Tariff-induced (de)industrialization: An empirical analysis

Petreski, Marjan

University American College Skopje, Skopje, Macedonia

marjan.petreski@uacs.edu.mk

Jovanovic, Branimir

University of Turin, Turin, Italy

branimir.jovanovic@unito.it

Velickovski, Igor

National Bank of the Republic of Macedonia, Skopje, Macedonia

velickovskii@nbrm.mk

Abstract

In this paper, we investigate if tariffs affected manufacturing value added in 25 countries from Central and Southeast Europe, the Commonwealth of Independent States, and the Middle East and North Africa over the period 1990-2010. We identify and test three channels through which tariffs may affect industry value added. We use various fixed effects and an instrumental variable approach to address tariffs' endogeneity with respect to value added. The results suggest that, in general, lower tariffs seem to lead to higher value added, mainly through the higher imports of inputs in the production process, which were either nonexistent or more expensive on the domestic market previously. However, there are notable differences in the effects between different groups of countries and industries: tariffs are not found to affect industrialization in Southeast Europe and the Middle East and North Africa, which implies that their decision to liberalize trade was likely premature. This is supported by the finding that lower tariffs have positive effects on industry value added only in more mature industries.

Keywords: industrialization, trade liberalization, tariffs

JEL classification: F13, F42

1. Introduction

Do tariffs affect industrialization patterns? In this paper, we investigate this relationship using industry-level data for value added and tariffs for the transition economies of Central Eastern Europe and Baltics (CEEB), Southeast Europe (SEE) and the Commonwealth of Independent States (CIS), and the economies of the Middle East and North Africa (MENA) region, over the period 1991-2010. Over these two decades, the mentioned groups of countries faced different patterns and speeds of (de)industrialization. Mishandled privatization, insufficient structural reforms, and the incapability of attracting FDI made the economies of SEE and CIS deindustrialize faster than CEEB, whose industrialization patterns were mainly shaped by a relatively fast transition process and better geographical positioning. On the other hand, MENA countries failed to raise their low industrial level. However, many of them committed to trade liberalization, mainly motivated by their desire to join the World Trade Organization (WTO). If tariffs somehow affect industrialization patterns, their timely reduction may have brought benefits for industries, while pre-mature liberalization may have had detrimental effects. In this paper, we use the widespread definition of (de)industrialization as a process of economic and social change resulting from the increase/reduction in the industrial capacity of a country. Industrial capacity is measured either through manufacturing employment or manufacturing value added. We opt for the second measure and mainly rely on it in absolute terms.

The paper faces two main challenges. The first is the comprehension of the channels through which tariffs potentially affect industrialization. Tariffs increase the cost of imports, and may, through this, affect industry value added. Tariffs also reduce the relative price of exports to imports, which may affect exports and industry value added in turn. Through their effect on imports and exports, tariffs also affect the revealed comparative advantage of a country, i.e. the share in world export of a particular good relative to the overall share in total world export. This reflects productivity, which may also affect industry value added. Hence, we test three potential channels - imports, exports and revealed comparative advantage.

The second challenge is the accounting for endogeneity of tariffs. Tariffs are determined by many factors, including lobbying by powerful industries, desire to protect infant industries, and economy-wide industrial policy, all three of which are related to industry value added. Hence, endogeneity may be present due to both reverse causality and omitted variables. The panel data that we use allows for reducing the endogeneity bias by including various fixed effects. Still, fixed effects would not account for the entire endogeneity, and for this reason we use instrumental variable estimation. Specifically, we instrument tariffs by the bound tariff rates, which are prescribed by the WTO and should be exogenous, and by the lagged tariffs, which are pre-determined and should be uncorrelated with current shocks in industry value added.

The results robustly support trade liberalization, but only for mature industries. We find that lower tariffs have likely resulted in higher value added, overall, and that this has been achieved mainly through higher imports and likely not through productivity; exports also materialized as a significant channel, but with a small magnitude. We find evidence that lower tariffs resulted in higher value added in the CEEB and CIS countries but played no role for industrialization in MENA and SEE, which could be explained by the possibly premature trade liberalization in these countries.

The theoretical background of the paper is discussed in Section 2. Section 3 offers some stylized facts. Section 4 describes the methodology and the data used, with special reference to the endogeneity of the tariffs. Section 5 presents the baseline results, including a battery of robustness checks, while Section 6 offers a comparative analysis between the four regions involved, and between mature versus young industries. The last section concludes.

2. Theoretical background and relevant literature

The starting point of the analysis is the Trade Liberalization Hypothesis (TLH). The TLH posits that trade liberalization leads to static and dynamic efficiency gains by stimulating investment, export expansion, and GDP growth, as well as export and output diversification in favour of manufactured goods (Balassa, 1978, 1980; Bhagwati, 1978, 1988; Krueger, 1978, 1980; World Bank, 1987). TLH's philosophy – the theory of static comparative cost advantage – has been the main ingredient of conditionalities imposed on (developing) countries for their accession to multilateral, regional and bilateral trade agreements, the most prominent example being the acceptance into the WTO. TLH recommends reduction of the level and dispersion of import tariff rates, the removal of import quotas, licences and other quantitative restrictions, the removal of export taxes and subsidies, and the devaluation of national currency so as to compensate for the removal of protection or remedy overvaluation (Shafaeddin, 2010). The universality principle behind TLH implies that it is applicable to all countries, irrespective of their level of development and industrial capacity, and to each country over time.

