Effects of non-tariff protectionism in Ukraine: sector aspects

by

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Abstract

The purpose of the study is to estimate sector impacts of the non-tariff protectionism in Ukraine. Recently the attention to non-tariff protectionism has considerably increased as Ukraine reduced its tariff barriers after becoming the WTO member. Surveys show that the most expensive and burdensome are procedures associated with standards compliance. Though, it remains to be studied what sectors are the most affected by non-tariff protectionism, and whether this policy has a significant trade distortion effects. In this paper we focus on one special aspect of non-tariff protectionism, namely the impact of various mandatory standards on trade flows. The main hypothesis is that the sign of the NTMs variable would reflect the ‘dominant’ nature of the NTMs. In other words, the statistically significant negative sign of the NTM index would mean that trade-distorting effect of the NTM dominates, while the statistically significant positive sign would indicate that information factor is of higher importance.

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Introduction

With the reduction of tariffs and quantitative barriers to trade, more and more attention is paid to other types of regulations applied to international trade flows that are broadly defined as non-tariff measures (NTMs). This term replaced the previously widely accepted term ‘non-tariff barriers’ (NTBs) (see, e.g., Baldwin, 1970; Walter, 1972; Mayer and Gevel, 1973; Deardorff & Stern, 1997) to emphasize the dual nature of the regulation as discussed in Laird & Yeats (1990). On the one hand, the NTMs could be discriminative against imports being a trade-restrictive measure like defined by Baldwin (1970), Hillman (1991), and others. On the other, the NTMs could be welfare-improving providing consumers with additional information that they cannot find themselves, and thus allowing overcoming imperfect/asymmetric information problem (see, e.g., Bureau et al., 1998, 2001; Movchan, 1999, Disdier et al., 2008).

This dual nature of the NTMs is typical for sanitary and phyto-sanitary measures (SPS), and technical barriers to trade (TBT). In Ukraine the compliance with the TBT regulations (so called mandatory third party certification) is rather cumbersome. According to IFC Study of Technical Regulation System in Ukraine (IFC, 2008), almost one third of industrial enterprises state that their products are subject to mandatory certification. The preparation of required documents takes 13 days on average per one certificate, and waiting time is 30 days on average. The IFC estimated foregone profits in manufacturing due to mandatory certification in Ukraine at USD 47.2 bn in 2006. The IER survey of manufacturing firms showed that 40% of managers consider mandatory certification as the major or significant obstacle for imports.

Ukraine has joined the WTO in May 2008 after more than fourteen years of negotiations. Alongside with the reduction and binding of tariffs, the country committed to adhere the Agreements on SPS and TBT. In particular, Ukraine bound itself to give priority to international standards over regional and other national ones, and to base technical regulations on the relevant international standards by the end of 2011. Also, the list of products subject to mandatory certification is to be reduced.

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3 Kuziakiv, O. Report of the Results of Survey “Managers Assessment of the Non-Tariff Barriers to Imports and Exports”. IER, 2004
4 http://www.wto.org/english/news_e/pres08_e/pr511_e.htm
The purpose of this paper is to study the sector impact of the existing system of SPS and TBT measures in Ukraine, answering two questions: first, in what sectors do these measures significantly influence trade flows? Second, what is the direction of impact of these measures? Answering the questions allows better understanding of the consequences of Ukraine’s WTO membership. Moreover, it will inform government about regulations that should be addressed in the first place in the process of harmonizing the current system with the WTO commitments.

The rest of the paper is as follows. In Section 2 we describe the related empirical literature on the topic. Section 3 contains the discussion of data, followed by methodology of estimation (Section 4) and results (Section 5). Section 6 concludes.

2 Related Empirical Literature

The academic debate regarding the NTMs is centred around several important topics: definition, quantification, and determination of the impact. Several researchers as Baldwin (1970), Walter (1972), Mayer & Gevel (1973), and Deardorff & Stern (1997) provided their definitions of this phenomenon. Moreover, international organisations like UNCTAD and GATT/WTO contributed to formulation of the term. Careful analysis of these studies as well as the nature of NTMs themselves allows formulating the following definition: “NTMs are measures, other than tariffs, that are tightly connected with state (administrative) activity and influence prices, quantity, structure and/or direction of international flows of goods and services as well as resources used to produce these goods and services.” (Movchan, 2002).

