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Working Paper No. 243

May 2008

The Effect of the Euro on Export Patterns: Empirical Evidence from Industry Data

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Subsequently published in G. Murphy, I. Siedschlag, "Has the Euro Boosted Intra-Euro Area Exports? Evidence from Industry Data", Review of Economics and Institutions, Vol. 2, No. 3, pp.1-22

Abstract: We estimate the euro effect on Irish export patterns using a panel of industry data over the period 1993-2004. Our innovation is to account for country and industry specific omitted trending variables bias. We find that the euro effect on Irish exports to the euro area countries relative to the rest of the trading partners of Ireland has been positive, significant and increasing since 2000. Furthermore, we find heterogeneous euro effects across industries. We find consistent significant positive euro effects for industries characterised by increasing returns to scale.

Key words: EMU, trade, Ireland

JEL classification: F14, F15, F41

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* We thank Patrick Honohan, John Fitz Gerald, Frances Ruane and participants at a research seminar in the ESRI and at the Irish Economic Association conference held in Westport for helpful comments on an earlier draft. We also thank Bettina Drepper for her valuable assistance with the data collection and preparation for this analysis.

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1 Introduction

In this paper we estimate the effect of the euro on export patterns in Ireland. Specifically, we estimate an augmented gravity model using industry level data on Irish exports over the period 1993-2004. We extend the literature on the effects of the euro on trade in two aspects. First, we provide empirical evidence about time and industry heterogeneity of the euro effects on trade. Second, we estimate an improved econometric model and account for unobserved country heterogeneity of the trading partners of Ireland and correct for country and industry specific omitted trending variable bias.

In particular, we ask the following research questions:

i) Has the single currency boosted Irish exports to euro area countries relative to exports the rest of its trading partners?

ii) Has the euro effect on exports changed over time?

iii) Has the euro effect on exports varied across industries?

Theses questions are interesting and policy relevant for at least three reasons. First, the existing literature on the effect of the euro on trade patterns is inconclusive. The average effect of the euro on the trade among euro area countries found in existing studies ranges from 5% to 40%[1]. Second, initial conditions and structural characteristics differentials are likely to result in country, industry and time specific effects. These differential effects can be best captured with industry-level country studies using panel data as opposed to cross-country analysis. Third, the anticipated trade gains following the adoption of the single currency is an important input for the decision about the time to enter the Third Stage of the European Economic and Monetary Union (EMU). This is relevant in the case of the EMU members with a derogation from adopting the single currency.

The remainder of this paper is structured as follows. Section 2 discusses the theoretical and empirical background for our analysis. In Section 3 we describe our data set and summary statistics. In Section 4 we explain our empirical strategy and

[1] Bun and Klaassen (2007) discuss recent studies on the euro effect on trade

model specifications. We discuss our estimation results in Section 5. Finally, Section 6 summarises our findings and concludes.

2 Theoretical and Empirical Background

Existing theory suggests several channels underlying a permanent structural break in bilateral trade following the adoption of a common currency[2]. First, the elimination of exchange rate uncertainty is equivalent to a reduction of the risk related to trade which in turn is expected to boost trade. Second, the elimination of transaction costs related to operations in different currencies is likely to lead to an increased volume of trade. Third, increased price transparency fosters competition among firms and leads to a fall in the mark-up which in turn is expected to increase the volume of bilateral trade. Fourth, the single currency enables the euro area countries to better hedge against the exchange rate risk in their trade with non-euro area countries. This suggests that the single currency might also boost trade with countries outside the euro area.

Baldwin, Skudelny and Taglioni (2005) propose a micro-founded theoretical model to explain the euro effect on bilateral trade. They suggest that the effect of the euro on trade is likely to vary across industries. This follows from the fact that the effect of exchange rate uncertainty on trade depends on the marginal cost faced by exporting firms and the cost structure of firms and firm's structure vary across industries. Their point of departure is the theoretical model of trade and firm heterogeneity proposed by Melitz (2003). The basic ingredients of this model are imperfect competition, the presence of fixed costs for market-entry which exporting firms are facing and marginal cost differentials across firms. The main outcome of the model is that exporting is profitable only for firms with low marginal costs. It follows that industries with imperfect competition and increasing returns to scale are likely to benefit more from the adoption of the single currency.

The intuition in Baldwin, Skudelny, and Taglioni (2005) is that the elimination of the exchange rate uncertainty leads to an increased export activity due to two effects: a) an increase in the volume of sales by existing exporters (intensive margin); b) a larger number of exporters (extensive margin).

