries export flows

U.K. exports to:	Sector							
	Animal oils and fats	Coal, lignite and peat	Hides and skins	Hydrocarbon& their halogen.& etc.	Leather	Sanitary heating and cooling equipment and parts	Steam and other vapour generating boilers and parts	Tobacco unmanufactured tobacco refuse
	Relationship	Relationship	Relationship	Relationship	Relationship	Relationship	Relationship	Relationship
Austria	no cointegration	cointegration	cointegration	cointegration	cointegration	cointegration	cointegration	no cointegration
Finland	cointegration	cointegration	no cointegration	no cointegration	no cointegration	cointegration	cointegration	no cointegration
France	cointegration	no cointegration	cointegration	no cointegration	no cointegration	no cointegration	cointegration	no cointegration
Greece	cointegration	cointegration	no cointegration	no cointegration	no cointegration	no cointegration	no cointegration	no cointegration
Ireland	no cointegration	cointegration	no cointegration	no cointegration	no cointegration	cointegration	no cointegration	no cointegration
Netherlands	cointegration	no cointegration	cointegration	cointegration	cointegration	no cointegration	no cointegration	cointegration
Italy	no cointegration	cointegration	no cointegration	no cointegration	no cointegration	cointegration	cointegration	cointegration
Portugal	no cointegration	no cointegration	no cointegration	no cointegration	no cointegration	no cointegration	cointegration	no cointegration
Sweden	no cointegration	cointegration	no cointegration	no cointegration	no cointegration	no cointegration	cointegration	no cointegration
Germany	cointegration	cointegration	no cointegration	cointegration	no cointegration	no cointegration	cointegration	cointegration
Denmark	no cointegration	no cointegration	no cointegration	cointegration	no cointegration	cointegration	cointegration	no cointegration

U.K. ex-ports to:	Sector							
	Animal oils and fats	Coal, lig-nite and peat	Hides and skins	Hydro-carbon& their halo-gen.& etc.	Leather	Sanitary heating and cool-ing equip-ment and parts	Steam and other vapour generat-ing boil-ers and parts	Tobacco unmanu-factured tobacco re-fuse
	Relation-ship	Relation-ship	Relation-ship	Relation-ship	Relation-ship	Relation-ship	Relation-ship	Relation-ship
Spain	cointe-gration	cointe-gration	no coin-tegration	cointe-gration	no coin-tegration	no coin-tegration	cointe-gration	cointegra-tion

*All tests are performed using the 10% level of significance*Vex the export quantity, GDP repre-sents the real gross domestic product, V2 volatility and P is the relative prices of the each country to the world price* For U.K. –Austria exports for hides and skins we used fur skins exports due to unavailability of data. For U.K. –Austria exports for coal lignite we used petroleum products exports due to unavailability of data. For U.K. to Austria, U.K. to Portugal, U.K. to Sweden and U.K. to Finland exports for umanufactured tobacco we used manufactured exports due to unavailability of data.

As we can see form this table (3) for the case of export flows between UK to EU there is only one case for which a cointegrating relationship is present. This is for the sector of hydrocarbons. The relationship of the U.K. export flows to each of the sample countries is more diverse. More specifically a cointegrating relationship was found for UK to: Finland, France, Greece, and Spain for animal oils and fats; Austria, Finland, Greece, Ireland Sweden Germany and Spain for Coal Lignite and peat; Austria and France for hides and skins; Austria, Netherlands, Germany, Denmark and Spain for Hy-drocarbons; Austria and Netherlands for Leather; Austria Finland Ireland Italy and Den-mark for sanitary heating and cooling equipment; Austria, Finland, France, Italy, Portu-gal, Sweden, Germany, Denmark and Spain for steam and vapor generating boilers and parts; Netherlands, Italy and Spain for unmanufactured tobacco leaving all the remaining and export flows with no cointegrating relationship.

6. Results
Given the presence of co-integration for the previously mentioned countries we em-ploy an error correction model to estimate these countries equations. The estimation models based on the previously presented tests for both types of export flows examined here are summarized in table (4).

