The trade effects of Euros among Euro Area before and after adoption

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Applied Economics Option

An Honours Degree Project Proposal Submitted to the

School of Business in Partial Fulfilment

of the Graduation Requirement for the Degree of

Bachelor of Business Administration (Honours)

Hong Kong Baptist University

Hong Kong

April 2007

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Abstract

This paper investigates the trading effect of Euroization for the Euro Area. It compares the trade-creation effects before and after the irrevocable Euro rates was announced. The empirical results show the Euroization had a significant effect and prompt effects on trade after the Euro was introduced in 1999 within the Euro Area. Besides, the Euro also makes the trade flows between the Euro Area and other countries worldwide increase. Therefore, the empirical results showing that the adoption of common currency has a positive effect on trade flows.   .

<u>Acknowledgement</u>

I would like to take this precious opportunity to thank my supervisor Doctor Bill

Hung W. S., from Economics Department for her valuable advises and most

importantly her fully support in this honors projects. He kindly devoted his precious

time in guiding me on the paper. Without his help, the project would not be completed

smoothly. Not only I gain much knowledge, but also my independent mind and

critical thinking is greater enhanced under his guidance.

Tsang Wing Yin

Content

1. Introduction

On January 1, 1999, eleven European countries have irrevocably established the conversion rates between their respective national currencies and the Euro. And they replaced their national currencies by a single European currency, the Euro. The Euro was officially circulated among the twelve countries of the European Union in January 2002. In the early 1970s the idea of using a common currency among the European countries was proposed. The original idea is to revitalize the European economies after the first oil shocks.

According to Raymond Barre (1971), a common currency would give the European countries a "unified personality" in the international monetary system. This binds the European countries closer together. The European currency union strengthens a unified European market and the trading relationship with the Euro Area by removing unnecessary foreign exchange risks. Apart from that, the transaction cost of trade can be reduced by using Euros.

The trading effect of a common currency has been discussed and tested in many literatures. However, most of the researched results are uncertain. Some studies provided positive effects on trade flow, but it is small and insignificant; while others show the adoption of common currency stimulated a great volume of trade between the members of European Union. Rose (2001) pointed out two countries which share the same currency trade three times as much as they would with different currencies.

Besides, he said a currency union represents a serious government commitment to long term economic integration, and it includes the private sector to have a strong will to involve more trade than the situation where there are different currencies and risks of exchange. Currency unions like EMU may thus lead to a large increase in international trade. Rose (2002) provided a time-series evidence to support this.

Clearly it is cheaper to trade between two countries that use the same currency than between countries with their own monies. A gravity model is used to assess the effects of unified Euro and to examine the time that trade effects of Euroization appeared. Apart from that, this paper will look at the overall trade effect within Euro area and others. The model is used to examine the applicability to the Euro area by answering the following question. Are trade-creations among the Euro member at the expense of trade-diversions among other non Euro members?

The Augmented Gravity Model (AGM) includes year-specific and trade-pair-specific dummy variables. The empirical results would be compared with the estimations from the baseline restricted fixed effects AGM.

This paper includes five sections. Section one is the introduction, section two is the review of literature. Section three is the methodology. Section four is the report of empirical results. The last section is the conclusion.

2. Literature Review

The aim of the paper is to present the trade-creating effects of Euroization for the Euro area. Hung & Hung's (2003) paper is very valuable because it examines the Euroization had an effect on trade creation. At the same time, it points out the Euro motivated trade flows between the Euro area and the other countries over the world.

The idea of using united currency for the custom union in Europe has been expressed long time ago in 1960s by Cohen and Mankiw (2004), states international cooperation is essential to realizing the potential gains from trade.

