Standardization union effects: the case of EU enlargement

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Abstract:

The analysis of trade policy shows growing interest in various types of "standards". While technical regulations and standards are introduced to protect the interest of consumers, they can also act as technical barriers to trade (TBT), as foreign suppliers complying with national regulations might be required to bear certain costs of adjustment to the new regime.

Recent literature focused on the concept of standards and concluded that shared standards promote trade. We instead set our attention to technical regulations of the European Union and concentrate on their effects on trade costs. The analysis is inspired by Gandal and Shy's (2001) cost reducing standardization union theory.

This paper summarizes results of research undertaken within a larger product assessing importance of technical barriers to trade for new EU members. The recent empirical study by Hagemejer (2005), based on detailed trade data of the EU. He has shown that in sectors where the EU technical regulations are most complicated and require costly adaptation, the trade within EU is booming. He argues that the trade between EU members is more concentrated within the high-TBT products, while the imports from outside are focused on the low-TBT or no-TBT products. Thus, EU technical regulations might in fact be trade diverting if the difference in productivity between intra and extra-EU partners is large.

In this context we analyze the pattern of new members' exports to the "old" EU. We calculate the trade coverage of various standardisation approaches and analyze the comparative advantage structure of the new EU members. We demonstrate that the structure of TBT's affecting exports from new EU members is slowly converging with the one that characterizes intra-EU trade. Therefore, we expect that CEEC's countries will benefit from applying common technical regulations of the EU after accession. In the last section of our paper we report the results of questionnaire-based research made among Polish companies in December of 2004, i.e. after the Eastern enlargement. It seems that the adjustment costs were moderate and the adaptation process to new technical regulations is already completed. Therefore, one can expected welfare gains for new members of the EU. We perform a CGE simulation using a GTAP model to assess these gains.

Elements of standardization union theory

A well known theoretical model aiming at analyzing the effects of common standardization policy has been elaborated by Gandal and Shy (2001).[2] The authors develop the basic three-country, three-firm, and three horizontally differentiated goods model. For the sake of

[1] The background research for this paper was co-financed by the Polish State Committee for Scientific Research and FEMISE network, financed by the European Commission. We used background materials and some conclusions from FEM 22-03 (2005) report.

[2] The authors do not distinguish between compulsory technical regulations and non-compulsory standards. They describe standards as they were compulsory. So in fact we should talk about technical regulations' union.

simplicity they assume that all varieties are produced with the same unit cost (equal to zero). But producers have to face the unit conversion (compliance) cost of a new compulsory standard (technical regulation). The utility of an arbitrary consumer, based on Salop approach, depends mainly on price and on index measuring how close a given variety to the ideal model is. The consumers can benefit from network effects, while producers do not.[3]

In the model the difference between these two effects is important. In the case of conversion costs, nonrecognition increases the market share and profits of the domestic firm and reduces the market share and profits of the foreign firms relative to the case in which foreign standards are recognized. In the network effects case, nonrecognition of foreign standards has no effect on prices, market shares, or profits, but has impact on consumers' utility.

In this framework Gandal and Shy analyze the efficiency of governmental policy. When government policy is limited to either recognizing all foreign standards or not recognizing any foreign standard, recognition is always the outcome.

Initially, authors examine two extreme cases: in the first one, they assume that there are no network effects and conversion costs are high. In this setting, when governments do not recognize foreign standards, foreign firms must incur a compliance cost in order be permitted to sell in the domestic country. In the second case, they assume the network effects are large while conversion costs are non-existent (or negligible).

On this basis Gandal and Shy analyze prerequisites of creating the standardization union. They prove that in the case in which there are no network effects, it is profitable for two of the countries to form a union, when the conversion costs are moderate or large. The formation of a standardization union will cause some consumers in member countries to switch from the third country's good to a brand produced by a member country. Thus, a formation of the union will increase trade between member countries, whereas trade between members and the nonmember will decrease. Therefore, in classic terminology, the formation of a standardization union will cause trade diversion, and therefore will reduce aggregate world welfare, since with the absence of a union, countries will choose to mutually recognize all standards.

In the reverse case in which there are positive network effects, and no conversion costs, all countries mutually recognize all (obligatory) standards and have no incentives to form

[3] The latter assumption is not very realistic, because producers may also benefit from information value provided by standard or from economies of scale.

standardization unions. In the more realistic setting in which there are both conversion costs and network effects, the profitability of a standardization union will depend on the relative magnitudes of the two effects. The work of Gandal and Shy suggests that strong network effects will reduce the likelihood of standardization unions which divert trade and reduce world welfare.

The last conclusion is qualified. They point out that standardization unions are not always welfare reducing. In an earlier version of the presented paper, they showed that when standardization conversion costs are extremely large, the nonrecognition of foreign brands eliminates foreign products from domestic market. In this case a formation of the union will create new trade between the union countries.[4] Thus in some instances, a formation of a standardization union may increase world welfare.