Table 4

Error model correction model results for UK sectoral exports to E. U.-14 countries

Sectors	U.K. exports to E.U. 14					
	Variables					Statistics
	Constant	P	GDP	V2	ECM	
Hydrocarbon& their halo-gen.& etc.	0.060896 (1.090647)	-1.624973 (-3.084193)	1.390429 (0.771706)	1.992196 (0.756995)	-0.640494 (-3.922335)	D.W=1.814258 S.E=0.198473 R2=0.555085

Error model correction model results for UK sectoral exports to each of the European Union countries

U.K. exports to:	Animal oils and fats — Constant	P	GDP	V2	ECM	Statistics	Coal, lignite and peat — Constant	P	GDP	V2	ECM	Statistics
Austria							-0.001559 (-0.004859)	-1.536735 (-3.15468)	-3.362011 (-0.296871)	-2.591795 (-0.195402)	-0.933796 (-3.546203)	D.W=1.73735 S.E=0.719936 R2=0.716797
Finland	-0.167889 (-0.665954)	-0.606074 (-1.44157)	5.700142 (0.689520)	-12.90766 (-1.004443)	-0.955993 (-4.876490)	D.W=1.623511 S.E=0.899829 R2=0.524969	0.328860 (1.076409)	-2.998752 (-8.615353)	-28.57528 (-2.665853)	23.37816 (1.452747)	-0.665297 (-3.827132)	D.W=1.916647 S.E=1.068129 R2=0.716797
France	0.046821 (0.382843)	-1.080030 (-4.857895)	-0.261662 (-0.063671)	9.767776 (1.354386)	-0.448006 (-2.398746)	D.W=2.096832 S.E=0.418140 R2=0.564222						
Greece	-0.012644 (-0.114165)	-0.784635 (-4.231776)	0.000994 (0.000274)	-3.256896 (-0.567768)	-0.761034 (-4.170931)	D.W=1.779076 S.E=0.401331 R2=0.586807	0.112817 (0.222647)	-3.045499 (-3.420547)	57.89432 (2.832496)	-20.58726 (-0.957909)	-1.442622 (-9.436505)	D.W=1.746880 S.E=0.533738 R2=0.970308
Ireland							0.009877 (0.164539)	0.170094 (1.240126)	0.407956 (0.190628)	-1.618838 (-0.546306)	-0.643297 (-3.169860)	D.W=1.71078 S.E=0.197777 R2=0.367610
Netherlands	-0.000738 (-0.005819)	-0.809086 (-3.943716)	1.502098 (0.365440)	0.760406 (0.115764)	-0.783867 (-4.118622)	D.W=1.698403 S.E=0.457541 R2=0.548991						
Italy							0.128027 (0.334093)	-2.545694 (-4.787605)	-16.79207 (-1.200650)	-56.00617 (-2.563800)	-1.119245 (-5.616761)	D.W=1.976124 S.E=1.276715 R2=0.773303
Portugal												
Sweden							-0.285185 (-1.039601)	-0.998821 (-1.568617)	2.257458 (0.244210)	-19.98520 (-1.229566)	-0.839301 (-4.091809)	D.W=1.873644 S.E=0.967512 R2=0.465219
Germany	-0.031512 (-0.298032)	-1.175335 (-6.899115)	2.524394 (0.734926)	6.585425 (1.196070)	-0.651397 (-3.309942)	D.W=2.056940 S.E=0.373750 R2=0.732113	0.095899 (0.270821)	-0.702143 (-1.833718)	-11.62954 (-1.002828)	-24.95037 (-1.419532)	-0.956960 (-4.561449)	D.W=1.761481 S.E=1.232880 R2=0.532562
Denmark												
Spain	-0.179991 (-1.193701)	-1.219917 (-6.325419)	6.957070 (1.390490)	-6.604698 (-0.844037)	-0.579820 (-2.857651)	D.W=2.032639 S.E=0.532789 R2=0.698016	0.087667 (0.139288)	-3.145447 (-5.139923)	-3.145447 (-5.139923)	12.71430 (0.478408)	-0.906946 (-3.717311)	D.W=1.866765 S.E=1.478003 R2=0.677232