In 1998, Scobie (1998) said that the economic and monetary difficulties of 1993-6 perfectly illustrate the main reason that establishing economic and monetary union is a must. These difficulties brought to the fore not only the need for monetary union and a single currency, but also the need for an adequate convergence of policies and economics preferences between member states. Besides, he pointed out that the great fluctuations between European currencies in 1994-6 have posed a threat to the European market. The uncertainly resulting from the widespread currency instability in Europe is a drag on fair international trade of the European trade market. With a single European currency; it may bring advantages to international trade.

The real bilateral trade flows between two countries can be specified by the gravity model. Tinbergan (1962) and Poyhonen (1963) stated that the real bilateral

trade flows between country i and country j at time t are positively proportional to the trade-pair economic sizes which measured by their real national income (Y_{it} and Y_{jt}). And they are inversely proportional to the transportation cost which measured by the Distance ($DIST_{ij}$) between their national capitals. The BGM model is written as follows:

$$X_{ijt} = \beta_0 Y^{\beta 1}_{it} \ Y^{\beta 2}_{jt} Dist^{\beta 3}_{ij} e^{u_{ijt}} \tag{1}$$

Lots of previous studies show that the bilateral trade flow with respect to incomes and distance providing a good explanation for a reasonable cross country trade variation.

The empirical success of Gravity model attracted many followers to adopt and even extend the model by other explanatory variables. Glick and Rose (2002) have contributed to the addition and refinement of the explanatory variables. Therefore, the BGM was advanced by the AGM which is written as log-log form as follows:

$$\ln(X_{ijt}) = \beta_0 + \beta_1 \ln(Y_{jt}) + \beta_3 \ln(P_{it}) + \beta_4 \ln(P_{jt}) + \beta_5 \ln(Area_i) + \beta_6(Area_j)$$

$$+ \beta_7 \ln(Dist_{ij}) + \beta_8 Exv_{ijt} + \sum_{k=9}^{n} \beta_k (A_{ijk}) + \varepsilon_2 \tag{2}$$

There are numbers of factor in this model. The population of export country P_{it} and export country P_{jt}, the national areas of the export country $Area_i$ and import country $Area_j$, the exchange rate volatilities, Exv_{ij}, and the time-invariant dummy variables. $A_{ijk}S$ represents other factors, such as common languages and currency

which could affect the trade flows between countries i and j.

The equation (2) becomes the baseline of models which investigate the effects of various issues of trade. Adding trade-pair-specific variables with the time-specific variables to the model could better examines the linkage between cross-country variations in exchange rate arrangements and the trade flows in many studies. (Rose 2000, Glick and Rose 2002)

It is not easy to find a suitable explanation to the previous empirical framework. With the newly implemented Euroization, it motivates me to study and try to provide empirical evidence to the trade-creating effects of Euroization.

3. Data and Methodology

Many Economists, such as Frankel(1997) ,Rose (2000, 2001) and Glick (2002) applied the fixed effects for the AGM model in equation (2) to illustrate some policy like common currency and the trade blocs. Hung(2003) examined whether this model is on right directions for the policy implications of Euroization on trade, and the AGM model was rewritten as follows:

$$\ln(X_{ijt}) = \lambda_0 + \lambda_1 \ln(Y_{it}Y_{jt}) + \lambda_2 \ln(P_{it}P_{jt}) + \lambda_3 \ln(Area_i Area_j) + \lambda_4 \ln(Dist_{ij})$$

$$+ \sum_{k=7}^{11} \lambda_k T_{1990+k} + \lambda_{12} Exv_{ij} + \varepsilon_3 \qquad (3)$$

This is the restricted fixed effect AGM. The multiplicative terms of $Y_{it}Y_{jt}$, $P_{it}P_{jt}$,

and AreaiAreaj are used to capture any possible non-linear gravity nature between trade-pair countries. $Y_{it}Y_{jt}$ is the real GDP of country i times country j. $P_{it}P_{jt}$ is the population of country i times population of country j. $Area_i Area_j$ is the area of country i times area of country j.