[2] For a detailed discussion of the channels underlying the euro effect on bilateral trade see Micco, Stein, and Ordonez (2003), and Baldwin (2006)

The empirical literature on the effect of currency unions on trade has been initiated by Rose (2000). He finds that bilateral trade among countries belonging to currency unions is three-times higher in comparison to other trading partners after controlling for other trade determinants such as GDP and distance. The Rose methodology has several shortcomings which have been discussed extensively in the follow up literature[3]. Subsequent studies have used improved methodologies and have found smaller effects of currency unions on trade. The interesting question in relation to EMU is whether the single currency is likely to foster trade integration among participating countries.

Micco, Stein and Ordonez (2003) was the first contribution to the literature focused on the EMU. They use panel data and analyse the dynamics of the impact of the euro on trade patterns. They find that the euro has fostered further trade integration among the euro area countries and this positive effect has increased over time. They used a data set over the period 1993-2002 to uncover underlying changes in trade patterns due to the single currency. The main issue is to distinguish the effect of the euro from other factors driving trade integration such as the Single Market Programme.

Faruqee (2004) finds that initial conditions and structural characteristics have led to country-specific effects of the euro on countries' trade performance. Cross-country differences are explained by trade openness (more open economies are likely to benefit more); trade patterns (countries with higher intra-trade shares are likely to benefit more), exchange rate volatility (countries with greater exchange rate volatility are likely to benefit more), countries with more flexible product and labour markets are likely to benefit more. While the three largest countries have experienced trade gains similar to the euro area average, trade gains in the small countries have been more dispersed. Trade gains were greater than the euro area average in Spain, the Netherlands, Austria, and Belgium. Trade gains were lower than the euro area average in Portugal, Finland, and Ireland. Growth in the trade of Ireland with countries outside the euro area has outperformed the growth in trade of other countries with non-euro area countries.

Bun and Klassen (2007) extend the standard gravity model that has been used to estimate the euro effect on trade by adding a time trend variable which varies across

[3] See for example Persson (2001), Tenreryo (2001) and Baldwin (2006)

country-pairs. Their results point to a much lower euro effect on trade, 3%. In addition, they find that the magnitude of the bias due to omitted trending variables depends on the length of the sample with longer samples producing more precise estimates.

Flam and Nordström (2003) estimate euro effects on exports using data for nine industries (one digit, SITC classification) over the period 1989-2002. They estimate aggregate and industry specific euro effects and find that, after controlling for other determinants of bilateral exports, the euro has fostered the level of trade between the euro countries by 15 percent and the level of trade with countries outside the euro area by 8 percent. The positive euro effect on trade has increased over time. In addition, they estimate industry specific euro effects and find that the strongest effects were concentrated in industries with differentiated products with vertical specialisation across countries such as Beverages and tobacco; Chemicals and related products; Manufactured goods classified by material.

Baldwin, Skudelny and Taglioni (2005) estimate industry specific euro effects (two digit, and three digit ISIC Rev.3 classification) and find that the strongest euro effects have appeared in industries characterised by imperfect competition and increasing returns to scale such as Office, accounting and computing machinery; Motor vehicles, trailers and semi-trailers; Non-pharmaceutical chemicals; Chemical, rubber, plastics and fuel products; Electricity, gas, and water supply; and Building and repairing of ships and boats.

In the case of Ireland, Dwane, Lane and McIndoe (2006) use aggregate trade data for Ireland and 21 major trading partners over the period 1950-2004 to estimate the effects of currency unions on Irish trade patterns. They find no significant euro effect on Irish trade.

In comparison to Flams and Nordström (2003) and Baldwin, Skudelny and Taglioni (2005) we focus on the effect of the single currency on the export patterns in a single country, Ireland. We use industry data covering 21 industries (two digit, ISIC Rev. 3 classification). Our innovation is to estimate an improved econometric model to account for country and industry specific time-varying omitted variables. We go beyond Dwane, Lane, and McIndoe (2006) by estimating not only aggregate average euro trade effects but also time and industry specific trade effects.