U.K. exports to:	Hides and skins						Hydrocarbon& their halogen.& etc.					
	Variables				ECM	Statistics	Variables				ECM	Statistics
	Constant	P	GDP	V2			Constant	P	GDP	V2		
Austria	0.056313 (0.307420)	-0.054050 (-0.167821)	-8.590288 (-1.442433)	7.019325 (0.757134)	-0.832040 (-2.521192)	D.W=2.056118 S.E=0.454968 R2=0.398110	-0.046564 (-0.438037)	-0.265550 (-0.828111)	2.966532 (0.865476)	-8.266219 (-1.608737)	-0.911451 (-4.662977)	D.W=2.002262 S.E=0.387636 R2=0.538941
Finland												
France	0.140780 (1.410228)	0.006067 (0.065586)	-8.692484 (-2.645584)	0.518932 (0.099397)	-0.870656 (-4.603583)	D.W=1.755062 S.E=0.359979 R2=0.505653						
Greece												
Ireland												
Netherlands	-0.049670 (-0.760444)	-0.063730 (-1.138438)	0.421167 (0.194367)	10.88487 (3.332550)	-0.424525 (-2.767493)	D.W=1.772162 S.E0.227164 R2=0.463363	0.010010 (0.147161)	-0.017638 (-0.091868)	0.678843 (0.307762)	0.510833 (0.150916)	-0.640286 (-3.506187)	D.W=1.780040 S.E=0.244434 R2=0.347644
Italy												
Portugal												
Sweden												
Germany							0.234541 (4.711498)	-0.474131 (-7.054519)	-5.264199 (-3.210831)	-2.832056 (-1.206951)	-0.182471 (-3.007230)	D.W=1.342818 S.E=0.175239 R2=0.763711
Denmark							-0.115031 (-1.469022)	-1.106830 (-11.37807)	3.833666 (1.511113)	-1.772562 (-0.470633)	-0.592125 (-3.747291)	D.W=1.785184 S.E=0.281061 R2=0.857464
Spain							0.067967 (0.879748)	0.058453 (0.756986)	-2.063788 (-0.828543)	-6.827725 (-1.740472)	-0.314487 (-2.391147)	D.W=1.772697 S.E=0.279943 R2=0.265985

Sector		Leather						Sanitary heating and cooling equipment and parts					
U.K. exports to:		Variables					Statistics	Variables					Statistics
		Constant	P	GDP	V2	ECM		Constant	P	GDP	V2	ECM	
Austria		-0.086868 (-0.522588)	-0.688037 (-2.204628)	-0.107682 (-0.020146)	-13.28152 (-1.577141)	-0.575193 (-3.064076)	D.W=1.710374 S.E=0.601627 R2=0.437471	0.137653 (1.773329)	-0.531116 (-2.899576)	-4.426363 (-1.729146)	6.506098 (1.6395504)	-0.566145 (-3.087021)	D.W=1.988297 S.E=0.276883 R2=0.565122
Finland								-0.057346 (-0.616403)	-0.953215 (-5.398794)	4.219042 (1.379857)	-10.97518 (-1.915344)	-0.710364 (-3.180717)	D.W=2.002839 S.E=0.334716 R2=0.752192
France													
Greece													
Ireland								-0.001705 (-0.050264)	-0.351770 (-2.329843)	1.992909 (1.818814)	3.729434 (2.196227)	-0.315815 (-2.162729)	D.W=1.145622 S.E=0.121279 R2=0.545813
Netherlands		-0.058580 (-0.790801)	-1.187691 (-8.698245)	-0.404442 (-0.164203)	-1.903321 (-0.533239)	-0.867761 (-4.072383)	D.W=2.148284 S.E=0.261205 R2=0.762493						
Italy								-0.028622 (-0.352324)	-1.251686 (-9.535144)	2.428318 (0.927184)	-0.256899 (-0.061507)	-0.735633 (-3.751520)	D.W=2.063486 S.E=0.286083 R2=0.850685
Portugal													
Sweden													
Germany													
Denmark								-0.019804 (-0.307732)	-1.108764 (-6.327368)	1.426073 (0.682851)	4.727596 (1.409733)	-0.674036 (-3.138062)	D.W=1.624755 S.E=0.228810 R2=0.642630
Spain													