Concerning the effects of Euroization, the richer countries are expected to trade more in term of goods and services, therefore $Y_{it}Y_{jt}$, is expected to be positive. $P_{it}P_{jt}$ is the populations of countries which are expected to be negative as the population growth make self sufficiency more feasible in the domestic market. The $Area_i Area_j$ is a proxy term for natural resources and it is expected to be negatively related to the trade flows. The greater reserves of natural resources less support for the international trade as it lead a higher sufficiency of the domestic market. $Dist_{ij}$ is a proxy of the transportation cost and other barriers of trade, which is expected to be negatively related to the trade flows. Exv_{ij} is the volatility of the bilateral exchange rate between countries i and j. It is expected to be negatively related to trade flows.

$\sum_{k=7}^{11} \lambda_k T_{1990+k}$ is the year-specific dummy variable which is expected to be positive in order to show the changes and effects of Euroization on trade after the adoption in 1999.

Consider the time-invariant variables between two trade-pair countries, some variables like area of the countries and the distances between trade-pair

countries could be omitted. Therefore the equation is written as follows:

$$\ln(X_{ij}) = \lambda_0 + \lambda_1 \ln(Y_i * Y_j) + \lambda_2 \ln(P_i * P_j) + \lambda_3 Exv_{ij} + \lambda_4 dd_{99}$$

$$+ \lambda_5 dd_{00} + \lambda_6 dd_{01} + \lambda_7 dd_{02} + \lambda_8 dd_{03} + \lambda_9 dd_{04} + \lambda_{10} dd_{05} + \varepsilon_4 \qquad (4)$$

In this equation, the time-invariant variables are replaced by the trade-pair-specific

dummy variables. Dummy variables dd_{99} dd_{00} dd_{01} dd_{02} dd_{03} dd_{04} dd_{05} are

year-specified which show the effect of Euroization was adopted after 1999. If there is

positive change in the coefficient of the year-specific dummy variables after the

adoption of Euro in 1999, then it means there is a trade creating effects for member

countries within the Euro Area.

The dependent variable is the log value of county i's real export to country j.

Y_iY_j is the real GDP of country i times country j. P_iP_j is the population of country i

times population of country j. $Area_iArea_j$ is the area of country i times the area of

country j.

$$\ln(X_{ij}) = \lambda_0 + \lambda_1 \ln(Y_i * Y_j) + \lambda_2 \ln(P_i * P_j) + \lambda_3 Exv_{ij} + \lambda_4 (dd_{99} * EURO)$$

$$+ \lambda_5 (dd_{00} * EURO) + \lambda_6 (dd_{01} * EURO) + \lambda_7 (dd_{02} * EURO)$$

$$+ \lambda_8 (dd_{03} * EURO) + \lambda_9 (dd_{04} * EURO) + \lambda_{10} (dd_{05} * EURO) + \varepsilon_5 \qquad (5)$$

where Euro is define as 1 for all Euro members and 0 for all EU non-Euro

member countries.

Dummy variable times Euro (dd_{99}*EURO dd_{00}*EURO dd_{01}*EURO dd_{02}*EURO

dd$_{03}$*EURO dd$_{04}$*EURO dd$_{05}$*EURO) are indicated the trade-pair countries which

both of them are Euro member. The equation is use to find the effects of trade within

Euro members after the Euroization adopted in1999.

$$\ln(X_{ij}) = \lambda_0 + \lambda_1 \ln(Y_i * Y_j) + \lambda_2 \ln(P_i * P_j) + \lambda_3 Exv_{ij} + \lambda_4(dd99 * DSUK)$$

$$+ \lambda_5(dd00 * DSUK) + \lambda_6(dd01 * DSUK) + \lambda_7(dd02 * DSUK) \qquad (6)$$

$$+ \lambda_8(dd03 * DSUK) + \lambda_9(dd04 * DSUK) + \lambda_{10}(dd05 * DSUK) + \varepsilon_6$$

where DUSK is define as 1 for Denmark, Sweden and the United Kingdom, and

0 for other countries.