3. Data

We use a panel of annual data on export flows between Ireland and its main trading partners[4] across 21 industries over the period 1993-2004. We focus in particular on Irish exports to 28 OECD countries. Ireland exported on average approximately 90 per cent of its total exports to this set of advanced economies[5] over the analysed period. Our motivation for choosing the aforementioned period is as a result of the change in the collection of intra-EU trade statistics in 1993 and the implications for data comparability discussed in Baldwin (2006)[6]. The panel is balanced so we have 588 observations per each industry.

The data on exports are taken from the OECD bilateral trade database. Trade flows are expressed in nominal US dollars, which we convert into Irish pounds using the annual average exchange rates[7]. We convert the data series into constant prices using the Irish export goods price index (2000=100) taken from the European Commission's AMECO database.

Figure 1 shows the evolution of Irish exports in constant prices to the euro area countries and to the non-euro area countries.

In comparison to their level in 1997 - before the adoption of the single currency - total Irish exports in constant prices were higher by 83.9 percent in 2004. While Irish exports to the euro area countries were higher by 92.8 percent, exports to the European countries which are not in the euro area[8] were only 45.5 percent higher. Exports from Ireland to non-euro area countries in the full OECD sample were higher by 91.6 percent.

[4] See Appendix A1 for the list of countries

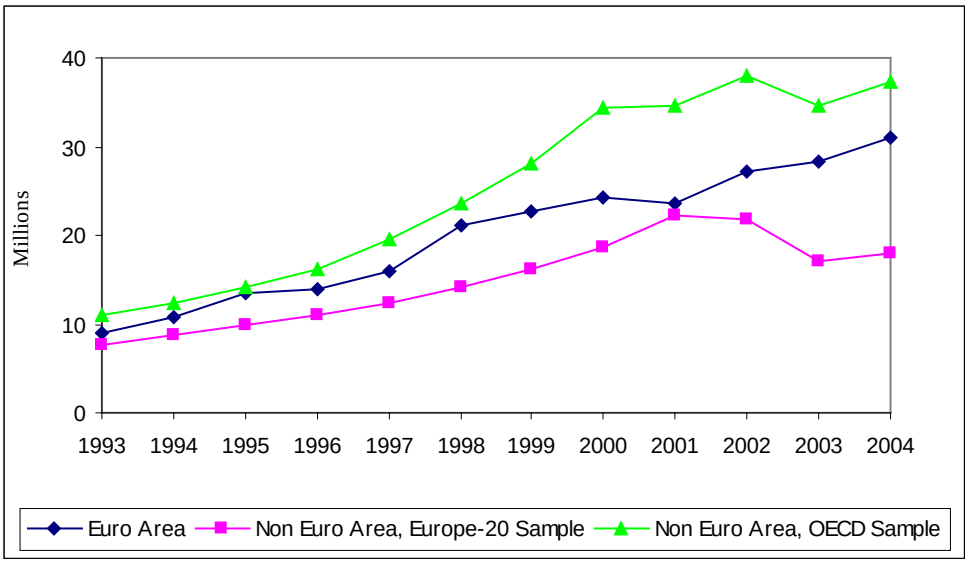
[5] Using a sample of countries with similar levels of economic development reduces the unobserved heterogeneity in the sample. See also Baldwin (2006).

[6] From 1993 onwards, statistics on intra-EU trade have been collected by VAT authorities instead of customs offices. Baldwin (2006) suggests that due VAT fraud data on intra-EU trade statistics collected in this way might not be comparable with the trade statistics collected before this change

[7] The annual average exchange rate is calculated as an average of the average monthly exchange rate in each year taken from the Economic and Social Research Institute (ESRI) databank.

[8] Denmark, Sweden, United Kingdom, Norway, Iceland, Switzerland, the Czech Republic, Hungary, Poland, the Slovak Republic.

Figure 1: Irish exports (constant prices) by country group destination, 1993-2004



4. Empirical Methodology and Econometric Issues

We first estimate the aggregate effect of the euro on the Irish exports to the euro area relative to the other trading partners. Second, we estimate time specific euro effects. Third, we identify average industry-specific euro effects.

Has the euro boosted the Irish exports to the euro area relative to exports to the other trading partners?

Our baseline model specification is an augmented gravity equation that explains Ireland's exports flows as a function of the gross domestic product (GDP) of the trading partner country[9] (a proxy of import demand in the partner country), total industry exports (a proxy for the supply capacity of Irish industries), country, industry and time fixed effects. In addition, we control for omitted trending variables specific to the pairs between Ireland and its trading partners, as suggested by Bun and Klassens (2007). Further, our innovation is to control for industry-specific time-varying omitted variables by adding an interacted term obtained by interacting the trend variable with an industry dummy.