The key aspects here are that the NTMs are the products of state (not private) activity, and that we cannot associate NTMs with welfare losses by definition as it is done by e.g. Baldwin (1970), and Mayer & Gevel (1973).

The issue of measurement (quantification) is more complicated. There are several generally accepted methods of non-tariff barriers measurement: frequency (inventory) measures, price-change measures, quantity measures (Deardorff & Stern, 1997; Laird & Yeats, 1990), and trade restrictiveness indices (Anderson & Neary, 1994, 1999). Among this variety, inventory measures are the most easy to collect and estimate. For instance, the frequency ratio is a share of commodity lines subject to at least one NTM in total number of lines for the respective group of trade nomenclature (Laird & Yeats, 1990). Such indices could be used for the preliminary analysis of the NTMs structure in the economy. Although they cannot be directly
plugged in the model to estimate their welfare effects, these measures are widely used in gravity-type studies.

Yet other way to quantify NTMs are price-change measures based on the determination of price wedge resulted from the introduction of the NTMs. Unfortunately, significant problems with collecting correct prices and stripping them out of NTM-non-related information usually precludes the use of these measures in macro-level researches (Deardorff & Stern, 1997; Laird & Yeats, 1990; Behgin & Bureau, 2001).

The most promising approach seems to be the quantity measures as discussed in Deardorff & Stern (1997) and Laird & Yeats (1990). This approach, in turn, incorporates several empirical methods. First, there could be an estimate of the NTMs as residual in gravity-type trade models. Recently, this approach was used to quantify the NTMs (regulatory costs of trade) in Ukraine by CEPS (2006). The logical extension of this approach is to include variables reflecting NTMs and test their effects (Laird & Yeats, 1990). The most recent and comprehensive study based on this approach is the paper by Kee et al. (2006).

Finally, it is the issue of determining the impact of the NTMs. The most straightforward way is to do so within the framework of econometric models (see, for instance, Kee et al., 2006; Harrigan, 1993; Lee & Swagel, 1997; Disdier et al., 2008). Here, key question is the sign of relation. Traditionally, trade regulations are treated as trade distractions as it is reflected even in definitions discussed above. Indeed, studies conform this. For instance, studying developed countries’ trade control measures that Latin America countries faced, Leamer (1990) found that both tariffs and the NTM have a significant import-reducing effect. Harrigan (1993) showed that tariffs and quantity barriers have significant negative impact on bilateral trade in OECD countries. Lee and Swagel (1997) pooled across industries, studying average effects of trade barriers on imports. They conclusion was that trade barriers hinder imports. Kee et al. (2006) also found significant negative impact of core NTMs on trade flows.

At the same time, Disdier et al. (2008) showed that TBT and SPS measures could have both trade-distorting and trade-improving effects. Also, Moenius (2004) demonstrated that country-specific standards could promote manufacturing trade resolving asymmetric information problem. Beghin & Bureau (2001) also discussed this issue and stated that regulation brings information and therefore allows overcoming asymmetric information problem.
3 Data

This paper relies on database assembled for paper Movchan (2004). Import flow are taken from the UN Commodity Trade (COMTRADE) database, while the industrial output is based on the OECD Industrial Survey. In the study we consider eight aggregated manufacturing sectors, namely food industry, light industry, production of wood and paper and products thereof, chemical and petrochemical industry, production of other non-metallic mineral products, production of metal and products thereof, machine building, and production of other manufacturing goods.