Dummy variable times Euro (dd$_{99}$*DUSK, dd$_{00}$* DUSK, dd$_{01}$* DUSK, dd$_{02}$*

DUSK, dd$_{03}$* DUSK, dd$_{04}$* DUSK, dd$_{05}$* DUSK) are indicated the trade-pair

countries which one of them is Euro member and one of them is European Union

member.   The equation is use to find the effects of trade between Euro member and

European Union member after the Euroization adopted.

According to the *Direction of Trade Statistic*, 22 developed countries and 25

developing Countries were selected be the bilateral trade-pair to study. There are 10

Euro member countries (Belgium, Finland, France, Germany, Greece, Ireland, Italy,

Netherlands, Portugal and Spain). 37 non Euro member countries were selected from

five different regions (Africa, Europe, the Middle East, and the Western Hemisphere.

Data for the Variables are mainly obtained from the *Direction of Trade Statistic* and

the *International Financial Statistic*-IMF. The sample period is 1999 to 2005; two

year covering the first announcement of Euroization since 1999 and the

implementation of the irrevocable Euro conversation rates since 2002. Seven-year

period time is sufficient to provide evidence on the trade-creation effects of

Euroization. From the 1999 to 2005, there are total 11040 observations.

4. Empirical results

Measuring the trade-creation effects of the implementation of a common

currency among the European Union members, we can divide into two different cases.

The first case is focus on the trade-creating effects of euro member trade within Euro

Area .The second one is focus on the trade-creating effect of euro member trade with

non euro member with Europe.

The estimation results for equations (5) and (6) are reported in table 1 and table 2

respectively. Most of the coefficients are statically significant and consistent with the

expected signs. The Adjusted R^2 are significant. This show the modified model is on

the right directions for the policy implications of Euroization on trade.

Insert   Table 1

In Table 1, the dependent variable is the log value of country i's real export to

county j. Most of the coefficients are significant with correct signs and most of the

dummy variables are statically significant. There is a growth of trade since 1999,

which means the trade-creation effects exist after the announcement of Euro. Most of the trade flows increased more 10 % from 1999 to 2001. It is clear to see the raising trades in all countries, some of them are greater changes like Belgium (the time dummy coefficients show the changes from 1.089 to 1.268), and similarly Finland also has the same results that the time dummy coefficients show the changes from 0.656 to 0.870. The following countries have the same result too, like France (the time dummy coefficients show the changes from 1.166 to 1.303), Germany (the time dummy coefficients show the changes from 0.977 to 1.199), and Netherlands (the time dummy coefficients show the changes from 0.987 to 1.172).   There is a large increase in trade flow for Ireland (the time dummy coefficients show the changes from 0.472 to 0.724).   As we know that Ireland is an island of Europe, the transaction of trade among the Euro area is greater than other European countries because of the distance. The use of Euro greatly stimulates the trade of Ireland in year 1999 to 2001.   Theoretically, the transportation costs of trade between two countries are small if the countries are close. The trade flow increase by using the common currency Euro rather than different currencies. It can be explained by reducing the transaction costs of trade and the risk of exchange rate of currencies.

The significant trade-creation effect occurred after 1999 and even after 2002. After the adoption of the common currency in 2002, the trade-creation effect exists

with a declining rate. Let's take a look to table 1 from year 2002 to 2005. The trade creation effects are still significant to the countries like Belgium (the time dummy coefficients show the changes from 1.217 to 0.967), France (the time dummy coefficients show the changes from 1.188 to 0.979), Germany (the time dummy coefficients show the changes from 1.074 to 0.880), Italy (the time dummy coefficients show the changes from 1.126 to0.972), Netherlands (the time dummy coefficients show the changes from 1.055 to 0.681), Portugal (the time dummy coefficients show the changes from 1.535 to 1.239), and Spain (the time dummy coefficients show the changes from 1.378 to 1.336).