Our baseline gravity model specification is as follows:

[9] The effect of the GDP of Ireland on Irish exports is captured by the time dummies

$$\ln X_{ie,kjt} = \alpha_0 + \alpha_1 \ln(GDP_{jt}) + \alpha_2 \ln(TX_{kt}) + \alpha_3 EURO_{jt} + \eta_{ie,j} + \gamma_k + \lambda_t + \delta_{ie,j} * t + + \varphi_k * t + \varepsilon_{kjt}$$

The dependant variable $X_{ie,kjt}$ is the natural log of exports in constant prices from sector k in Ireland to country *j* in year *t.* The first explanatory variable $\ln(GDP_{jt})$ is the natural log of the gross domestic product in country *j* in year *t.* The variable $\ln(TX_{kt})$ is the natural log of total Irish exports in sector *k* in year *t.* The variable of interest is $EURO_{jt}$, which is a binary variable equal to 1 from 1998 onwards for euro area countries and 0 otherwise. [10] It captures a permanent structural break in the volume of exports between Ireland and its euro country partners relative to the pre-euro period and relative to the volume of exports to other non-euro countries. If α_3 >0, this implies that the euro has led to an increase in the volume of exports from Ireland to its euro area country partners compared to the volume of exports during the pre-euro period and to the volume of exports to all other exporting partners included in the sample. $\eta_{ie,j}$ controls for all time-invariant determinants of exports (e.g. bilateral distance) between Ireland and country *j*. γ_k controls for all unobserved time-invariant industry characteristics that might affect industry's exports. λ_t captures time specific common shocks to country-pair export determinants such as the state of the world economy.

To account for country-specific omitted trending variables we add to the model a trend variable *t* and interact it with a dummy for Ireland's trading partners $\delta_{ie,j}$ to allow its coefficient to vary across countries. In addition, our innovation is to account for omitted trending variable bias across industries by interacting the trend with an industry dummy, $\varphi_k.t$.

We estimate the above model using a fixed effect estimator. The estimation results are shown in Table 1.

[10] Flam and Nordstrom (2003) show that the initial effects of the euro on exports can be identified in 1998. This is not unsurprising as uncertainty was removed in early 1998 as to which countries would enter into the Euro along with the fixing of the national currency conversion rates to the Euro.

Has the euro effect on exports varied over time?

To estimate time specific euro effects we add to the above baseline model interacted variables obtained by interacting the euro dummy and year dummies from 1999 onwards. The estimation results are shown in Table 2.

Has the euro effect been homogeneous across industries?

To answer this question we add to our model specification a set of interacted variables obtained by interacting the euro dummy variable with a dummy variable, IND_k , which is equal to one for industry *k* and zero otherwise. This interaction variable captures the effect of the euro on exports in industry *k* relative to the volume of exports in each industry during the pre-euro period to the euro area and to the volume of exports in each industry to all other partner countries that are outside the euro area. The estimates for industry-specific aggregate average euro effects are shown in Table 3.

Econometric Issues

As pointed out by Bun and Klassen (2007), as a result of entry and exit barriers due to sunk cost for example, past trade has an important influence on current trade. In other words, one would generally expect countries that trade with each other to continue trading with each other. It follows that the error term may be serially correlated. Indeed, the Wooldridge test for no first order autocorrelation rejects the null of no first order correlation.

Second, the error term may be correlated across panels. It is possible that a country shock may impact on all trade flows. The Peseran test of cross sectional independence rejects the null hypothesis that error term is cross sectionally independent.

To account for both serial correlation and cross sectional dependency, we estimate Driscoll Kraay standard errors.

5 Estimation Results

We estimate the baseline model discussed above using a fixed effect estimator for two distinct groups of trading partners: the full sample of 28 OECD countries; and the subgroup of 20 European countries (Europe-20)[11]. Our motivation for using the two different samples is to account for the possibility that the euro dummy might capture in part the effect of the Single Market Programme on the Irish exports to these European countries. Having implemented the Single Market Programme, all countries in the Europe-20 sample receive thus the same "treatment".

Aggregate average euro effects

Table 1 shows the estimates of our aggregate average euro effect. The estimated coefficient of the EURO dummy is not significantly different from zero. This result suggests that on average, *ceteris paribus*, the single currency has had no significant effect on the Irish exports to euro area countries relative to the rest of Ireland's trading partners in the sample. Similarly, for the European country sample we find that the euro effect on Irish export is insignificant.