Thus, we may conclude that work of Gandal and Shy has important theoretical implications for explaining effects of the standardization policy of the European Union. It may also be useful in better understanding the economic position of exporters from new member states.

First, it provides an explanation why uniform technical regulations applied by the EU may provoke trade diversion and restrict imports from third countries. Second, it explains why protective effect may be more powerful in some sectors (like food industry) in which the compliance costs are relatively high, whereas network effects are probably close to zero. On the other hand the restrictive effect of technical regulations in sectors exhibiting substantial network effects (like household electronics or electric equipment) might not exist or be only very limited. Third, it provides explanation why CEEC countries, having previously quite distinct system of technical regulations, limiting the foreign competition, might benefit from the accession to the EU. It could be interpreted as a case for trade creation in the standardization union. In our paper we will try to empirically verify some of these hypotheses.

Approaches to the harmonization policy in the EU

Common standardization policy leads to establishment of common technical regulations and standards. The European Union defines technical barrier to trade as a situation when a producer from one Member State who wants to sell his/her product in another Member State must meet different technical regulations (or standards). A situation when a product needs

[4] The concept of trade creation and diversion is used here in a traditional Vinerian terminology.

additional testing or certification procedure before it is allowed to be marketed in another country is also considered a technical barrier to trade (TBT)[5].

The approach of the European Union to the removal of TBT is twofold. It bases either on (i) Mutual Recognition (MR) Principle or on (ii) Harmonization. The MR Principle states that any product legally manufactured and marketed in one country of the EU must be allowed free entry in any other market of the EU. The Harmonization approach applies when the MR Principle fails to work. It is based on the unification of standards and regulations among the Member States.

Harmonization of standards is needed when the MRP fails to remove technical barriers to trade, i.e. when the Member States do not want to recognize each other standards and regulations. The evolution of harmonized regulations is quite impressive. In 1975 there were 20 EU-wide (i.e. common for all states) regulations. In 1999 – almost 5.5 thousand. In principle, harmonization relies on the superiority of the EU law over national law. There are two approaches to harmonization in the European Union. The traditional, Old Approach and the more recent, New Approach. Both will be discussed below.

The traditional approach of the EU to harmonization is often called the Old Approach (OA). It gives a very detailed instruction on the characteristics of a product as well as on the process of production. Most of the Old Approach directives apply only to narrow product groups and to specific health, environmental and safety characteristics.

One problem with the OA is that it is time consuming. It is very difficult for all members states to reach a compromise on the final shape of the legislation. In order to reach a common set of standards, some (usually all) countries must change their legislations. This can be costly for the firms from those countries. Therefore each country would like to have common standards as similar as possible to their own standards in order to minimize adjustment costs for their domestic firms. At the moment the OA directives are applied mostly in sectors such as: chemicals, pharmaceuticals, food processing, labeling and motor vehicles. Health and safety requirements are especially important in these sectors. In other sectors the OA is replaced by the New Approach directives.

Since mid-eighties of XX century the EU is shifting slowly towards the so-called New Approach (NA) to harmonization, which was initiated by the Council of Resolution in 1985.

[5] European Commission (1998), p. 17.

It bases on setting only essential requirements for the most important characteristics of the products. NA directives apply to groups of products with similar characteristics, when national legislations differ.

New Approach (comparing to OA) makes it easier for the producers to declare conformity with the EU technical regulations. Therefore it improves the efficiency of the European standardization bodies. For practical purposes, NA requires the appointment of Notified Bodies for testing and certification. The role of these bodies is defined by each NA directive. This leads to greater cooperation between the testing and certifying bodies established in each country. The visible effect of the New Approach is the CE-marking of products. Every product that meets all relevant requirements and conforms all relevant directives is affixed the CE-mark by either manufacturer or importer established in the European Union.

New Approach seems to be quite effective in removing technical barriers to intra-EU trade. In 2003 more than 50% of intra-EU trade is covered by harmonized regulations and over 30% is covered by some kind of mutual recognition. Only 13% of intra-EU trade is not covered by any type of technical regulation. We will focus on the importance of different approaches for the EU trade with new members states.

Effects of standardization on intra and extra EU trade

In order to later assess the importance of the technical barriers to trade and the EU policy towards external world we look at the significance of the TBT's in the EU. This is currently being analyzed by Hagemejer (2005).

The study uses a commonly employed CES preference structure as a basis for the theoretical model. Small country assumption allows for consumer price taking behaviour and estimation of the demand for imports equation alone.