Two factors can be use to explain the phenomenon above. First it is easier for the countries to trade with one common currency within the Euro Area. Because the risks of exchange rate of difference currencies are eliminated which the transaction costs of trade within Euro Area are decreased. Second, Euroization did provide positive effects on the economics activities with the Euro Area. It may lead the non-Euro members to consider whether they should use the Euro and be Euro member.

The empirical results in Table 1 indicate that the trade- creation effect started in 1999 when the use of common currency was announced. And it shows the trade-creation effects of Euroization after the adoption of irrevocable Euro conversion rate for the Euro member countries. Therefore, the adoption of Euro is beneficial to

the Euro members. Even Italy is less openness of trade, it still have a greater benefit than non-Euro member.

Particularly Denmark, Sweden and the United Kingdom are the European Union members, but they are not Euro member. The above results implicate Denmark, Sweden and the United Kingdom may join the currency union to gain a greater benefit of trade. The idea whether they should join the currency union and adopt Euro as their common currency is a hot discussed topic worldwide. However, the monetary and currency policies should be reconsidered.

Insert Table 2

Generally, the trade- creation effects are significant for some of the countries since 1999. The cases of Finland, Ireland and Netherlands trading with Non-Euro member are significant. The trade flows increased more than 10%. For Finland (the time dummy coefficients show the changes from 1.721 to 1.911), Ireland (the time dummy coefficients show the changes from 1.115 to 1.308) and Netherlands (the time dummy coefficients show the changes from 0.933 to 1.058). After the adoption of Euro in 2002, trade-creation effects are not significant in most of the countries. There was a significant increase of trade for the Finland in 2002 and 2003, while the results of Ireland and Netherlands showed the significant trade-creation effect still occurred in 2002. Therefore, we can conclude that the trade-creation effects are not significant

after 2002.

5. Conclusion and implication

This paper illustrates the trade-creation effect of Euroization by used of modified AGM model. To measuring the trade-creation effects for the Euro and non-Euro member countries in Europe, this model include the year-specific variables and trade-pair specific dummy variables.

The estimated results show that trade flows among the European countries has been stimulated after the adoption of Euroization. Significant trade-creation effects occurred immediately after the announcement of Euro as the common currency and official adoption of Euro in 1999.

Comparing the larger magnitudes of trade flows of Euro member, this study can be use to persuade those Denmark, Sweden and the United Kingdom to join the currency union. Therefore the trade flows within the European Union can be increased, and they can enjoy the benefit of the Euroization.

Most of the Euro member countries have a positive significant trade-creation effect after the adoption of Euroization. That means using a common currency within the same region can stimulate the trade within the same region and it is benefit for their economy.

Recently, there are some discussions on the topic"Using a common currency in

Asia". Regarding to the results of using common currencies in Europe, a common

currency increase trade and make trading become easier for Euro member. It also

leads an economic growth to those countries in a short period of time. Therefore,

using common currency within the same region is practical.   We may foresee if Asia

countries adopt a common currency, it has a positive effect on their economic growth.

Common currency in Asia may introduce and adopt in the future.

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Table 1: Measuring trade-creation effects of the Euro between selected Euro and non-Euro member

(the dependent variable is the log value of country i's real export to county j)