The compound measure of transportation costs that includes both the distance and the weight is applied as discussed in Movchan (2004). It is constructed by multiplying the distance between capitals of trading partner on the weight-to-value ratio:

\[
\tau_{ijk} = \frac{\sum_j W_{jk} \times Dist_{jk}}{\sum_j m_{jk}},
\]

where

\[
\begin{align*}
\tau_{ijk} & = \text{a proxy for transportation costs; } \\
W_{jk} & = \text{a weight of imports of countries } j \text{ from } k; \\
m_{jk} & = \text{a value of respective imports; } \\
Dist_{jk} & = \text{a distance between capitals of countries } j \text{ and } k.
\end{align*}
\]

The hypothesis is that heavier the goods and longer the distance, the less trade will occur.

Import tariff rates are taken from the Law on Customs Tariff in Ukraine. All tariffs are transformed into ad valorem equivalents. To match industrial structure, tariffs were aggregated to the four-digit level of the ISIC classification. As already discussed in Movchan (2004), ‘third party’ weighting scheme was chosen for aggregation\(^5\). The weight is constructed on the basis of export structure of the country of origin assuming that this structure is stable for all destinations and determined by competitive advantages of the

\(^5\) Further discussion of weighting scheme see, for example, Daly & Kuwahara, 1999; Lee & Swagel, 1997; Nogues, Olechowski, & Winters, 1986; Leamer, 1990
country. Technically, tariff structure of importing country is matched with export structure of the country of origin, allowing assigning weights in line with potential importance of trade barriers for each partner country.

The list of TBT and SPS measures covers mandatory certification, including the metrological and energy-saving controls, ecological control, sanitary, phyto-sanitary, and veterinary controls, as well as registration of medicaments and medical equipment. The inventory approach is taken to construct NTM index. In particular, it was constructed an NTM intensity (NTMI) index that shows the percentage of cases when the pre-selected NTM are actually applied to the given number of tariff lines:

\[
NTMI = \left( \frac{\sum_{n=1}^{N} \sum_{l=1}^{L} NTM_{nl}}{L \cdot N} \right) \cdot 100,
\]

where

\[NTM_{nl} = \begin{cases} 1 & \text{if the } n\text{ type of the NTM is applied to the tariff line } l \text{ and zero otherwise;} \\ 0 & \end{cases}\]

\[N = \text{a total number of considered tariff lines, } n = 1, \ldots, N;\]

\[L = \text{a total numbers of considered types of the NTMs, } l = 1, \ldots, L.\]

Thus, the NTMI shows the share of the entire non-tariff protection capacity used by the country. As in the case with traditional frequency index, it is possible to add weights to the NTMI. Here, it is used the ‘third-party’ export-structure weighting scheme, which was already discussed for tariff weighting.

4 Econometric specification

We choose the traditional gravity equation as a basic framework for our analysis. The theoretical foundation of the model are rooted in monopolistic competition model of trade developed by Helpman & Krugman (1985). Therefore, contrary to usual approach using GDP as a key component of gravity equation, we follow Lee & Swagel (1997) and Harrigan (1993), and specify the equation with sector outputs to ensure better match between exporting country production structure and import flows received in destination country. Adopting log-

6 By construction, the NTMI is very sensitive to the number of the NTM involved in the study. Therefore, for meaningful international comparisons it is necessary to ensure that similar sets of the NTM are involved in the comparisons.
form and including transportation costs alongside with tariffs and NTM, the equation looks as follows:

\[
\log \left( \frac{m_{ijk}}{\Pi_j} \right) = \beta_{i1} + \beta_{i2} \log \left( \frac{y_{jk}}{y_i} \right) + \beta_{i3} \log(1 + \tau_{ijk}) + \beta_{i4} \log(1 + \kappa_{ijk}) + \beta_{i5} \log(1 + NTM_{ijk}) + \epsilon_{ijk}
\]

(3)

where

- \( m_{ijk} \) = imports of industry \( i \) output by country \( j \) from country \( k \),
- \( \Pi_j \) = country \( j \)'s aggregate spending,
- \( y_{ik} \) = output of industry \( i \) in country \( k \),
- \( \tau_{ijk} \) = average tariff on industry \( i \) output by country \( j \) from country \( k \),
- \( \kappa_{ijk} \) = transportation costs to deliver industry \( i \) output by country \( j \) to country \( k \),
- \( NTM_{ijk} \) = NTM index on industry \( i \) output by country \( j \) from country \( k \).