U.K. exports to:	Sector												
	Steam and other vapour generating boilers and parts						Tobacco unmanufactured tobacco refuse					
	Constant	Variables				Statistics	Constant	Variables				Statistics
		P	GDP	V2	ECM			P	GDP	V2	ECM	
Austria	-0.088239 (-0.421400)	-1.465619 (-10.44286)	5.137995 (0.742093)	-22.05874 (-2.158402)	-0.946910 (-4.477224)	D.W=1.965891 S.E=0.739168 R2=0.822339						
Finland	0.074553 (0.406738)	-1.884495 (-9.715574)	-1.110519 (-0.183927)	-25.76316 (-2.731711)	-0.799839 (-3.945710)	D.W=2.138026 S.E=0.652294 R2=0.797877						
France	-0.075462 (-0.632780)	0.034525 (0.318691)	2.933478 (0.706787)	-0.800573 (-0.124537)	-0.244981 (-1.319863)	D.W=1.833819 S.E=0.406915 R2=0.097723						
Greece												
Ireland												
Netherlands							-0.086678 (-0.713455)	-1.009370 (-10.71118)	1.914706 (0.491801)	10.27681 (1.747492)	-0.334873 (-2.207927)	D.W=2.195051 S.E=0.442225 R2=0.816933
Italy	-0.035361 (-0.167580)	-0.864432 (-4.394171)	3.365639 (0.491568)	-18.13076 (-1.689516)	-0.742138 (-3.645726)	D.W=1.815077 S.E=0.761503 R2=0.495457	-0.102031 (-0.072059)	-0.455585 (-1.559089)	-1.981863 (-0.042465)	30.12730 (0.456635)	-0.916777 (-3.031204)	D.W=2.041486 S.E=3.323054 R2=0.574829
Portugal	-0.242356 (-1.027856)	0.114927 (0.255871)	8.295243 (1.085796)	-5.153929 (-0.426659)	-0.808811 (-4.189151)	D.W=1.805958 S.E=0.848775 R2=0.411953						
Sweden												
Germany	-0.016771 (-0.113709)	-1.023115 (-6.369821)	0.724006 (0.148395)	1.036832 (0.136307)	-0.748859 (-3.687996)	D.W=2.003805 S.E=0.516293 R2=0.699681	0.040413 (0.084815)	-0.362968 (-1.284913)	-8.155723 (-0.509244)	11.81776 (0.454817)	-0.974231 (-4.730596)	D.W=2.066162 S.E=1.645026 R2=0.523371
Denmark	-0.026574 (-0.199604)	-1.430367 (-13.31987)	-1.944689 (-0.453449)	8.213466 (1.171038)	-1.034501 (-5.941277)	D.W=1.809800 S.E=0.483647 R2=0.906892						
Spain	-0.079210 (-0.765407)	-0.526728 (-3.277054)	2.341905 (0.711909)	3.925357 (0.749950)	-0.086641 (-0.787255)	D.W=0.967306 S.E=0.373139 R2=0.350753	-0.039150 (-0.177014)	-1.833977 (-10.27818)	-0.060105 (-0.008481)	-2.529811 (-0.223327)	-0.594155 (-3.309045)	D.W=1.901741 S.E=0.804890 R2=0.828245

*Vex the export quantity, GDP represents the real gross domestic product, V2 volatility and P is the relative prices of the each country to the world price. For U.K. –Austria exports for hides and skins we used fur skins exports due to unavailability of data. For U.K. –Austria exports for coal lignite we used petroleum products exports due to unavailability of data. For U.K. to Austria, U.K. to Portugal, U.K. to Sweden and U.K. to Finland exports for urnanufactured tobacco we used manufactured exports due to unavailability of data.

For the most part all the control variables (for both trade flows) contain the expected signs (GDP, P). With regard to the remaining variable, volatility in most of the cases examined here (for the bilateral exports of the U.K. to each of the E.U. countries) had a negative coefficient (twenty three cases) leaving the remaining export flows with a positive coefficient (for the remaining eighteen cases). However, the volatility coefficient turned out to be significant for fifteen of these cases. More importantly the significant negative cases were: UK to Italy trade flows (significant at 2%) and U.K. to Germany trade flows (significant at 16%) for coal lignite and pet; UK to Austria trade flows (significant at 1%) and UK to Spain trade flows (significant at 1%) for Hydrocarbons; U.K. to Austria trade flows (significant at 12%) for leather; U.K. to Finland trade flows (significant at 7%) for sanitary, heating and cooling equipment; finally U.K. to Austria export flows (significant at 4%), U.K. to Finland (significant at 1%) and U.K to Italy trade flows (significant at 10%) for steam and vapour generating boilers and parts. In addition to the significant negative cases we have has estimated some positive significant cases as well. These cases were: U.K. to France trade flows (significant at 18%) for animal oils and fats; U.K. to Finland export flows significant at 16%) for coal lignite and pet; U.K. to Netherlands export flows (significant at 1%) for hides and skins; U.K. to Austria export flows (significant at 10%), U.K. to Ireland export flows (significant at 3%) and U.K. to Denmark export flows (significant at 17%) for sanitary heating and cooling equipment; lastly volatility turned out to be significant for U.K. to Netherlands export flows (significant at 2%) for unmanufactured tobacco. With regard to the U.K. to the E.U.-14 sectoral export flows the only case for which we used an ECM model was for hydrocarbons which contained a positive coefficient for volatility. However this coefficient was proven insignificant. Due to the absence of co-integration for the remaining countries of our sample, a first differences model will be estimated. The results of these estimations are presented in table (5)