Dependent Variables : ln(Xij)	Belgium	Finland	France	Germany	Ireland	Italy	Netherlands	Portugal	Spain	Denmark	Sweden	United Kingdom
Constant	-2.897*	-8.899*	-0.868***	-2.765*	-11.534*	0.328	-3.289*	-3.730*	0.779***	-9.702*	-6.726*	-5.428*
	(-6.424)	(-12.035)	(-1.883)	(-5.745)	(-19.273)	(0.768)	(-7.730)	(-7.618)	(1.911)	(-15.879)	(-11.974)	(-13.656)
ln(Yi*Yj)	0.812*	1.078*	0.652*	0.777*	1.285*	0.609*	0.786*	0.741*	0.543*	1.053*	0.934*	0.889*
	(29.637)	(23.957)	(23.553)	(26.976)	(34.706)	(23.458)	(30.492)	(23.619)	(21.554)	(28.791)	(27.345)	(36.301)
ln (Pi*Pj)	-0.112*	-0.362*	-0.043***	-0.159*	-0.464*	0.065*	-0.193*	-0.133*	0.068*	-0.467*	-0.319*	-0.301*
	(-4.313)	-8.457	(-1.657)	(-5.928)	(-13.374)	(2.671)	(-7.931)	(-4.493)	(2.837)	(-13.357)	(-9.915)	(-13.652)
Exvij	-0.017*	-0.018**	-0.009***	-0.011**	-0.01	-0.008	-0.004	-0.003	-0.009***	-0.005	0.002	-0.004
	(-3.274)	(-2.044)	(-1.763)	(-2.021)	(-1.399)	(-1.535)	(-0.876)	(-0.633)	(-1.812)	(-0.749)	(0.306)	(-0.850)
D99*EURO	1.089*	0.656***	1.166*	0.977*	0.472	1.085*	0.987*	1.560*	1.320*	0.877*	0.930*	0.829*
	(4.759)	(1.742)	(5.071)	(4.109)	(1.548)	(4.985)	(4.560)	(5.844)	(6.214)	(3.010)	(3.401)	(4.256)
D00*EURO	1.289*	0.852**	1.296*	1.152*	0.665**	1.199*	1.149*	1.616*	1.430*	1.059*	1.078*	0.934*
	(5.645)	(2.267)	(5.646)	(4.852)	(2.184)	(5.519)	(5.324)	(6.124)	(6.747)	(3.646)	(3.951)	(4.802)
D01*EURO	1.268*	0.870**	1.303*	1.199*	0.724**	1.179*	1.172*	1.650*	1.401*	1.048*	1.040*	1.145*
	(5.556)	(2.317)	(5.685)	(5.055)	(2.380)	(5.433)	(5.487)	-6.262	(6.615)	(3.611)	(3.814)	(5.918)

Dependent Variables : ln(Xij)	Belgium	Finland	France	Germany	Ireland	Italy	Netherlands	Portugal	Spain	Denmark	Sweden	United Kingdom
D02*EURO	1.217*	0.692***	1.188*	1.074*	0.435	1.126*	1.055*	1.535*	1.378*	0.973*	0.890*	0.840*
	(5.323)	(1.840)	(5.169)	(4.518)	(1.427)	(5.179)	(4.882)	(5.809)	(6.495)	(3.349)	(3.259)	(4.315)
D03* EURO	1.053*	0.454	1.126*	0.955*	0.08	*1.058	0.954*	1.436*	1.400*	0.747**	0.723*	0.669*
	(4.586)	(1.200)	(4.881)	(4.00)	(0.262)	(4.849)	(4.400)	(5.411)	(6.570)	(2.559)	(2.632)	(3.423)
D04* EURO	0.998*	0.204	1.056*	0.9101*	0.283	*1.016	0.839*	1.298*	1.383*	0.529***	0.588**	0.417**
	(4.318)	(0.535)	(4.549)	(3.794)	(0.920)	(4.619)	(3.838)	(4.843)	(6.433)	(1.795)	(2.124)	(2.110)
D05* EURO	0.967*	0.121	0.979*	0.880*	-0.036	*0.972	0.681*	1.239*	1.336*	0.535***	0.539***	0.350***
	(4.177)	(0.318)	(4.209)	(3.660)	(0.120)	(4.411)	(3.112)	-4.615	(6.201)	(1.814)	(1.944)	(1.769)
Observations	914	918	920	920	919	920	920	919	920	918	920	920
SEE	1.003	1.652	1.009	1.043	1.336	0.954	0.948	1.159	0.931	1.335	1.255	0.893
Adjusted R2	0.632	0.454	0.54	0.558	0.624	0.57	0.614	0.547	0.576	0.552	0.532	0.668

*' denotes 1% statistical significance '**' denotes 5% statistical significance '***' denotes 10% statistical significance, and t-value are in parentheses.