Table 1. Aggregate average euro effects: Fixed effects estimates

	OECD Sample		**Europe-20 Sample**	
	Coefficient	Driscoll Kraay Std Errors	Coefficient	Driscoll Kraay Std Errors
Euro	-0.115	(0.137)	-0.126	(0.159)
GDP	1.005	(0.950)	0.833	(1.463)
Ln(TX)	0.090***	(0.025)	0.129***	(0.035)
Obs		7056		5040
Obs per group		588		420
R^2		0.1703		0.204

*** Significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. The equation includes, country, industry and time specific effects, country specific time trends, sector specific time trends.

[11] The euro area countries (Austria, Belgium-Luxembourg, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal, Spain), Denmark, Sweden, United Kingdom, the Czech Republic, Hungary, Iceland, Norway, Poland, the Slovak Republic, Switzerland.

Time specific euro effects

Figure 1 shows that the Irish exports to euro area countries have increased steadily since 2001. This suggests that the euro effect on Irish exports to the euro area countries might have been uneven across time. Thus, next we relax our assumption of the homogenous effect of the euro on exports over the period and estimate year specific euro effects. The results of this model specification are shown in Table 2.

Table 2. Aggregate time specific euro estimates

	OECD Sample		**Europe-20 Sample**	
	Coefficent	Driscoll Kraay Std Errors	Coefficent	Driscoll Kraay Std Errors
Euro*1998	0.075	(0.078)	0.082	(0.093)
Euro*1999	0.088	(0.095)	0.134	(0.114)
Euro*2000	0.211*	(0.120)	0.292*	(0.151)
Euro*2001	0.245*	(0.142)	0.427**	(0.178)
Euro*2002	0.366**	(0.164)	0.582***	(0.205)
Euro*2003	0.489***	(0.188)	0.694***	(0.233)
Euro*2004	0.813***	(0.212)	1.044***	(0.261)
GDP	1.02	(0.833)	0.423	(1.259)
ln (TX)	0.0904***	(0.025)	0.129***	(0.035)
Obs	7056		5040	
Obs per group	588		420	
R^2	0.1726		0.208	
Test of Joint Significance of time specific euro effects	F(7, 587) =2.68,Prob> F = 0.0098		F(7,419)=2.62, Prob> F =0.0117	

*** Significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. The equation includes, country, industry and time specific effects, country specific time trends, sector specific time trends.

The effect of the euro on exports to euro area countries relative to non-euro area countries appears positive and significantly different from zero since 2000 and it that has increased over time. It ranges from 23.5 percent in 2000 to 125.5 percent in 2004[12].

The estimation results based on the Europe-20 sample are quite similar. We find that the euro effect was not instant but appears to start in 2000 and has increased over time. When we compare the magnitude of the euro effect estimates across the samples

[12] The marginal effect of the euro on the Irish exports is equal to $(\exp^{(coefficient)} -1)*100$.

we find they are slightly higher in the Europe-20 sample. This is partly due to the inclusion of the US in the benchmark group in the full sample. The US accounts for a the large share of Irish exports which has risen rapidly from 8 per cent of total Irish real exports in 1993 to just over 20 per cent in 2004. The marginal euro effect ranges from 33.9 per cent in 2000 to 184 per cent in 2004.

We reject the null that the time specific euro effects are jointly equal to zero in both samples.

Industry specific average effects

As suggested above, analysis at the aggregate level may hide significant shifts in exporting activity at industry level arising out of the adoption of the euro. We now investigate whether the euro effect is heterogeneous across industries.

Table 3 shows the industry specific estimates of average euro effects for both samples. Based on the OECD sample we find a positive and significant euro effect on exports in Chemicals (excluding pharmaceuticals); Other non-metallic mineral products; Office, accounting and computing machinery; Radio, television and communication equipment. We find that the euro has led to higher exports to non euro area countries relative to euro area countries in Iron and steel; Non-ferrous metals; Motor vehicles, trailers and semi-trailers; Textiles, textile products, leather and footwear; Rubber and plastics products.

When we compare these results to those based on the Europe-20 sample we notice that the single currency has boosted Irish exports to euro area countries in the same sectors except for Other non-metallic mineral products. In addition, we find that the euro has led to higher exports to non-euro area countries relative to euro area countries in Wood and products of wood and cork, while the effect of the euro on exports in the Iron and steel; Non-ferrous metals sectors is no longer significant.