The demand for imports of a variety *i* subject to TBT from the EU relative to the imports from the rest of the world and to the varieties not subject to TBT (double difference) is given by the following expression:

$$\log(Y_i) = \beta_0 + \beta_1 \mathrm{TBT}_i + \beta_2 \log(p_i) + \beta_3 \log(t_i) + \beta_4 \log(N_i)$$

Where y, *p, t,* and N are relative, eg: $p_i = \frac{p(i)^{EU}_{TBT} / p(i)^{RoW}_{TBT}}{p^{EU}_{nTBT} / p^{RoW}_{nTBT}}$. TBT is a set of dummy variables corresponding to existence of one or more EU approaches in every *i* category. The variables

indexed by *i* and marked by TBT correspond to those CN-8 categories where there is one (or more) of the EU approaches present. For each EU country a ratio is used between the variable corresponding to imports from EU subject to an EU approach (*EU*,*TBT*) and the same variable corresponding to rest of the World (*RoW, TBT)*. This is then normalized by a ratio of the same variable corresponding to the aggregate imports of products not covered by any approaches (*EU, nTBT* and *RoW, nTBT*).

The estimations are based on trade data extracted from the Eurostat Comext database. containing intra and extra EU trade. The data on technical barriers to trade is taken from European Commission (1997). The publication reports what approach to reducing technical barriers to trade the European Single Market program has been selected for each industry. This is reported at the 3-digit NACE level. The concordance between CN and NACE 1970 table is available and updated to correspond to years 1995 and 1999 that are used for estimation. For each NACE industry we can construct dummy variables reflecting presence of one or more EU approaches: harmonization, "new approach", mutual recognition. The estimations were performed at the level of CN 8 nomenclature. The price (unit value) data is derived from the Comext database. This is extracted for each of the EU countries and with recognition of the intra and extra EU trade. This gives a proxy for average price per product/source. The tariff data is extracted at the HS 6-digit level from the trains database. These MFN tariffs are averaged across import sources for the extra EU trade (intra-EU trade is tariff-free) using a simple mean. For each of the CN8 category, the corresponding tariff is the relevant HS6 category (CN6 and HS6 are equivalent). The variable measuring remaining (country AND product specific) trade barriers is omitted.

Table 1 presents the results of the estimation. Variable `pratio` corresponds to the ratio of prices, variable `nratio` to the ratio of the number of varieties and variable `tratio` to relative tariffs. Variables `OA`, `NA`, `MR` correspond to dummy variables that are on when harmonization, new approach or mutual recognition are present (there are a number of categories where more than one approach is present).

Table 1 Estimation results

year	1995		1999	
variable	**Coefficient**	**t-statistic**	**coefficient**	**t-statistic**
pratio	-1.09294	-159.17	-1.0926	-132.76
tratio	0.198738	18.55	0.022359	2.12
nratio	1.432676	147.36	1.326079	115.4
OA	0.054694	2.78	0.157403	5.44
NA	0.18727	11.33	0.137403	4.83
MR	-0.0763	-4.94	-0.14174	-5.72
constant	1.448324	108.77	1.278861	44.18
Number of obs		86633		60112
F-statistic		9322.86		6360.85
Prob > F		0		0
R-squared		0.3924		0.3884
Adj R-squared		0.3923		0.3883
Root MSE		2.0578		2.0149

From table 1 we can see that all coefficients in all years are significant. `pratio`, `tratio` and `nratio` have also expected signs - negative on the price coefficient and positive on both the extra-EU tariff ratio and on the ratio of prices. When looking at the estimate of the β_1 we can extract the estimate of the elasticity of substitution $\sigma = 1 - \beta_1$. In both cases, 1995 and 1999, the elasticity of substitution is of the order of 2.09 which is within the lower range suggested by the literature.

The estimates of *tratio* vary a lot between 1995 and 1999 with the latter being almost 10 times smaller. Testing the hypothesis implied by the theoretical model that $\beta_2 = 1 - \beta_1$ is heavily rejected in both periods. This may be due either to low quality of tariff and price data and also to the aggregation procedure involving taking means over multiple partners.

Turning to the estimates of coefficients on the variables of main interest `OA`, `NA` and `MR` we see significant differences between the estimates in the two periods. In 1995 the estimate for `NA` was the highest among all three, and the ratio of import volumes was on higher than the average by around 12.5 percent (ratio of the coefficient and the intercept). The same ratio for the products covered by harmonization was only higher by 3.75 percent (holding everything else constant). For products covered by mutual recognition, the ratio was lower than the average holding everything else constant, by about 4.8 percent. The coefficients are significantly different from each other.

In 1999 however, the estimates on the TBT variables are somewhat different. The highest is the coefficient on the harmonization (OA) dummy. In 1999 the import ratio for products covered by this approach was 12.3 percent higher than the average, holding everything else constant. For the second highest coefficient, on the new approach, the distance from the mean is equal to 10.7 percent. However, these two coefficients are not very different from each other. They are significantly different from the coefficient corresponding to the MR, which is again negative, and the ratio of imports for product covered by this approach is over 11 percent lower than average.

The above results are somewhat striking. The common sense suggests that the mutual recognition approach is the most effective in eliminating technical barriers to trade. We have also noted that the OA is the most costly for the firms and that there might be problems with reaching agreement between EU members. The results contradict this hypothesis. There seems however, to be the plausible explanation for what the results suggest.