Table 5

First difference model results for UK sectoral exports to 14 European Union countries

Sectors	U.K. exports to E.U. 15				
	Variables				Statistics
	Constant	P	GDP	V2	
Animal oils and fats	0.081575 (1.408670)	-1.002687 (-1.856855)	-0.011180 (-0.006045)	-0.202578 (-0.073617)	D.W=2.292737 S.E=0.207701 R2=0.112231
Coal, lignite and peat	0.207424 (1.910130)	-2.253476 (-2.225450)	-6.351479 (-1.831550)	1.566826 (0.303638)	D.W=1.619302 S.E=0.389481 R2=0.204528
Hides and skins	-0.071444 (-1.219412)	-1.180926 (-2.161564)	3.350263 (1.790619)	3.817519 (1.371189)	D.W=1.772451 S.E=0.210139 R2=0.321140
Leather	-0.084177 (-2.033831)	-1.525199 (-3.951925)	3.666881 (2.774329)	3.782514 (1.923241)	D.W=1.891435 S.E=0.148446 R2=0.561987
Sanitary heating and cooling equipment and parts	0.067819 (1.975292)	-2.515697 (-7.857743)	1.305402 (1.190591)	1.410622 (0.864611)	D.W=1.237468 S.E=0.123144 R2=0.717362
Steam and other vapour generating boilers and parts	0.018846 (0.241071)	-1.459584 (-2.002201)	0.178763 (0.071604)	5.826810 (1.568485)	D.W=1.761393 S.E=0.280397 R2=0.208030
Tobacco unmanufactured tobacco refuse	-0.355264 (-1.478482)	-1.960547 (-0.874988)	16.36833 (2.133086)	17.99616 (1.576071)	D.W=2.104148 S.E=0.861840 R2=0.276534

First difference model results for UK sectoral exports to each of the European Union countries

U.K. exports to:	Sector									
	Animal oils and fats					Coal, lignite and peat				
	Variables				Statistics	Variables				Statistics
	Constant	P	GDP	V2		Constant	P	GDP	V2	
Austria	-0.440424 (-1.217452)	-2.536891 (-7.083897)	8.533752 (0.734341)	4.164632 (0.239151)	D.W=2.224359 S.E=1.315431 R2=0.664531					
Finland										
France						0.099783 (0.767194)	-0.357640 (-1.317444)	-9.039665 (-2.098937)	-7.190119 (-1.108175)	D.W=1.769681 S.E=0.469351 R2=0.255720
Greece										
Ireland										
Netherlands						-0.072999 (-0.198787)	-2.626010 (-4.290445)	-0.395848 (-0.033022)	-19.02404 (-1.071334)	D.W=2.556069 S.E=1.325766 R2=0.455743
Italy	-0.031598 (-0.270251)	-0.888664 (-3.381924)	1.405354 (0.362778)	-5.614025 (-0.933157)	D.W=2.266379 S.E=0.421382 R2=0.406972	-0.098543 (-0.281192)	-2.095715 (-4.805044)	-6.156349 (-0.545909)	43.91779 (2.590412)	D.W=2.005848 S.E=1.273948 R2=0.515092
Portugal	-0.047682 (-0.173317)	-1.662698 (-6.889968)	2.132671 (0.237938)	-2.011697 (-0.153353)	D.W=2.477092 S.E=0.987190 R2=0.663459					
Sweden	0.106454 (0.630576)	-0.553087 (-2.132676)	-4.198036 (-0.776424)	3.544595 (0.437456)	D.W=2.711482 S.E=0.611837 R2=0.173084					
Germany										
Denmark	0.009041 (0.054786)	-1.108107 (-7.576285)	1.482025 (0.279426)	2.811023 (0.345674)	D.W=2.129283 S.E=0.599941 R2=0.703030	0.239754 (0.984412)	-0.279805 (-0.595105)	-13.90170 (-1.754848)	11.27747 (0.969030)	D.W=1.943293 S.E=0.872766 R2=0.116645
Spain										

