# The propensity to exports and the membership in the Economic and Monetary Union of Central and Eastern European Countries: the micro-econometric firm level analysis

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with contribution of Anna Michałek
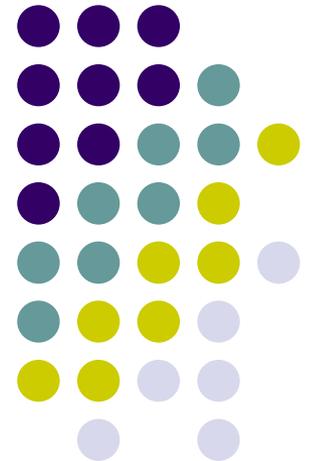
Motivation
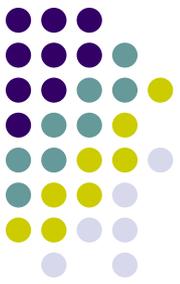
Monetary Union - potential benefits:

- Reduces transaction costs in trade transactions;
- Eliminates exchange rate volatility (risk):
  - Especially important for less developed countries, where financial markets are less developed;
  - Important for the countries having high concentration of trade with their partners;
  - CEE (Central and East European Countries): the share of Germany in their total trade is close to 1/3;
- Increased volume of trade, in line with standard trade theory, increases specialization and leads to welfare gains
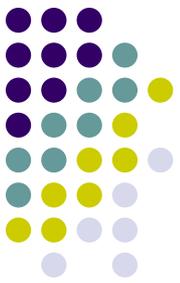
Goal of the analysis

- According to many empirical studies the trade among the members of the EMU has grown on average by 10–15 % due to the use of a common currency
- However, these studies did not take into account the latest EMU enlargements and the impact of 2008-2009 economic crisis.
- ➔ the aim of this paper is to evaluate the *ex post* effects of two new EU member countries' (Slovakia and Slovenia) accession to the EMU on their exports.
- In contrast to the previous studies, that were mostly devoted to the evaluation of the effects of the creation of the Eurozone,
- => we study the implications of accession of new CEE countries (i.e. Slovenia and Slovakia) to the already existing and functioning EMU, using firm level data

# Implications of Euro adoption: analyzing firm-level data
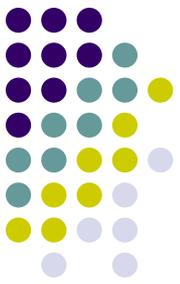
- There are only few studies analyzing trade implications of euro adoption for firms' exports of "old EU" members.

- There are almost no studies for „new EU members"

- In our study we use the firm level data basis set up by the EBRD and the World Bank for Central and Eastern European (CEE) countries.

- Using the probit model we analyze whether the accession of Slovenia and Slovakia to the Eurozone did increase the firms' propensity to export in those countries.

# Sequence of accession of the CEE countries to the Eurozone
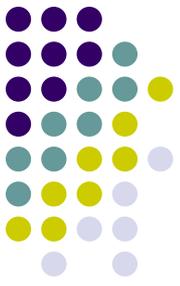
- Slovenia January 2007.

- Cyprus and Malta January 2008

- Slovakia in January 2009,

- Estonia in January 2011

- Latvia is expected to do it in 2014.

- Other countries from CEE such as Bulgaria, the Czech Republic, Hungary, Poland and Romania, that joined the EU, despite their declarations to adopt the euro have not joined the ERM II so far.

  - Bulgaria, although it did not officially enter the ERM II, pegged its currency to the euro since its creation in 1999

- ➔ It is not possible to analyze ex post direct effects of the euro adoption for trade flows of these countries.

Literature review: based on gravity model: A. Rose

- The seminal contribution by Rose (2000), Glick and Rose (2002) and Rose (2002).
- Two main effects of the adoption of a common currency:
  - the effects associated with the elimination of the exchange rate volatility;
  - the pure monetary effect associated with the use of a single currency.
- Rose included several small countries that adopted currencies of larger countries.
- A statistically significant negative effect of exchange rate variability on bilateral trade flows.
- Rose: participation in the monetary union may increase trade between its member countries even <u>threefold.</u>
- Rose provoked heated debate and other studies.