We have to take into account how in fact import ratio is constructed. In the denominator we have everything that corresponds to the extra-EU trade, including the trade barriers. The possible explanation to the results is that the trade barriers within the EU are not very significant due to the standardization policy being in place. However, this policy affects a lot the external EU trade. We may expect that the MR approach is introduced in sectors when the amount of required product characteristics is low and in fact this sectors have low TBTs. The EU-mutual recognition do not impede the extra-EU imports since TBTs are low anyway. That is why we observe low internal/external import ratio for this sectors.

The new and old approaches have a different effect. They do facilitate trade between the EU members but they impede the external trade. We can expect, than in these sectors - which are chemicals, pharmaceuticals, motor vehicles etc., the TBTs are really high and common EU standardization policy is actually promoting internal trade. The external partners have to meet both their home and the EU requirements which seems to impede trade a lot. The above hypothesis seems to be confirmed by the changes in the TBT's significance over time. The results suggest that the EU members were still struggling with establishing agreements in the harmonization policy in 1995, while the adjustment process of both the national regulations and the firms have been more or less completed by 1999. That is why we see the increase in the coefficient on OA. The high coefficient on NA approach is as expected - this approach clearly facilitate trade since only the essential requirements need to be met.

The results suggest that there is a huge protective effect of both the OA and the NA approach. In fact, we can calculate the required decrease in the price ratio that would be equivalent to setting the ratio of imports to the same value as obtained by setting OA dummy to 1. This requires a decrease in the price ratio by 15 percent of a good for which the price ratio was initially equal to one. This corresponds to the idea of the trade diversion and high welfare effects of the standardization union. The country/region that is left out certainly looses, the countries within the union gain, provided that the difference in the costs of production between the union and the non-union trade partners are not too large.

We can also see the TBT induced change in the structure of trade. The trade between EU members seems to be concentrated within the high-TBT products while the imports from outside are only focused on the low-TBT or no-TBT products. This certainly has implications for the world welfare since EU is one of the largest trade players and specialization facilitates exploitation in economies of scale and greater competitiveness in the world market. The possible implications for CEEC exports are presented later on.

Trade coverage of CEECs by different approaches to standardization

The paper of Brenton, Sheehy and Vancauteren (2001) evaluates the importance of technical barriers to trade for 10 Central and Eastern European Countries. The authors estimated the share of the tradable goods that were affected by the various EU approaches to TBT removal. They analyzed 114 industrial sectors for the intensity of three EU approaches. According to the study the Old Approach was dominating in 22 sectors. The same number of sectors was affected by MRP regulation. The New Approach applied to 19 sectors. In the remaining 51 sectors the standards were rare or nonexistent. The authors estimated the importance of standards in the intra-EU in the EU trade with acceding countries. Trade coverage of an approach is defined as the share of value of EU imports from a region subject to a particular standardization approach in the total value of EU imports from that region.

The structure of CEEC's exports evolved since the early 1990s as the countries began reorientation of their economies towards integration with the EU. This change led also to the evolution of trade coverage of different approaches. Trade coverage of various approaches in export of selected CEECs to the EU in the most recent years is presented in Table 2.

Table 2. Evolution of trade coverage of Old Approach, New Approach and Mutual Recognition in CEEC export to the EU – 1999-2003.

Year	Approach	Czech Republic	Hungary	Poland	Slovakia	INTRA-EUR
1999	OA	21,0%	30,3%	19,8%	33,4%	27,8%
2000	OA	24,7%	28,2%	27,6%	31,4%	27,7%
2001	OA	23,2%	29,9%	28,7%	31,0%	27,7%
2002	OA	22,2%	28,6%	28,4%	37,5%	28,2%
2003	OA	21,0%	27,9%	30,2%	39,4%	29,1%
1999	MR	18,9%	27,3%	29,9%	24,9%	25,8%
2000	MR	18,3%	26,3%	26,7%	23,3%	27,6%
2001	MR	19,9%	22,1%	26,0%	21,3%	28,0%
2002	MR	21,9%	22,6%	25,8%	19,0%	27,9%
2003	MR	21,7%	20,3%	23,4%	16,0%	27,9%
1999	NA	37,0%	17,0%	26,3%	22,0%	20,7%
2000	NA	35,1%	17,6%	24,7%	24,3%	19,8%
2001	NA	35,0%	17,7%	24,5%	24,5%	19,6%
2002	NA	34,3%	19,1%	25,3%	21,3%	19,3%
2003	NA	34,8%	19,6%	25,7%	19,3%	19,1%
1999	No regulation	17,2%	10,8%	13,9%	12,7%	13,5%
2000	No regulation	15,3%	10,2%	11,7%	12,5%	12,5%
2001	No regulation	14,5%	10,4%	11,6%	13,5%	12,8%
2002	No regulation	13,9%	11,0%	11,6%	12,5%	12,8%
2003	No regulation	13,9%	10,5%	12,1%	17,1%	13,0%

Source: Own calculations using the data from European Commission (1998) and COMEXT 2004.