We reject the null that the industry specific euro effects are jointly equal to zero in both samples.

Table 3. Sector specific estimates: Fixed effects estimates

	OECD Sample		**Europe-20 Sample**	
Industry	Coefficient	Driscoll Kraay std error	Coefficient	Driscoll Kraay std error
Chemicals (excluding pharmaceuticals)	0.315***	(0.087)	0.236*	(0.133)
Other non-metallic mineral products	0.425**	(0.202)	0.28	(0.223)
Office, accounting and computing machinery	0.269***	(0.096)	0.267*	(0.138)
Radio, television and communication equipment	0.330***	(0.108)	0.418***	(0.135)
Motor vehicles, trailers and semi-trailers	-0.772**	(0.335)	-0.886**	(0.382)
Non-ferrous metals	-0.516*	(0.260)	-0.578**	(0.458)
Rubber and plastics products	-0.701*	(0.267)	-0.921***	(0.27)
Iron and steel	-1.077*	(0.600)	-0.421	(0.203)
Textiles, textile products, leather and footwear	-0.304*	(0.179)	-0.331	(0.33)
Wood and products of wood and cork	-0.435	(0.284)	-0.716**	(0.274)
Agriculture, hunting, forestry and fishing	-0.020	(0.271)	-.080	(0.324)
Mining and quarrying	-0.114	(0.307)	0.029	(0.225)
Food products, beverages and tobacco	-0.039	(0.182)	-0.062	(0.232)
Pulp, paper, paper products, printing and publishing	0.098	(0.099)	0.115	(0.19)
Coke, refined petroleum products and nuclear fuel	-0.505	(0.368)	-0.269	(0.324)
Pharmaceuticals	0.158	(0.148)	-0.055	(0.147)
Fabricated metal products (except machinery and equipment)	-0.135	(0.273)	-0.144	(0.286)
Medical, precision and optical instruments	-0.177	(0.182)	-0.064	(0.209)
Aircraft and spacecraft	-0.013	(0.327)	-0.165	(0.292)
Electricity, gas and water supply	0.236	(0.201)	0.263	(0.271)
Scrap metal	0.555	(0.508)	0.441	(0.548)
GDP	1.005	(0.950)	0.824	1.498
ln(TX)	0.097***	(0.240)	0.091**	.037
Obs		7056		5040
Obs per group		588		420
R^2		0.1791		0.2137
Test of Joint Significance of industry specific euro effects	F(21,587) =2.42,Prob > F =0.0004		F(21,419) = 2.03, Prob > F = 0.0048	

*** Significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. The equation includes, country, industry and time specific effects, country specific time trends, sector specific time trends.

The marginal effects of the euro on Irish exports in each industry with a significant coefficient are shown in Table 4.

Table 4. The industry-specific marginal effect of the euro on exports to the euro area

	OECD Sample	Europe-20 Sample
Chemicals (excluding pharmaceuticals)	37.03	26.62
Other non-metallic mineral products	52.96	32.31
Office, accounting and computing machinery	30.87	30.6
Radio, television and communication equipment	39.10	51.89
Motor vehicles, trailers and semi-trailers	-53.79	-58.77
Non-ferrous metals	-40.31	-43.9
Rubber and plastics products	-50.39	-60.19
Iron and steel	-65.94	-34.36
Textiles, textile products, leather and footwear	-26.21	-28.18
Wood and products of wood and cork	-35.27	-51.13
Agriculture, hunting, forestry and fishing	-1.98	-7.69
Mining and quarrying	-10.77	2.94
Food products, beverages and tobacco	-3.82	-6.01
Pulp, paper, paper products, printing and publishing	10.3	12.19
Coke, refined petroleum products and nuclear fuel	-39.65	-23.59
Pharmaceuticals	17.12	-5.35
Fabricated metal products (except machinery and equipment)	-12.63	-13.41
Medical, precision and optical instruments	-16.22	-6.2
Aircraft and spacecraft	-1.29	-15.21
Electricity, gas and water supply	26.62	30.08
Scrap metal	74.19	55.43

Focusing on the industries where the euro boosted Irish exports to euro area countries relative to non-euro area countries, we find that the effect ranges between 37 to 52 per cent. In those industries in which the euro boosted exports to non-euro area countries the effect ranges from 26 to 65 per cent. It is clear that the effect of the euro has differed across industries.