Other well known studies, based on gravity model
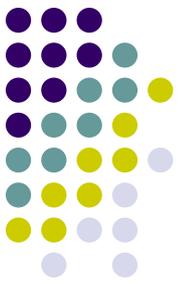
- Barr, Breedon & Miles (2003) tried to solve endogeneity problem using instrumental variables:
  - Estimated results for EU and EFTA countries;
  - Their estimates were much lower.

- Micco, Stein & Ordonez (2003):
  - Sample of OECD countries;
  - EMU increases trade "only" by 6 percent .

- Flam i Nordstrom (2006):
  - 8 percent increase of trade for 1998-2002 (in comparison to 1989-97);
  - And differentiated sectoral results ➔

- Baldwin (2006) summarizes these studies and specifically points his critique to possible estimation biases.

Early forecasts for CEE
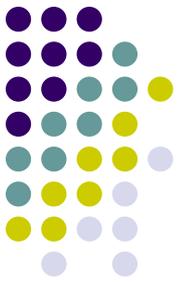
- *Maliszewska (*2004) in her ex ante forecast shows that relatively closed economies such as Poland, Latvia and Lithuania would experience a decrease in their exports while more open economies such as the Czech Republic, Estonia and Slovakia would experience an increase in their exports.

- In another ex ante study Belke and Spies (2008) formulate completely different conclusions. The authors included in their analysis all the OECD and the CEE countries during the period 1992-2004.

  - They estimated a gravity model based on the assumption of the complete specialization using the Hausman-Taylor approach that allowed them to endogenize the EMU variable.

  - In their study the estimated parameter on the EMU variable also turned out to be positive and statistically significant.

Our first *ex-ante* study based on gravity (Cieslik, Michalek & Mycielski, 2009)
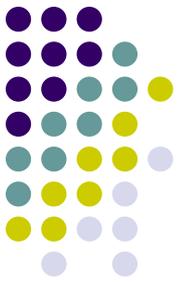
- In another study by Cieślik, Michałek and Mycielski (2009) analyzed the *ex ante* trade effects of Poland joining the Eurozone using a generalized gravity model.
- They employed panel data for the present members of the Eurozone and almost 100 other countries trading with the Eurozone countries during the period of 1993–2006.
- Their forecast consisted of two elements:
  - the effect of exchange rate stabilization against the euro, making use of data for the group of CEE countries which pegged their currency to the euro.
  - The second component involved the elimination of exchange rate fluctuations effect and the impact of trade policy changes related to joining the Eurozone.
- Their results suggested that just after joining the Eurozone, Polish exports should increase by ca. 12 per cent, but the positive effect will gradually disappear over time.

The early ex post study for CEE
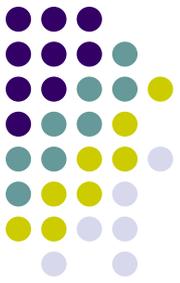
- The *ex post* evaluation of trade effects of euro adoption in the CE countries are rare

- On of the rare examples is the study by Aristovnik and Meze (2009) who used a time series approach to study the ex post effect of the EMU creation for Slovenian trade.

  - They argued that the trade benefits of the entry of new countries into the EMU would thus not be the same as the benefits of the initial formation of the EMU in the nineties.