The trade coverage of different approaches varies considerably across the CEEC. For instance, high share of Slovakian and Polish exports to the EU is covered by the Old Approach. For Poland, the share of exports covered by OA is actually very close to the value calculated for intra-EU[6] trade. Old Approach seems least important for the Baltic States – it covers only 15-16% of the Estonian and Latvian exports to the EU. Baltic States, which are not shown here, benefit considerably from MR Principle. 47.5% of the Lithuanian export to the EU is covered either by MR Principle (42.1%) or by Mutual Recognition Agreements (remaining 5.4%). The numbers for Estonia and Latvia are not that impressive but are still high. The dominates in the exports of Czech Republic to the EU. As much as 35% of the value of their export are products covered by the New Approach.

The structure of trade (from the point of view of trade coverage) has been evolving since the early 1990s when Central and Eastern European Countries began to integrate with the European Communities. It is especially visible for Poland, for which over half of its exports to

[6] By intra-EU we mean the trade between the countries that were Member States of the EU before 1 May 2004.

the EU in the late 1980s were not covered by any of the approaches. Now the pattern is very similar to the of intra-EU trade.

All these countries have relatively smaller share of products exported to the EU covered by MRP. But in general the TBT trade coverage is getting much more similar over the time. Only in case of Baltic States the structure is somewhat different, in the sense that a high share of their exports is not covered by any type of regulation.

We can therefore make a following observation. The intra industry pattern of CEEC exports to the old members of the EU revel large factor intensity differences demonstrated in many studies.[7] In general, CEEC's export unskilled labor intensive products and do import goods intensive in human capital and (to a smaller extent) in physical capital. On the other hand the differences in TBT coverage are very small, especially, if we compare them with exports of non-EU third countries.[8] Thus, probably, the requirement to accept EU standards by prospective members from CEEC states gradually eliminated technical barriers facing their exports to the single European market.

The following section verifies if companies in new member states confirm this opinion, which seems to be correct in view of presented earlier econometric results.

Survey based analysis of TBTs faced by Polish companies.

It is frequently argued that only the firms, that are active in international markets, can properly assess the importance of TBTs. Therefore, using thorough surveys can reveal links that could otherwise remain hidden. They can also serve as a basis for further research. We conducted this sort of review among Polish firms, just after the accession to the EU, in December 2004.

There were two similar opinion surveys made before accession of Poland to the EU. They considered various obstacles regarding technical regulations in exports to the EU faced by Polish companies. Firstly, Gorzelak and Żołkiewski (2002) reported opinion of 96 firms, mainly big companies from food and chemical sector. According to their results, over one third of the sample expressed some difficulties in selling due to specific technical regulations. However, the overall cost-benefits balances were assessed as neutral by 90% of the respondents.

[7] Michalek, Sledziewska (2003).

[8] FEMISE report (2005). Chapter six.

Second survey by UKIE (2003), published in Marczewski (2003), included 272 Polish firms mainly from machinery, furniture and textile industries, where 70% of them were exporters to the EU. In this opinion poll most of the companies expressed their balanced interest in the technical regulations. Only smaller exporters assessed unification of standards as very beneficial. On the other hand these firms were the least prepared to meet the new EU regulations, including compulsory directives.

In case of Poland, the questionnaire was made six months after accession to the European Union. The following industries were analyzed: food processing (NACE 15), chemical (NACE 24) and electrical (NACE 31). The main reason behind this choice was the extent of various EU regulations and standards effective in those industries. These industries also constitute relatively large shares of total Polish production (33%) as well as exports (19%). Two methods of data collection were used: personal interviews with 96 firms and email questionnaires, to which 55 firms responded. Altogether, 155 Polish companies answered provided us with their opinion; among them 54 firms belonged to food, 46 to chemical and 55 to electrical industry.

We notice a number of positive effects that arose after joining the EU. The most important were the following:

- More than 80% of the firms did not face any difficulties while selling their products in the EU and 75% of the firms did not have to redesign their products, i.e. they did not have to bear additional adjustment costs since the enlargement;
- Most firms (usually in the food and electrical industries) assessed the existence of the MR principle positively due to their economic activity;
- The firms are usually interested in ISO-9000 system, improving quality management in a company.
- More than half of the exporters reported that the unification of technical standards within the European Union may positively affect their exports;
- The general opinion on Poland's membership in the EU is rather positive, given both the necessity of adjustment costs and the opportunities to sell in the common market. However, 19% of the firms said the membership would be negative for their economic activity.