For the Europe-20 sample the marginal effects of the euro on Irish exports are similar, ranging from 26 to 52 per cent in those industries in which the euro boosted trade to Euro area. In those industries in which the euro boosted exports to non-euro area countries the effect ranges from 43 to 61 per cent.

Our results across the two samples are quite similar. As we control for the effect of the single market in the European sample this suggests that the potential bias in our euro estimates due to single market is negligible in our OECD sample.

What explains the industry-specific euro trade effect?

As discussed in Section 2, previous theoretical and empirical research on the impact of the euro on trade has shown that sectors characterised by imperfect competition and increasing returns to scale, are likely to benefit more from the adoption of the euro in comparison to the other industries.

We compare the industries in which we obtain statistically significant euro effects to the classification of manufacturing industries with scale economies suggested by Pratten (1988). Appendix A2 shows a ranking of industries based on the size of economies of scale. Based on the OECD sample we find that 7 out of the 9 industries for which we find a significant effect of the euro on exports are characterised as moderately or substantially scale intensive. In the Europe-20 sample 6 of the 7 industries exhibit moderate to substantial economies of scale.

These results are consistent with Flam and Nordström (2003) and Baldwin, Skudelny and Taglioni (2005). It is likely that the reduction of transaction costs due to the single currency have benefited these industries. Furthermore, the reduction of trade costs benefited goods that became more competitive in markets outside the euro area as well.

6. Summary and Conclusions

We use a panel of cross-country and industry data over the period 1993-2004 and estimate the euro effect on Irish exports to its trading partners. We estimate an augmented gravity panel model which allows us to control for unobserved country and industry heterogeneity. Our innovation is to account in addition for country and industry-specific omitted trending variables bias. We estimate average and time specific aggregate effects as well as industry specific euro effects.

Our results suggest that on average, *ceteris paribus*, the single currency has had no significant effect on the Irish exports to euro area countries relative to the rest of the Irish trading partners. This result is consistent with Dwane, Lane and McIndoe (2006). Furthermore, we find that the impact of the euro on exports to euro area countries relative to non-euro area countries is significant and positive from 2000 onwards and that this effect has increased over time.

Our industry specific estimates indicate that the euro effects have been heterogeneous across industries. We find a positive and significant euro effect on exports in Chemicals (excluding pharmaceuticals); Other non-metallic mineral products; Office, accounting and computing machinery; Radio, television and communication equipment. We find that the euro has led to higher exports to the non-euro area countries relative to euro area countries in Iron and steel; Non-ferrous metals; Motor vehicles, trailers and semi-trailers; Textiles, textile products, leather and footwear; Rubber and plastics products.

The majority of these industries are characterised by increasing returns to scale. These results are consistent with Flam and Nordström (2003) and Baldwin, Skudelny and Taglioni (2005). Furthermore, the reduction of trade costs benefited goods that became more competitive in markets outside the euro area as well.

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Appendix A1

List of countries

Euro Area Countries	Austria Belgium-Luxembourg Finland France Germany Greece Italy Netherlands Portugal Spain
Non Euro Area countries	Sweden Denmark UK US Australia Canada Czech Rep Hungary Iceland Japan Korea Mexico New Zealand Norway Poland Slovak Rep Switzerland Turkey

Appendix A2

Manufacturing industries ranked by size of economies of scale (EOS)

Industry	**Remarks**
Motor Vehicles	Very substantial EOS in production and in development
Other means of transport	Variable EOS, very substantial in aircraft
Chemical industry	Substantial EOS in production processes, in some segments R&D is an important source of EOS
Man-made Fibres	Substantial EOS in general
Metals	Substantial EOS in general
Office machinery	Substantial EOS at product level
Mechanical engineering	Substantial production EOS
Electrical and instrument engineering	Substantial production EOS
Paper printing and publishing	Substantial EOS in paper mills and printing
Non-metallic mineral products	Substantial EOS
Metal articles; Rubber plastics; Drink and tobacco; Food ; Other manufacturing; Textile industry Timber and wood; Footwear and clothing; Leather and leather goods	Moderate to small EOS

Source **:** Pratten (1988)

Year	Number	Title / Author(s) ESRI Authors / Co-authors *Italicised*
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The International Study Group on Exports and Productivity

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Joe O'Doherty, *Seán Lyons* and *Richard S.J. Tol*

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