Our second ex-post, based on gravity and devoted to CEE members: Cieslik, Michalek & Mycieslki (2012)
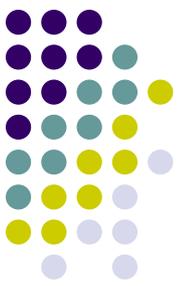
We studied trade implications of CEE's accession to the EMU:

1. We estimated the *ex post* effects of the euro adoption for the EMU members using a generalized gravity model:

   - control for trade theory, monetary and trade policy variables

2. We estimated the effects for Slovenia and Slovakia jointly and separately the FE, RE and Hausman-Taylor estimators;

# Conclusions from Cieślik, Michałek & Mycielski (2012)
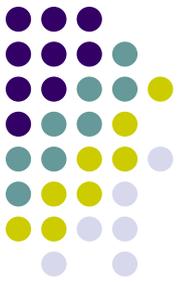
- Our results show that the EMU accession and membership of these countries <u>did not stimulate</u> their bilateral exports.

- These results were in contrast to the majority of studies analyzing *ex post* trade implications for the old member countries.

- We observed only that the <u>reduction in volatility</u> expanded Slovenian exports & had no impact on the exports of Slovakia.

- This surprising result might be due to the financial and economic crisis of 2008-2009.

- Now we are testing the same hypothesis in another way by using firm level-data, which has some advantages

Aggregate trade flows vs. firm level analysis
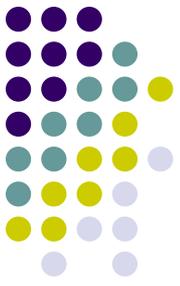
- The results are based on the gravity model and aggregate trade data can mask two important microeconomic gains.

- 1. euro may increase the availability of differentiated varieties of both final and intermediate products.
  - In addition to this it may also help existing exporters to increase the number of products exported and the number of destinations served.

- 2. value of aggregate exports may be affected by the increased competition ➔ the compression of prices.
  - Enhanced transparency and lower transaction costs ➔ fall in markups and prices across the euro area.

M. Melitz (2003): a new strand in the trade theory
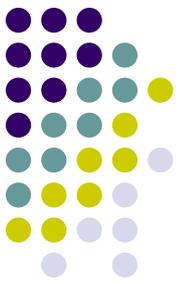
- Empirical studies reveal that only a small fraction of the most productive firms account for the majority of exports; most firms do not export at all.

- Melitz (2003) relaxed the key assumption of firms' symmetry in Krugman's (1980) monopolistic competition model and introduced firms' heterogeneity in terms of labour productivity.

- ➔ new literature focuses on firms' heterogeneity in terms of productivity and its impact on firms' export performance

The Melitz model and exports of firms:
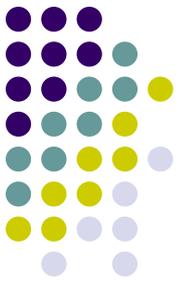
- There is a sunk "invention cost"; if the firm enters the domestic market, it has to pay a <u>fixed entry cost</u>.
- if it wishes to export, it has to pay the additional fixed cost of <u>entering the export</u> market.
- ➔ Depending on the level of productivity, firm will either produce or exit,
  - if it produces, it will either produce only for the domestic market or will be an exporter.
- Firms with the lowest marginal costs will find it profitable to pay the entry cost for both the domestic and the export market,
  - while firms with intermediate productivity levels will find it profitable to pay only the entry cost for the domestic market.
- ➔ Thus <u>only the most productive firms become exporters.</u>