Apart from the positive effects of the membership we should notice that firms have to bear additional costs of adjustment to the new requirements. The assessment of these costs depends on a firm and on an industry:

- Quite significant percentage of firms said that Poland's membership in the EU did not have any influence on their economic situation. Above 10% said that the harmonization of technical standards within the EU had negative impact on their activity;
- A large number of firms in the food industry (54%) said that the cost of certification of their products had increased. Less than half of the surveyed firms answered that the cost of providing detailed information on their products' labels was high. Again, these firms were usually from the food industry (43%), whereas in the chemical and electrical industries the most frequent answer was 'neutral/negligible';
- More than half of the firms were not interested in the ISO-18000 and ISO-14000 systems. Only firms from the chemical industry applied ISO-14000 system.

Results of the survey suggest that the effects of joining the EU were quite different for firms from different industries. Probably the highest cost was in the food industry**.** Here, 54% of the firms said that the net effect of joining the EU was positive, while still 20% said that the effect was negative. More than 30 percent of the food- industry firms had to invest to redesign their products to fulfill EU requirements what required major investments.

The costs seem to be less pronounced in the chemical industry: 76% of the firms have not faced any difficulties while selling in the EU since 1st of May 2004. More than 70% said they were not forced to redesign their product to fulfill the EU requirements. An important issue is the opinion of firms about regulations on hazardous products, on soaps and fertilizers and on the so-called Good Laboratory Practice. 70% of the firms think that all these regulations have already been implemented or will be implemented soon;

Firms from the electrical industry seemed to be well prepared for the membership in the EU and there has been little change in the industry since 1st of May 2004. Only 25% of the firms redesigned their product, what required minor investments. 60% of the firms admitted that unification of technical standards within the EU would be beneficial for their activity;

The first general conclusion we may withdraw from the opinion of Polish companies facing various technical regulations within the EU common market is that they had to bear some adjustment costs. However the net effect of accession to EU is positive. Most of companies – especially exporters – said they expected benefits from harmonization of the standards and/or existence of the MR agreement. Secondly, it seems that the process of adjustment the EU regulations had already started and often was accomplished before 1 May 2004. It reduced the

additional adjustment costs after accession and enabled the firms to perceive net benefits arising from access to the common European market.

Possible welfare gains resulting from Poland's accession to the EU

In this part of the project we try to asses the potential effects of implementing the EU standardization policy by new EU members. In the analysis we will use a computable general equilibrium model GTAP. It is a multi-sector, multi-country general equilibrium model that is often employed in the evaluation of trade policies. The model and the corresponding GTAP database used here is prepared by the Global Trade Analysis Project at Purdue University, USA.

The general structure of the model is relatively simple[9]. It assumes the existence of the regional household that takes all the expenditure decisions within the economy. This entity is allocating expenditures to private consumption, government expenditures or savings. In the multi-region model each of these shares of expenditures is further divided into domestically produced goods and imports.

The firms produce using the primary factors purchased from the regional household and intermediates. The sources of primary factors are purely domestic – it is assumed that the factors are strictly immobile internationally and mobile within a region (with exception of land and natural resources). The intermediate goods can be either domestically produced and imported.

The demand side of the GTAP model is modeled through the regional household concept. The structure of preference of the regional household is based on the multiply nested utility function. According to such a function, the division of expenditure is made at different level of aggregation. In the case of the GTAP model, on the top level or the top nest the household is taking a decision concerning allocation of expenditures between the private consumption, government consumption and savings. The allocation is done according to the Cobb-Douglas utility function. The government consumption and private consumption expenditures are further allocated into domestic and imported goods according to the constant elasticity of substitution (CES) function. The imported goods are differentiated according to the Armington aggregation, using another CES function.

[9]This part follows Hertel, Tsigas (1997), *Structure of GTAP*

On the supply side, the production function has a similar structure as the utility function. It is also a multi-level concept. The demands derived from the production function allocate expenditures into primary factors (eg. land, capital, labour, natural resoutces) and intermediates. The demand for these two broadly defined aggregates is Leontief.

The research cited before, both on the problem of the creation of the single market and on the EU enlargement assumes that the standardization policy of the European Union leads to the partial or complete removal of the non-tariff barriers, especially the technical barriers to trade that arise due to different and incompatible policies on norm and standards of countries being trade partners. This assumptions seems plausible, taking into account that the one of the main objective of the of the European Union single market-related policies is dismantling the technical barriers to trade.

In papers by Maliszewska (2002) and Hofmann (2001) it is assumed that the lack of the common standardization policy of the countries participating in international trade leads to a inefficiency that leads to the increase in price of a product imported. In Hofmann's work it is assumed that the inefficiency is leading to an increase in prices equal to 2.5 percent of the value of imports. Maliszewska differentiates these costs according to sector. In her research she assumes that the removal of the inefficiency leads to a reduction of transport costs.