Sector

U.K. exports to:	Hides and skins — Variables				Hides and skins — Statistics	Hydrocarbon& their halogen.& etc. — Variables				Hydrocarbon& their halogen.& etc. — Statistics
	Constant	P	GDP	V2		Constant	P	GDP	V2	
Austria										
Finland	0.052721 (0.355214)	0.233602 (1.879034)	-9.778396 (-2.038496)	7.529329 (0.928564)	D.W=2.224359 S.E=1.315431 R2=0.664531	0.096234 (0.548500)	-1.655691 (-10.42937)	-3.658265 (-0.642169)	1.452232 (0.174150)	D.W=2.549422 S.E=0.628726 R2=0.812052
France						-0.093580 (-1.153653)	-0.583903 (-3.501450)	4.479801 (1.717438)	-2.093411 (-0.515762)	D.W=2.010514 S.E=0.295676 R2=0.385306
Greece	0.128985 (0.597539)	-0.482353 (-4.054339)	-7.226478 (-1.043410)	16.36297 (1.555866)	D.W=2.132785 S.E=0.779087 R2=0.446578	0.082965 (0.487337)	-1.457330 (-7.150029)	-2.173917 (-0.397515)	-6.682809 (-0.807388)	D.W=2.035431 S.E=0.622138 R2=0.658392
Ireland	0.096377 (0.822337)	-0.697004 (-3.421540)	-4.166707 (-1.109868)	-0.437875 (-0.078543)	D.W=1.349422 S.E=0.421128 R2=0.358047	-0.072085 (-0.655682)	-1.236366 (-4.006870)	3.164333 (0.895409)	6.861959 (1.293182)	D.W=2.048786 S.E=0.400887 R2=0.414598
Netherlands										
Italy	-0.004873 (-0.118827)	0.042459 (1.121993)	0.513621 (0.390108)	-1.600477 (-0.791371)	D.W=1.594866 S.E=0.148742 R2=0.057891	0.017910 (0.150131)	-1.129994 (-6.114657)	0.499519 (0.130292)	-0.771982 (-0.132510)	D.W=2.741243 S.E=0.434881 R2=0.576375
Portugal	0.287385 (0.750905)	-1.574796 (-4.825997)	-16.58366 (-1.350763)	24.89526 (1.346579)	D.W=2.301265 S.E=1.391162 R2=0.494271	0.003938 (0.015039)	-1.750949 (-2.988011)	-3.252837 (-0.382328)	-2.940622 (-0.233661)	D.W=2.661363 S.E=0.950584 R2=0.265683
Sweden	0.097818 (0.331588)	-0.451126 (-2.261505)	-2.976372 (-0.316561)	-17.10443 (-1.217466)	D.W=1.635461 S.E=1.061209 R2=0.216034	0.102125 (0.770107)	-1.728894 (-4.725943)	-2.817018 (-0.660397)	-7.048898 (-1.095571)	D.W=2.102984 S.E=0.481054 R2=0.468929
Germany	0.128985 (0.597539)	-0.482353 (-4.054339)	-7.226478 (-1.043410)	16.36297 (1.555866)	D.W=2.132785 S.E=0.779087 R2=0.446578					
Denmark	0.001453 (0.002398)	-1.549963 (-4.507893)	-24.06511 (-1.243361)	19.34226 (0.640091)	D.W=1.753149 S.E=2.083161 R2=0.510451					
Spain	0.078507 (0.936420)	0.002645 (0.033064)	-2.656999 (-0.986278)	-4.524295 (-1.094552)	D.W=2.009274 S.E=0.304282 R2=0.098113					