Though, as discussed in Kee et al. (2006), Trefler (1993), Harrigan (1993), and Lee & Swagel (1997), such a specification bears high likelihood of endogeneity problem. Thus, we follow the procedure proposed in Kee et al. (2006), and move the tariff term to right-hand side of the equation. The import demand elasticity for Ukraine is assumed to remain fixed over sectors, and within studied time frame. Thus, the estimation equation is transformed into:

\[
\log \left( \frac{m_{ijk}}{\Pi_j} \right) - \beta_3 \log(1 + \tau_{ijk}) = \beta_{i1} + \beta_{i2} \log \left( \frac{y_{jk}}{y_i} \right) + \beta_{i4} \log(1 + \kappa_{ijk}) + \beta_{i5} \log(1 + NTM_{ijk}) + \epsilon_{ijk},
\]

where \( \beta_3 = 1.06 \) in line with estimations done by Kee et al. (2004) for Ukraine.

5 Results

In Table 2 we present our estimation results. Consistently with the \textit{a priori} hypothesis, for all sectors imports is positively and significantly correlated with output of the exporting country, and negatively and significantly correlated with transportation costs measured by weight-to-value ratio multiplied by distance. Also, the significance of the most of period dummies demonstrates that they capture some period-specific variations of Ukraine’s imports.

Now let us turn to non-tariff measures impact that is in the centre of the study. As shown in Table 1, the highest level of the TBT and SPS protection is set for food industry, each
product of which is subject to at least one non-tariff regulation (as seen from non-zero minimum of the NTM index). This sector is followed by chemical products, including pharmaceuticals. The least protected are metal production, and production of other manufacturing goods. Though, the intensity of non-tariff protection doesn’t necessarily correlate with trade-distorting effect of NTMs application.

**Table 1.** Descriptive statistics for NTM index

<table>
<thead>
<tr>
<th>Industry</th>
<th>Mean</th>
<th>Median</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Std. Dev.</th>
<th>Observations</th>
<th>Cross sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food industry</td>
<td>34.12</td>
<td>33.33</td>
<td>64.97</td>
<td>16.67</td>
<td>8.10</td>
<td>1893</td>
<td>320</td>
</tr>
<tr>
<td>Textile and leather industry</td>
<td>5.67</td>
<td>3.19</td>
<td>26.92</td>
<td>0.00</td>
<td>6.54</td>
<td>1320</td>
<td>220</td>
</tr>
<tr>
<td>Wood and wood thereof; paper and paper thereof</td>
<td>8.38</td>
<td>5.24</td>
<td>30.34</td>
<td>0.00</td>
<td>8.37</td>
<td>960</td>
<td>160</td>
</tr>
<tr>
<td>Chemical and Petrochemical industry</td>
<td>13.35</td>
<td>11.49</td>
<td>33.33</td>
<td>0.00</td>
<td>10.01</td>
<td>1434</td>
<td>239</td>
</tr>
<tr>
<td>Other non-metallic mineral products</td>
<td>5.01</td>
<td>3.93</td>
<td>16.67</td>
<td>0.00</td>
<td>4.36</td>
<td>600</td>
<td>100</td>
</tr>
<tr>
<td>Metal production</td>
<td>1.40</td>
<td>0.97</td>
<td>7.45</td>
<td>0.00</td>
<td>1.49</td>
<td>240</td>
<td>40</td>
</tr>
<tr>
<td>Machine building</td>
<td>4.72</td>
<td>3.35</td>
<td>21.76</td>
<td>0.00</td>
<td>4.95</td>
<td>2760</td>
<td>460</td>
</tr>
<tr>
<td>Other manufactured products</td>
<td>2.15</td>
<td>0.42</td>
<td>11.12</td>
<td>0.00</td>
<td>2.81</td>
<td>480</td>
<td>80</td>
</tr>
</tbody>
</table>

Source: NTM database for Ukraine, UN ComTrade, authors’ estimates

According to our results, the application of TBT and SPS measures have significant negative impact on food imports, on imports of other non-metallic mineral products (construction materials), and on metal production. Thus, two sectors that face the highest and the lowest protection suffers the most from the application of the TBT and SPS measures. The negative sign obtained for food industry in general corresponds to product-level results by Disdier et al. (2008), and Moenius (2004). In particular, Disdier et al. (2008) showed that SPS and TBT measures have significant negative impact on nine food-industry sectors out of fifteen sectors with significant sign.