In the GTAP model, transport costs are modeled by a global transport sector producing a transport service which is purchased in the process of imports of good. In the way the GTAP model works, reduction of the cost of transport leads to a decrease of its price. This in turns leads to an increased demand for transport services. In a general equilibrium framework it leads to an increase in supply and requires extra resources shifted into transport sector from other sector. A decrease in transport cost thus leads here to a decrease of production by all sectors except the transport sector. Thus, in the GTAP framework, modeling of price wedges through transport costs is not a correct solution.

Keeping the above in mind, we take another approach to the problem which is easily implemented using the simple structure of the GTAP model. The parameter *ams*, indexed by product, origin country, destination country, import-augmenting "technical change" variable can be used. "Shocks to *ams*(i,r,s) represent the negative of the rate of decay on imports of commodity or service i from region r imported by region s. When *ams*(i,r,s) is shocked by 20%, then 20% more of the product becomes available to domestic consumers - given the same level of exports from the source country. In order to ensure that producers still receive the same revenue on their sales, effective import prices (*pms*) fall by 20%" (Hertel,

McDougall, Itakura, 2001). In fact, the parameter corresponds to the iceberg transport cost and causes the effective price faced by the importer to go down.

For the purpose of the simulation, the following aggregated database has been created. The following Central and Eastern European countries have been disaggregated: Czech Republic, Estonia, Lithuania, Latvia, Poland, Slovakia and Hungary. The EU has been disaggregated into two regions: Germany (being a largest trade partner of many of the CEEC's) and the Rest of the UE. The remaining regions were aggregated into Rest of the World.

In the simulation, it was assumed that due to the decrease in the TBT's in the European Union (similarly as in Hoffmann), the prices of imports go down by maximally 2.5 percent. It is reflected by shocking the ams variable to 2.5 percent. This price change is also differentiated by sector (following Hoffmann (2001) and cited by Maliszewska (2002)). The exact change of *ams* is given below:

Table 3 Shock to price of imports

Sector	**Change in price**
Agriculture	2.5
Raw materials	2.5
Food	2.5
Textiles	2.5
Apparel	2.5
Leather products	2.5
Wood products	0.875
Paper and printing	1.875
Fuels	2.5
Chemicals	1
Minerals	0.625
Ferrous metals	0.875
Other materials	1.125
Metal products	1.125
Vehicles	0.5
Other transport equipment	1.375
Electronics	0.625
Other industrial production	0.625
Other machinery	0.625

The decrease of the price of imports is bilateral and focused on the new EU members and the EU-15. The price of a given product from a CEEC goes down in every EU country (both EU-15 and accessing) and the same applies to EU-15 products purchased in the CEEC markets.

We evaluate two scenarios a short term and a long term (with capital accumulation). The immediate effect in short run of the decrease of the price of imports is the increase of the

volume of international trade. The table below shows the German import changes from the Central and Eastern European countries under consideration.

Table 4 Export changes to Germany

Industry	Rest of UE	Czech Republic	Estonia	Poland	Hungary	Slovakia	Slovenia	Lithuania	Latria	Rest of the World
Agriculture	-0.3	7.6	9.0	8.9	6.8	8.4	10.0	9.1	8.2	-0.1
Raw materials	-0.4	15.3	13.2	17.2	20.6	20.4	23.4	12.4	19.9	-0.3
Food	-0.2	4.8	7.1	5.8	5.1	5.0	5.8	4.6	4.0	-0.1
Textiles	-1.3	14.0	17.2	14.5	12.9	14.6	14.0	16.2	15.5	-1.3
Apparel	-1.8	12.0	13.6	12.0	9.4	11.5	13.9	14.8	13.2	-1.8
Leather products	-1.4	13.8	14.0	13.3	13.0	13.2	13.2	14.2	13.2	-1.3
Wood products	-0.3	-0.5	2.9	0.4	3.4	-0.7	1.8	-0.9	-1.6	-0.2
Paper and printing	-0.4	5.3	6.4	6.5	7.5	4.9	5.6	5.9	5.0	-0.3
Fuels	-0.2	7.7	3.4	7.2	7.7	7.9	7.9	4.9	6.9	-0.3
Chemicals	-0.1	3.7	2.7	2.9	1.9	2.6	2.5	2.7	2.0	0.0
Minerals	0.1	-1.4	1.1	0.2	-1.5	-0.7	-0.4	-1.3	-1.6	0.2
Ferrous metals	-0.2	1.8	-0.3	0.7	1.9	2.2	2.4	1.3	0.2	-0.1
Other materials	-0.3	2.5	1.0	2.7	5.0	2.3	2.6	3.6	2.2	-0.2
Metal products	-0.5	1.7	3.6	2.7	1.5	1.2	3.1	2.3	0.7	-0.3
Vehicles	-0.2	1.0	-0.8	0.9	1.0	1.3	1.0	-0.9	-0.7	-0.1
Other transport equipment	-0.4	8.7	7.3	6.9	6.7	5.5	6.3	3.0	2.3	-0.3
Electronics	-0.1	0.7	0.2	0.8	3.5	-1.6	1.1	0.1	-1.3	0.0
Other industrial production	-0.2	2.8	-2.4	-0.1	0.6	0.0	2.0	-1.0	-2.2	-0.1
Other machinery	0.0	-0.6	2.7	0.9	-0.8	-0.8	0.1	-0.4	-1.4	0.1