Sector	Leather					Sanitary heating and cooling equipment and parts				
U.K. exports to:	Variables				Statistics	Variables				Statistics
	Constant	P	GDP	V2		Constant	P	GDP	V2	
Austria										
Finland	-0.175986 (-1.265042)	-1.022157 (-7.853296)	1.068803 (0.238196)	-1.501005 (-0.224112)	D.W=2.441878 S.E=0.506050 R2=0.693377					
France	-0.196366 (-1.959171)	-0.868047 (-2.587601)	4.653522 (1.456363)	-1.477757 (-0.309332)	D.W=1.606892 S.E=0.360957 R2=0.260290	0.041087 (0.737622)	-0.715348 (-3.937858)	-0.134595 (-0.075373)	2.684014 (0.966055)	D.W=1.921233 S.E=0.202313 R2=0.374190
Greece	-0.233480 (-1.421449)	-1.361907 (-9.552246)	11.23340 (2.093182)	-6.866779 (-0.857655)	D.W=2.341698 S.E=0.587274 R2=0.769514	0.044040 (0.381557)	-0.400797 (-1.408786)	-0.172037 (-0.046129)	3.381797 (0.607654)	D.W=2.172739 S.E=0.418562 R2=0.089119
Ireland	-0.127023 (-1.987298)	-1.065574 (-9.024466)	1.433395 (0.693526)	1.963639 (0.619901)	D.W=1.697899 S.E=0.232464 R2=0.756704					
Netherlands						-0.035934 (-0.531950)	-1.107748 (-9.538538)	2.559976 (1.179415)	1.912164 (0.587821)	D.W=1.534681 S.E=0.245587 R2=0.780708
Italy	-0.076374 (-0.890050)	-0.530933 (-2.187061)	3.926537 (1.486673)	7.008276 (1.743994)	D.W=1.697899 S.E=0.232464 R2=0.756704					
Portugal	-0.070121 (-0.574554)	-1.103601 (-5.079941)	5.095100 (1.301024)	4.094325 (0.688257)	D.W=2.305761 S.E=0.445232 R2=0.515917	0.124523 (1.174376)	-1.103218 (-10.32198)	-4.142495 (-1.217398)	3.510449 (0.683389)	D.W=2.466859 S.E=0.385528 R2=0.809433
Sweden	-0.080479 (-0.733367)	-1.014797 (-3.147310)	-0.794540 (-0.224830)	0.244693 (0.045818)	D.W=1.713453 S.E=0.400661 R2=0.267977	0.008403 (0.127748)	-1.077451 (-8.051320)	0.705436 (0.705436)	-3.867794 (-1.192143)	D.W=2.090651 S.E=0.238674 R2=0.718105
Germany	-0.233480 (-1.421449)	-1.361907 (-9.552246)	11.23340 (2.093182)	-6.866779 (-0.857655)	D.W=2.341698 S.E=0.587274 R2=0.769514	0.044040 (0.381557)	-0.400797 (-1.408786)	-0.172037 (-0.046129)	3.381797 (0.607654)	D.W=2.172739 S.E=0.418562 R2=0.089119
Denmark	-0.263145 (-2.423472)	-0.885167 (-4.835440)	3.246723 (0.930187)	2.593555 (0.491973)	D.W=2.040930 S.E=0.396150 R2=0.487835					
Spain	-0.080339 (-0.784310)	-0.538031 (-3.360058)	2.693048 (0.819929)	5.240528 (1.059491)	D.W=1.030095 S.E=0.373658 R2=0.324256	0.070947 (1.039957)	-0.879156 (-5.169069)	0.210822 (0.096009)	4.197783 (1.275166)	D.W=1.876251 S.E=0.246976 R2=0.548936

U.K. exports to:	Steam and other vapour generating boilers and parts					Tobacco unmanufactured tobacco refuse				
	Variables				Statistics	Variables				Statistics
	Constant	P	GDP	V2		Constant	P	GDP	V2	
Austria						0.070906 (0.532884)	-0.434547 (-2.595688)	-0.783105 (-0.180983)	3.933065 (0.615080)	D.W=1.961120 S.E=0.481491 R2=0.202578
Finland						-0.438559 (-0.925168)	-2.333673 (-5.529472)	5.857692 (0.402352)	-6.062634 (-0.267760)	D.W=1.496293 S.E=1.608772 R2=0.592361
France						-0.020363 (-0.172377)	0.080569 (0.739378)	1.214202 (0.320155)	6.572913 (1.158906)	D.W=2.066232 S.E=0.427951 R2=0.084826
Greece	-0.274318 (-0.829437)	-1.079308 (-4.401620)	8.332474 (0.782076)	-23.04688 (-1.421541)	D.W=1.960704 S.E=1.203165 R2=0.431371	0.769194 (0.469183)	-2.133449 (-1.827645)	-19.67179 (-0.362434)	-6.239603 (-0.070022)	D.W=2.870253 S.E=3.671780 R2=0.298549
Ireland	-0.028100 (-0.246072)	-0.003623 (-0.020123)	-0.337568 (-0.092017)	9.776719 (1.765960)	D.W=2.014064 S.E=0.417342 R2=0.103198	-0.041775 (-0.238553)	-1.496340 (-8.612852)	5.590006 (0.989742)	11.58090 (1.352499)	D.W=2.359802 S.E=0.635860 R2=0.762564
Netherlands	-0.113091 (-0.857945)	-0.957398 (-9.534614)	1.725906 (0.407586)	10.89234 (1.702293)	D.W=2.587285 S.E=0.481700 R2=0.766553					
Italy										
Portugal						-0.038113 (-0.422795)	0.130571 (1.037655)	5.657514 (1.934518)	-3.349713 (-0.774140)	D.W=2.025589 S.E=0.325199 R2=0.131790
Sweden						-0.249093 (-1.656437)	-0.897128 (-5.770156)	8.569513 (1.771526)	3.757550 (0.516622)	D.W=2.592940 S.E=0.549249 R2=0.578915
Germany										
Denmark						-0.045850 (-0.039296)	0.200682 (0.042070)	19.70845 (0.542534)	-32.51303 (-0.426912)	D.W=2.994621 S.E=1.807717 R2=0.223450
Spain										