Melitz (2003) Different equilibria
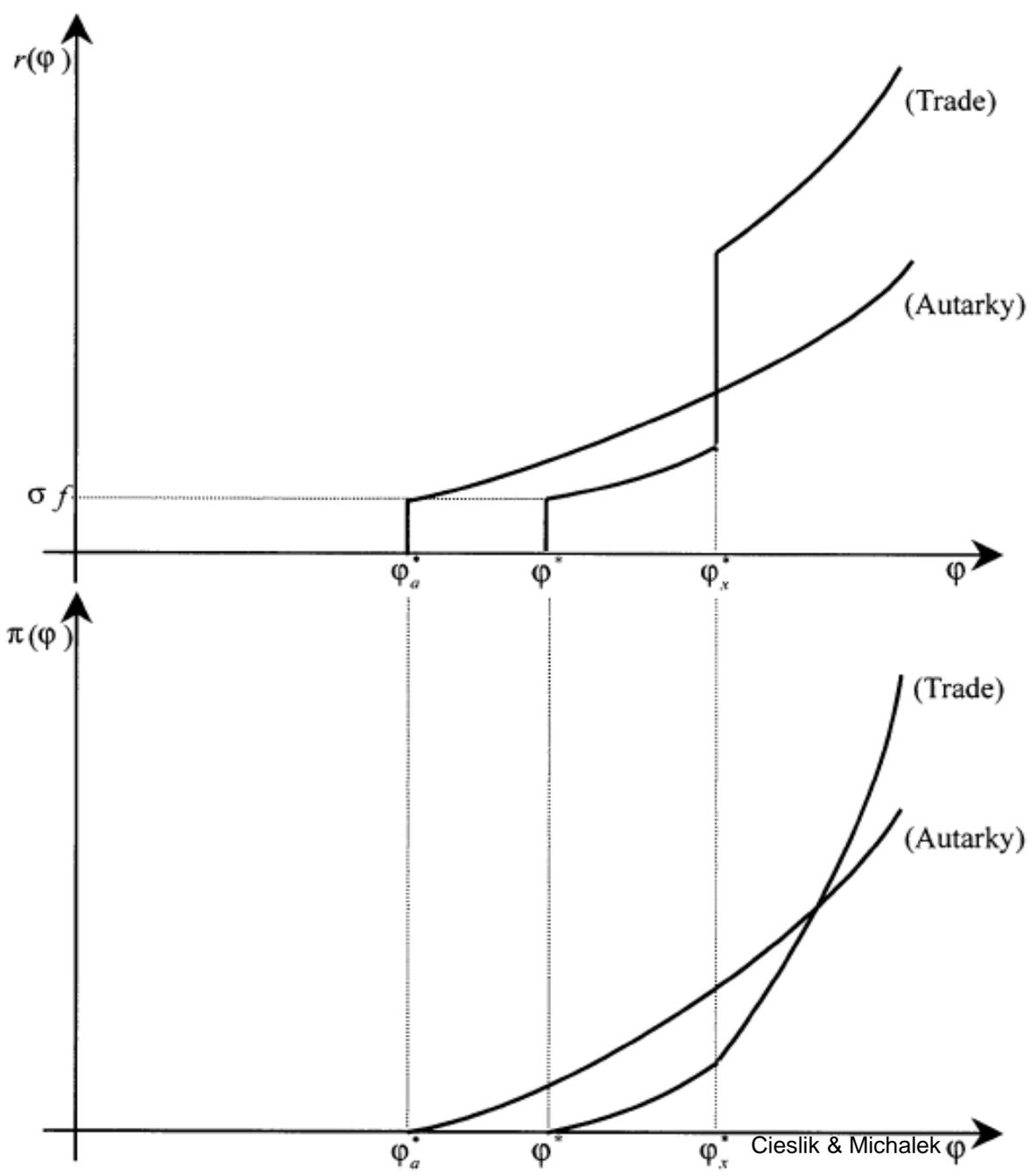
Notaton used:
f >0 fixed cost
$\varphi > 0$: productivity level
$\varphi_A, \varphi^*, \varphi_x$: cut off productivity levels
for non-entry, domestic, and export markets.
$r(\varphi)$ <u>revenue</u> $\pi(\varphi)$ profits

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16

Determinants of extensive margins by countries (EFIGE)