At the same time, in line with our assumptions regarding the changing sign of the TBT and SPS measures depending on the dominant nature of their impact, our estimations (all specifications) showed significant positive impact of the NTMs on imports of products belonging to chemical and Petrochemical industry, and textile and leather industry. Moreover, the second model specification shows that TBT and SPS requirements have trade-stimulating impact on imports of machine building products, and on wood and paper and products thereof.
### Table 2. Influence of NTMs – Sector Approach

<table>
<thead>
<tr>
<th></th>
<th>Food industry</th>
<th>Textile and leather industry</th>
<th>Wood and wood thereof; paper and paper thereof</th>
<th>Chemical and petrochemical industry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(A)</td>
<td>(B)</td>
<td>(C)</td>
<td>(A)</td>
</tr>
<tr>
<td><strong>Const</strong></td>
<td>-9.43&lt;sup&gt;a&lt;/sup&gt; (0.89)</td>
<td>-7.51&lt;sup&gt;a&lt;/sup&gt; (1.15)</td>
<td>-5.02&lt;sup&gt;a&lt;/sup&gt; (0.61)</td>
<td>-3.52&lt;sup&gt;a&lt;/sup&gt; (1.05)</td>
</tr>
<tr>
<td>Log Output</td>
<td>0.41&lt;sup&gt;a&lt;/sup&gt; (0.08)</td>
<td>0.41&lt;sup&gt;a&lt;/sup&gt; (0.08)</td>
<td>0.54&lt;sup&gt;a&lt;/sup&gt; (0.04)</td>
<td>0.69&lt;sup&gt;a&lt;/sup&gt; (0.06)</td>
</tr>
<tr>
<td><strong>Log Weight &amp; Distance</strong></td>
<td>-0.23&lt;sup&gt;b&lt;/sup&gt; (0.10)</td>
<td>-0.27&lt;sup&gt;b&lt;/sup&gt; (0.10)</td>
<td>-0.43&lt;sup&gt;b&lt;/sup&gt; (0.05)</td>
<td>-1.12&lt;sup&gt;a&lt;/sup&gt; (0.14)</td>
</tr>
<tr>
<td>D1</td>
<td>-0.51&lt;sup&gt;b&lt;/sup&gt; (0.20)</td>
<td>-0.40&lt;sup&gt;b&lt;/sup&gt; (0.21)</td>
<td>-0.23&lt;sup&gt;b&lt;/sup&gt; (0.14)</td>
<td>0.04 (0.19)</td>
</tr>
<tr>
<td>D2</td>
<td>-0.28 (0.23)</td>
<td>-0.02 (0.23)</td>
<td>0.05 (0.14)</td>
<td>0.46&lt;sup&gt;a&lt;/sup&gt; (0.21)</td>
</tr>
<tr>
<td>D3</td>
<td>-0.49&lt;sup&gt;b&lt;/sup&gt; (0.25)</td>
<td>-0.25 (0.26)</td>
<td>-0.24&lt;sup&gt;b&lt;/sup&gt; (0.12)</td>
<td>0.61&lt;sup&gt;a&lt;/sup&gt; (0.23)</td>
</tr>
<tr>
<td>D4</td>
<td>-0.46&lt;sup&gt;b&lt;/sup&gt; (0.26)</td>
<td>-0.14 (0.27)</td>
<td>-0.08 (0.14)</td>
<td>0.65&lt;sup&gt;a&lt;/sup&gt; (0.23)</td>
</tr>
<tr>
<td><strong>Log NTM</strong></td>
<td>-4.67&lt;sup&gt;a&lt;/sup&gt; (1.94)</td>
<td>-7.19&lt;sup&gt;a&lt;/sup&gt; (1.16)</td>
<td>-4.50&lt;sup&gt;a&lt;/sup&gt; (2.22)</td>
<td>2.75&lt;sup&gt;a&lt;/sup&gt; (0.93)</td>
</tr>
<tr>
<td><strong>No. Obs.</strong></td>
<td>648</td>
<td>647</td>
<td>647</td>
<td>635</td>
</tr>
<tr>
<td><strong>Adjusted R²</strong></td>
<td>0.66</td>
<td>0.63</td>
<td>0.99</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Note: Scenarios in columns (A) and (B) are run envisaging correction for period heteroskedasticity and for general correlation of observations within a given cross-section, and scenario in column (C) is run using specification with GLS cross-section weights that assumes the presence of cross-section heteroskedasticity. Standard errors are in parentheses with a, b, and c denoting significance at 1%, 5%, and 10% levels respectively.
Table 2 (cont.)