Table 2: Trade-creating effect between Euro member and non -Euro member (Denmark, Sweden and United Kingdom)

Dependent Variables: ln(Xij)	Belgium	Finland	France	Germany	Ireland	Italy	Netherlands	Portugal	Spain
Constant	-3.772*	-8.615*	-1.866*	-3.526*	-11.391*	0.702	-3.902*	-5.128*	-0.514
	(-7.993)	(-11.987)	(-3.839)	(-7.079)	(-19.516)	(-1.559)	(-8.902)	(-9.951)	(-1.153)
ln(Yi*Yj)	0.875*	1.067*	0.717*	0.825*	1.281*	0.676*	0.830*	0.843*	0.630*
	(30.740)	(24.650)	(24.609)	(27.75)	(36.059)	(24.791)	(31.458)	(25.794)	(23.012)
ln (Pi*Pj)	-0.155*	-0.347*	-0.099**	-0.204*	-0.455*	0.008	-0.226*	-0.204*	-0.002
	(-5.675)	(-8.245)	(-3.597)	(-7.348)	(-13.260)	(0.319)	(-8.907)	(-6.453)	(-0.082)
Exvij	-0.022*	-0.021**	-0.014**	-0.015*	-0.012***	-0.012**	-0.009	-0.003	-0.014**
	(-3.914)	(-2.422)	(-2.472)	(-2.674)	(-1.656)	(-2.224)	(-1.642)	(-0.487)	(-2.576)
D99*DUSK	0.746***	1.721**	0.572	0.539	1.116**	0.371	0.933**	0.966***	0.537
	(1.699)	(2.563)	(1.288)	(1.197)	(2.042)	(0.881)	(2.283)	(1.870)	(1.258)
D00*DUSK	0.912**	1.911*	0.646	0.732	1.308**	0.416	1.058*	0.975***	0.578
	(2.079)	(2.847)	(1.456)	(1.628)	(2.395)	(0.990)	(2.591)	(1.889)	(1.355)
D01*DUSK	0.832***	1.783*	0.658	0.762***	1.314**	0.403	0.951**	0.890***	0.52
	(1.897)	(2.657)	(1.484)	(1.694)	(2.405)	(0.957)	(2.330)	(1.725)	(1.218)
D02*DUSK	0.743***	1.635**	0.553	0.672	1.015***	0.323	0.847**	0.789	0.505
	(1.693)	(2.436)	(1.246)	(1.494)	(1.858)	(0.768)	(2.074)	(1.528)	(1.183)
D03*DUSK	0.594	1.496**	0.426	0.559	0.654	0.22	0.743***	0.596	0.512
	(1.352)	(2.225)	(0.958)	(1.240)	(1.194)	(0.522)	(1.816)	(1.153)	(1.120)
D04*DUSK	0.418	1.203***	0.326	0.467	0.867	0.157	0.647	0.396	0.491
	(0.950)	(1.784)	(0.731)	(1.033)	(1.583)	(0.372)	(1.577)	(0.699)	(1.144)
D05*DUSK	0.435	1.183***	0.294	0.485	0.64	0.168	0.514	0.522	0.447
	(0.989)	(1.754)	(0.659)	(1.074)	(1.168)	(0.397)	(1.252)	(1.006)	(1.042)
Observations	914	918	920	920	919	920	920	919	920
SEE	1.068	1.635	1.081	1.096	1.331	0.505	0.995	1.257	1.04
Adjusted R^2	0.584	0.466	0.472	0.514	0.628	0.505	0.577	0.468	0.47

'*' denotes 1% statistical significance '**' denotes 5% statistical significance

'***' denotes 10% statistical significance, and t-value are in parentheses.