*Vex the export quantity, GDP represents the real gross domestic product, V2 volatility and P is the relative prices of the each country to the world price. For U.K. –Austria exports for hides and skins we used fur skins exports due to unavailability of data. For U.K. –Austria exports for coal lignite we used petroleum products exports due to unavailability of data. For U.K. to Austria, U.K. to Portugal, U.K. to Sweden and U.K. to Finland exports for unmanufactured tobacco we used manufactured exports due to unavailability of data.

Both in the error correction model and in the first difference model, for the most part all the control variables contain the expected signs (GDP, P). Volatility has a positive coefficient for all of the sectors examined here for the U.K. to the E.U.-14 export flows with the exception of animal oils and fats. However the volatility coefficient turned out to be significant for four cases. These were: U.K. to E.U.-14 export flows for hides and skins; U.K. to E.U.-14 export flows for leather; U.K. to E.U.-14 export flows for steam and vapour; and finally U.K. to E.U.-14 export flows for unmanufactured tobacco (all with a positive coefficient). With regard to the bilateral-sectoral export flows the results are different. More specifically twenty nine volatility coefficients had a positive coefficient for volatility leaving the remaining twenty three with a negative volatility coefficient. However these estimated coefficients were significant for only nine cases. The positive significant cases were: for U.K. to Portugal export flows (significant at 1%) for coal and peat; U.K. to Greece export flows (significant at 13%) and U.K. to Portugal (significant at 18%) for hides and skins; U.K. to Italy export flows (significant at 9%) for leather; U.K. to Ireland (significant at 8%) and U.K. to Netherlands (significant at 9%) for steam and vapour generating boilers and parts; finally U.K. to Ireland export flows (significant at 18%) for unmanufactured tobacco. In addition to these positive significant cases there are two more for which the volatility coefficients turned to be significant and negative. These cases were: U.K. to Germany export flows (significant at 5%) for leather and U.K. to Greece export flows (significant at 16%) level of significance.

7. Conclusion and policy implications
Policy implications

The main reasoning for which economic research is preformed is in order to examine potential effects with regard to economic policy. As with every research, similarly our results can be used in order to suggest policy implications. Since the results of our study have suggested mixed results the effect of a policy which reduces volatility has to be performed with the over all benefit in mind. In other words, a policy which reduces volatility at a specific sector of a country for which there is a negative effect from volatility to exports will produce a financial gain to the specific sector and product. Only in the event that such a policy (a policy reducing volatility) has a benefit to specific products and sectors it would be possible to be implemented in that country. Another issue that has to be considered is the amount of the total financial gain (in the case for which such a gain exists). If the amount of the potential gain is fairly low it might not be worth while to impose such a policy. The effects of a volatility reducing policy have been examined to some extent in our previous empirical work (Serenis, D., 2006). However, as it evident, the effects of such a policy will require the examination of an additional number of sectors and products. Therefore this is an area for our future research to examine.

Conclusion

Even though it has been argued by some empirical researchers that exchange rate volatility has a negative effect on the level of exports, some empirical researchers have been able to examine positive, indeterminate or no effects of exchange rate volatility on exports. The purpose of this paper has been to examine whether exchange rate volatility produces any effects on secotial- bilateral exports. Motivated by the switch from fixed to flexible exchange rate and also by the dissagrement among empirical researchers as to the true effects of volatility, our investigation on the topic has tried to incorporate one other important aspect. In other words, it is possible with in the same set of countries to have different sets of results since different trade flows can lead to different results. Our investigation on bilateral sectorial trade flows has been preformed in two ways. The first incorporated the utilization of total U.K. to E.U. -14 exports for each sector while the

second incorporated each of the U.K.'s to E.U.-14 sectoral flows. The results seem to suggest that there is an overall mixed relationship. More specifically, for the first case (aggregate-sectoral trade) we have estimated a positive effect of volatility to exports (with four significant positive cases). On the other hand, for the second trade flow (bilateral-sectoral exports) we have estimated a mixed relationship from volatility to trade as seen with ten significant negative cases and fourteen significant positive cases.

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