<table>
<thead>
<tr>
<th></th>
<th>Other non-metallic mineral products</th>
<th>Metal production</th>
<th>Machine building</th>
<th>Other manufactured products</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(A)</td>
<td>(B)</td>
<td>(C)</td>
<td>(A)</td>
</tr>
<tr>
<td>Const</td>
<td>-4.93(^a)</td>
<td>-5.80(^a)</td>
<td>-5.20(^a)</td>
<td>3.66(^c)</td>
</tr>
<tr>
<td>Log Output</td>
<td>0.44(^a)</td>
<td>0.39(^a)</td>
<td>0.42(^a)</td>
<td>0.65(^a)</td>
</tr>
<tr>
<td>Log Weight &amp; Distance</td>
<td>-0.82(^a)</td>
<td>-0.70(^a)</td>
<td>-0.76(^a)</td>
<td>-1.96(^a)</td>
</tr>
<tr>
<td>D1</td>
<td>0.30(^a)</td>
<td>0.35(^a)</td>
<td>0.34(^a)</td>
<td>-0.58(^a)</td>
</tr>
<tr>
<td>D2</td>
<td>0.65(^a)</td>
<td>0.97(^a)</td>
<td>0.93(^a)</td>
<td>0.60(^a)</td>
</tr>
<tr>
<td>D3</td>
<td>0.61(^a)</td>
<td>0.88(^a)</td>
<td>0.93(^a)</td>
<td>0.35(^a)</td>
</tr>
<tr>
<td>D4</td>
<td>0.48(^a)</td>
<td>0.77(^a)</td>
<td>0.76(^a)</td>
<td>1.08(^a)</td>
</tr>
<tr>
<td>Log NTM</td>
<td>-7.50(^b)</td>
<td>-7.31(^b)</td>
<td>-28.69(^a)</td>
<td>-41.16(^a)</td>
</tr>
</tbody>
</table>

| No. Obs.              | 285       | 285       | 285       | 94        | 94        | 1210      | 1204      | 1204      | 151       | 151       | 151       |
| Adjusted R^2          | 0.85      | 0.85      | 0.99      | 0.96      | 0.94      | 0.98      | 0.70      | 0.70      | 0.99      | 0.91      | 0.90      | 0.99      |

Note: Scenarios in columns (A) and (B) are run envisaging correction for period heteroskedasticity and for general correlation of observations within a given cross-section, and scenario in column (C) is run using specification with GLS cross-section weights that assumes the presence of cross-section heteroskedasticity. Standard errors are in parentheses with a, b, and c denoting significance at 1%, 5%, and 10% levels respectively.
6 Conclusion

Our short study confirmed that the impact of TBT and SPS measures could be both trade-distorting and trade-facilitating. As shown, in Ukraine only three out of eight studied manufacturing sectors (at high level of aggregation) face such severe TBT and SPS measures that they significantly distort trade. The highest protection is set for food products, and here the government intervention should be the most prompt and, at the same time, well-balanced. The harmonisation of the technical requirements and sanitary and phyto-sanitary standards with the international as Ukraine committed to the WTO should have a positive impact on trade flows into the country.

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