	(1) FRA	(2) GER	(3) ITA	(4) SPA	(5) UK
Log(Employment)	0.075***	0.092***	0.071***	0.077***	0.056***
	[0.009]	[0.010]	[0.011]	[0.012]	[0.012]
Log(Age)	0.088***	0.021*	0.073***	0.122***	0.040***
	[0.010]	[0.011]	[0.011]	[0.014]	[0.012]
Group	0.023	0.046	-0.068	0.046	0.048
	[0.043]	[0.063]	[0.069]	[0.080]	[0.055]
Foreign Own	0.129***	0.084	0.130**	0.098	0.072
	[0.042]	[0.056]	[0.058]	[0.077]	[0.055]
Graduate share	0.005***	0.002**	0.002***	0.001	0.003***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Product Innov	0.123***	0.160***	0.160***	0.131***	0.191***
	[0.017]	[0.020]	[0.017]	[0.019]	[0.023]
RD share	0.003**	0.006***	0.003***	0.005***	0.004**
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Bank Debt share	0.000**	0.000	0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

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Possible emprical applications of the Melitz model
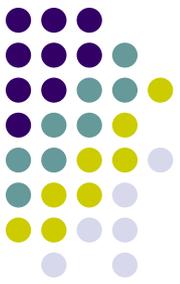
- The Melitz (2003) model implies important microeconomic effects of reduction in transaction costs.
    - Reduction of transaction costs ➔ significant changes within sectors: growth of the most efficient firms, a richer variety of goods, tougher competition & consequently, exit of the least efficient firms.
- In particular, it can be used to analyze the effects of the adoption of the common currency .
- In the light of this model it might be argued that the adoption of the common currency lowers trade costs and can positively affect the firms' export performance.

Firm specific factors having positive impact on their exports:
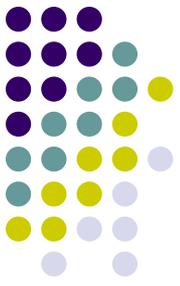
- Larger size of the firms (in terms of employment)
- „Older" firm (having more experience in the sector)
- Foreign owned firms (mostly affiliates of large MNE)
- Larger share of human capital (share of graduates in total employment)
- Larger innovative potential
- Larger spending on Research & Development (R&D)

Firms' specific factors having positive impact on their exports:
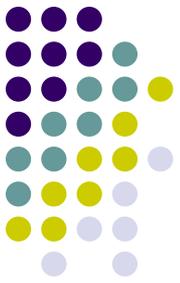
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The implications of the accession to the Eurozone by „old member" states
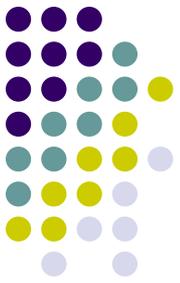
- There are only few empirical studies analzying this issue;
- Fontagne et al. (2009) analyze the implications of the euro adoption for Belgian and Franch firms in the period of 1998-2003.
- They compute the number of exporters on each market, the average number of products exported by firm on each market, and the average value of exports by product.
- They distinguish among four groups of trade flows:
  - Flows between euro-area countries;
  - Flows between a euro-area and a non-euro area country;
  - Flows between a non-euro area and a euro-area country;
  - Flows from non-euro area countries

Trade flows analazyed by Fontagne et al. (2009): counterfactual world

- Fontagne et al. (2009) distinguish among four groups of trade flows:

  - Flows between euro-area countries;

  - Flows between a euro-area and a non-euro area country;

  - Flows between a non-euro area and a euro-area country;

  - Flows from non-euro area countries.

- They compute the intensive and extensive margins of exports distinguishing among different types of destination

Extensive and intensive margins of exports
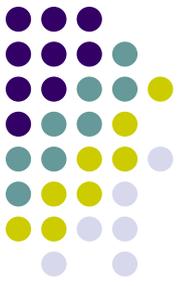
- They compute the intensive and extensive margins of exports, distinguishing among different destinations
    - The extensive margin is defined as the number of varieties exported (or the number of firms exporting)
    - The intensive margin as the average value of exports per variety (or the amount of exports by exporting firm).
- Conclusions of Fontagne et al. (2009) regarding the bevaviour of French & Belgian firms:
    - changes in the total value of euro-area exports were driven mostly by the extensive margin (the number of exporting firms, products exported and countries served)
    - in the case of non-European destinations mostly driven by the intensive margin (the average value of exports per product and exporter across destinations).