Clearly the most significant export changes in all countries under consideration are concentrated in sectors producing raw materials, textiles, apparel, leather products. The changes in exports to Germany in the case of imports amount to 20 percent and are the highest in Slovenia, Slovakia and Hungary. In Poland, the simulated increase in exports to Germany amounts to 17 percent. In the case of textiles, apparel or leather products, the simulated changes range close to 15 percent. There are significant changes in exports of agricultural products, however, we have to keep in mind that this simulation does not take into account changes in agricultural tariffs and subsidies due to EU enlargement and we should probably

expect much larger changes if those are included (as 2003 increase of Polish exports have shown), paper and printing industry and transport equipment. Changes in those sectors range between 5 to 10 percent depending on a region. In the remaining sectors, for most of the new member states of the EU, the change in exports is less than 5 percent. As a result of the demand shift towards new member states, import of Germany from remaining EU member falls down by a small amount. The largest change is found in the case of apparel.

The similar changes can be expected exports to the EU-14 countries, which are not cited here. The growth in imports has a similar structure as in the case of exports to Germany. The largest increase in exports (above 5 percent) is expected in agriculture, food, paper, fuels and the transport equipment. In Poland, the largest simulated increase is expected in the textile industry.

Changes in export to the EU cause a large change in the total exports of the EU-acceding CEEC's. The largest changes in exports are expected for Poland where the change is estimated at 1.6 percent. In Czech Republic, Estonia, Lithuania and Slovakia, this value amounts to around 1.4 percent change. In the remaining countries the change is close to one percent. The results are given in the table below.

Table 5 Change in total export value

Country	% change in export value
Czech Republic	1.407
Estonia	1.347
Poland	1.616
Hungary	0.882
Slovakia	1.4
Slovenia	0.993
Latvia	0.919
Lithuania	1.434

The output changes resulting from policy experiment are concentrated in the industries where the largest increase in export was simulated. The largest increase in production is expected in textiles and apparel industry. In the case of textiles the largest increase is simulated for Estonia, Lithuania and Latvia and for apparel for Estonia and Lithuania. This changes range from 5 to 12 percent. Other industries where there are expected significant changes in production are raw materials (especially Lithuania and Estonia), fuels, other materials and

transport equipment. There are industries where output is expected to drop – chemicals, minerals, ferrous metals, metal products and electronics. The changes are usually less than two percent of the value of production. The detailed simulation results are given below.

The changes in export lead to, through changes in production, change in the gross domestic product. Not only the export grows but also we impose a policy experiment where the import demand grows as well. The change in GDP is a sum of these two changes. The simulated change of GDP of the countries under consideration is given below.

Table 6 GDP changes resulting from TBT elimination

Country	Change in GDP
Germany	0.037
Rest of EU	0.006
Czech Republic	1.512
Estonia	1.599
Poland	1.015
Hungary	1.544
Slovakia	1.565
Slovenia	1.456
Latvia	1.66
Lithuania	1.774
Rest of the World	-0.023

According to the simulation results, the largest increase of GDP as a result of a decrease of the technical barriers to trade will be experienced by Lithuania and Latvia, where the increase amounts to 1.77 and 1.66 percent respectively. For Czech Republic, Estonia, Slovaka and Slovenia the simulated GDP increases are equal to 1.4 to 1.6 percent. For Poland the simulated change is equal to 1 percent.

Concluding remarks

This paper argues that in sectors where the EU technical regulations are most complicated and require costly adaptation, the trade within EU is booming. We argue that the trade between EU members is more concentrated within the high-TBT products, while the imports from outside are focused on the low-TBT or no-TBT products. Thus, EU technical regulations might in fact be trade diverting if the difference in productivity between intra and extra-EU partners is large.

We demonstrate that the structure of TBT's affecting exports from new EU members is converging with the one that characterizes intra-EU trade. Therefore, we expect that CEEC's

countries will benefit from applying common technical regulations of the EU after accession, provided that the initial adjustment costs are not excessively high.

In the last section of our paper we report the results of questionnaire-based research made among Polish companies in December of 2005, i.e. after the Eastern enlargement. It seems that the adjustment costs were moderate and the adaptation process to new technical regulations is already completed. Therefore, one can expected welfare gains for new members of the EU. We perform a CGE simulation using a GTAP model to assess these gains. Both the econometric analysis and the GTAP simulation imply that the effects of changes in standardization policy and especially creation of standardization unions have important welfare effects. For Czech Republic, Estonia, Slovaka and Slovenia the simulated GDP increases are equal to 1.4 to 1.6 percent, whereas for Poland the simulated change is equal to 1 percent.

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