Our emprircal approach: simple probit model
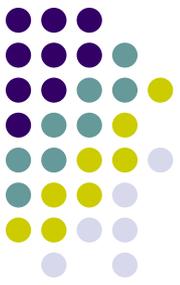
- Let Y_i^* be our dependent variable indicating the export status of firm i. Instead of observing the volume of exports, we observe only a binary variable Y_i indicating the sign of Y_i^*. Our dependent variable follows a binary distribution and takes the value 1 when the firm exports and 0 otherwise:

- $$Y_t = \begin{cases} 1 & if \ Y_i^* > 0 \\ 0 & if \ Y_i^* = 0 \end{cases}$$

- Moreover, we assume that $Y_i^* = X_i \theta + \varepsilon_i$, where X_i is a vector of explanatory variables affecting exports, θ is the vector of parameters on these variables that needs to be estimated and ε_i is an error term which is assumed to be normally distributed with a zero mean. Hence, the probability that a firm exports can be written as:

- $Pr(Y_i = 1 | X_i) = (\beta + X_i \theta)$

Data base used in our analysis
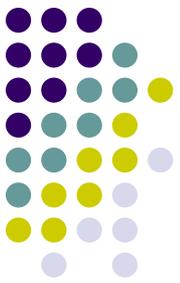
- Analysis is based on the Business Environment and Enterprise Performance Survey (BEEPS) data base collected by the World Bank and the EBRD for the post-communist countries located in Europe and Central Asia (*ECA*) and Turkey.

- The surveys covered the manufacturing and services sectors and are representative of the variety of firms according to sector and location within each country.

- The data was collected for the years 2002, 2005, 2009 and 2010. In all countries where a reliable sample frame was available

- the sample was selected using stratified random sampling.

- However, only a small proportion of firms was sampled every year => no chance of using panel data analysis.

Explanatory variables: Firm characteristics
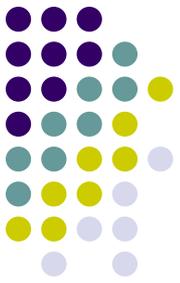
Variable Name	BEEP input Name	Description
lprod	lprod=log(lprod) prod=exchange rate*(d2/l1)	Logarithm of productivity expressed as total amount of annual sales per full time employee. The annual sales are converted from local currencies to USD.
Firm_size	l1	Logarithm of no. permanent, full-time employees of this firm at end of last fiscal year
age		Logarithm of number of years since start of operations
luniv	luniv=log(ECAq69)	Logarithm of % employees at end of fiscal year with a university degree.
lRaD	RaD=(ECAo4/d2)*100 lRaD=log(RaD)	Logarithm of % of total annual sales spent on research and development.
foreign_tech	e6	The use of technology licensed from a foreign-owned company
foreign_cap	b2b	Shares in capital of private foreign individuals, companies or organizations.

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# Additional country characteristics: the role of EMU membership
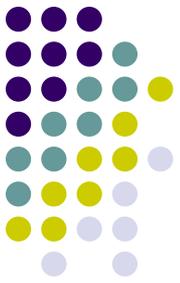
- In addition to firm characteristics we also included the following variables reflecting country characteristics :

- The EMU membership variable (dummy variable)

- the EU membership: in order to distinguish „pure" EMU effect

- The size of the domestic market (level of GDP in current US)

- level of development, proxied by the level of GDP per capita (expressed also in current US dollars).
  - Those variables are very frequently used in gravity models.
  - The expected sign of GDP level is negative,
  - the GDP pc should have positive sign (more developed countries are more open)
  - In our estimations we used both variables in logarithms.

- Finally, we also control for individual time and sectoral effects.

Our results of estimations
## (standard errors in parentheses)

VARIABLES	(1) no GDP	(2) GDP	(3) GDP - year	(4) GDP - year -sector
lprod	0.0128***	0.00581	0.00747	0.0102**
	(0.00463)	(0.00490)	(0.00496)	(0.00410)
firm_size	0.285***	0.288***	0.259***	0.259***
	(0.0136)	(0.0138)	(0.0142)	(0.0120)
age	0.00304***	0.00221**	0.00327***	0.00279***
	(0.00105)	(0.00107)	(0.00108)	(0.000928)
foreign_cap	0.00734***	0.00738***	0.00798***	0.00799***
	(0.000733)	(0.000743)	(0.000750)	(0.000611)
lRaD	0.0701***	0.0724***	0.0741***	0.0702***
	(0.0216)	(0.0218)	(0.0221)	(0.0172)
luniv	0.0498***	0.0562***	0.0591***	0.0634***
	(0.00760)	(0.00771)	(0.00782)	(0.00762)
EU	0.492***	0.0541	0.275***	0.242***
	(0.0405)	(0.0539)	(0.0575)	(0.0507)
EMU	1.234***	0.833***	0.460*	0.494*
	(0.245)	(0.250)	(0.257)	(0.263)
lgdp		-0.120***	-0.147***	-0.148***
		(0.0163)	(0.0167)	(0.0143)
lgdp_per_capita		0.449***	0.363***	0.390***
		(0.0361)	(0.0368)	(0.0272)

Our results: part II
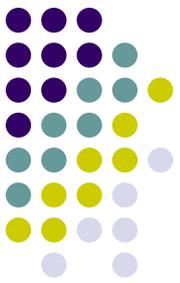
d_2005			-0.562***	-0.249***
			(0.0715)	(0.0468)
d_2008			0.563***	0.571***
			(0.106)	(0.108)
d_other_manuf				0.415***
				(0.0808)
d_food				-0.0466
				(0.124)
d_textiles				0.302**
				(0.141)
d_electro_IT				0.461
				(0.286)
d_construc				1.157
				(0.707)
d_wsale_retail				0.404
				(0.304)
d_hotel_trans				-1.048
				(0.820)
foreign_tech	0.674***	0.531***	0.0790	
	(0.0838)	(0.0854)	(0.0955)	
Constant	-2.132***	-2.680***	-0.868**	-1.414***
	(0.0884)	(0.332)	(0.368)	(0.293)
Observations	5,932	5,932	5,932	7,508
Log likelihood	-2961	-2879	-2804	-3696
Pseudo R2	0.179	0.202	0.223	0.212

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Conclusions
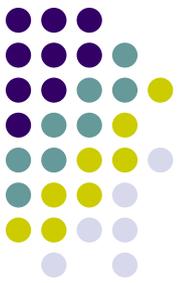
- Our results demonstrated that the EMU membership positively affects the probability of exporting.

- ➔ firms from Slovenia and Slovakia after the accession to the Eurozone reveal a higher propensity to export.

  - Moreover, the EU membership is also positively related to the probability of exporting.

  - The estimated parameters on our control variables such as productivity, the size and age of the firm and the stock of human capital, foreign ownership and technology were in line with the results of previous empirical studies based on the Melitz (2003) model.

  - We controlled the results for market size & level of development

  - Finally, we controlled for both individual time and sectoral effects.

Limited comparability of the results based on aggregate & firm level data
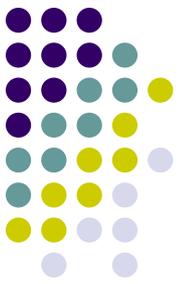
- The result concerning the significance of the EMU membership is different from our previous estimations based on the aggregate trade flows.

- However, these two sets of empirical results are not mutually exclusive.
  - The results based on the aggregate data may not properly reflect microeconomic gains as the value of aggregate exports may be affected by the increased competition resulting in the compression of prices.
  - The estimations based on the aggregate data can mask gains resulting from changes in extensive and intensive margins.