But has the application of TLH led to improved welfare: export expansion, and industry diversification? Empirical results remain mixed. The neo-liberal strand of literature (e.g. Sachs and Warner, 1995, 1997) finds some evidence in favour of the TLH. The other strand of literature (e.g. Rodriguez and Rodrik, 2001; Rodrik, 2007; Wacziarg and Welch, 2008; ECLAC, 2002; Di Maio, 2008) finds little or no evidence that greater trade openness impacts growth. Specifically, the (de)industrialization effects of greater trade liberalization have been particularly examined and the results, while being dependent on the level of industrial development, are also largely inconclusive. For instance, some researchers found that manufacturing productivity increased after an episode of liberalization (Handoussa et al. (1986) for Egypt, Tybout and Westbrook (1995) for Mexico, and Tybout et al. (1991) for Chile). On the other

hand, Stiglitz (2005) argues that when the tariff and other quantitative restrictions are reduced , workers do not necessarily move to high-productivity jobs, as these are not created when the economy is in low stages of development, but rather become unemployed. Indeed, Shafaeddin (2006a,b) documents this; for instance, for nearly half their sample, he finds that liberalization was followed by rapid expansion of exports of manufactured goods and fast expansion of industrial supply capacity and upgrading; and this group of countries undertook gradual and selective trade liberalization only after industries matured. On the other hand, he documents that countries with aninsufficiently developed industrial base, like in Africa and in most of Latin America, premature trade liberalization brought de-industrialization, along the lines of Stiglitz (2005). Similarly, the results of trade liberalization on manufacturing are also not clear-cut in other parts of the literature (e.g. Harrison, 1994, Harrison and Revenga, 1995).

Baldwin (2011) argues that earlier research failed to estimate neatly the trade liberalization effects because trade liberalization theory overlooked the radical change in globalization that has been occurring since the mid-1980s. In the Pre-1980s period, international competition occurred mainly at the level of sectors, whereas later it has been occurring at a finer degree of resolution – the level of production stages. As a result of the information communication technology revolution, it became increasingly economical to geographically separate manufacturing stages; that is, to unbundle the factories, which made it easy for rich-nation firms to combine the high technology they developed at home with low-wage workers abroad.[1] Within the supply chain, the developing nation only has to provide reliable workers and a hospitable business environment. Thus, apart from rushing to unilaterally lower their tariffs (especially on intermediate goods), developing countries have also unilaterally reduced behind-the-border barriers to doing business. Although industrialization has become easier due to technological advances, the geographical proximity matters greatly in supply chains, since key personnel must still visit the offshored factory (Gamberoni et al. 2010). Thus, most production networks concentrate in low-wage countries that are near the high-technology nations (Baldwin and Lopez-Gonzales, 2014).

There are three main channels through which tariffs can affect industry value added. As tariffs are imposed on imported goods, the first channel is imports. Tariff effects on production are a topic of study in many standard international economics textbooks (e.g. Krugman and Obstfeld, 2014). Namely, a tariff increases the cost of an import, making it less attractive, which could translate to larger costs for producers' inputs in case they cannot find a substitute on the domestic market, hence negatively affecting producers' value added; or could translate to a competitive gain for producers of substitutes to the imported good, in which case their value added may increase (at least in the short run).

[1]Deardorff and Park (2010) provide detailed explanation about modelling trade between developed and developing countries based on exchange of capital-intensive and labour-intensive intermediates.

The second channel is exports. The effects of tariffs on exports are indirect (unless taxes are levied on exports). Lerner (1936) showed that there is a symmetry between the effect of an import tariff and an export tax on domestic relative prices. In other words, a tariff may reduce the incentive to export by increasing the relative domestic price of import to export, which is equivalent to reducing the relative price of export to import. Tokarick (2006) adds two additional explanations of how a tariff could affect exports: i) with the tariff, consumers may shift demand toward the domestic good (if it is considered a substitute to the imported good), which is now cheaper in relative terms. Hence, the tariff actually reduces the price of export relative to non-traded goods, which is equivalent to a real exchange rate appreciation, which harms exports; and ii) the tariff may make capital more expensive, especially in developing economies, which import capital. Under the assumption of capital mobility across sectors, a higher rental rate on capital would spread across sectors, hence raising the cost of production in the export sector and reducing output.

The third channel is the Revealed Comparative Advantage (RCA; Balassa, 1965). The RCA index measures an industry's actual comparative advantage in production and trade. The RCA approach argues that if a country's share in world export of a particular good is greater than its overall share in total world export, then the country has a revealed comparative advantage in exporting that good.[2] Balassa argued that export/import ratios would be more influenced by protectionist measures (as are tariffs; Hamilton and Svensson, 1982), while the relative export shares, such as RCA, would be more reliable indicators of comparative advantage. The lower the trade costs, such as tariffs, the better the RCA measure and more equivalent it is with production-based indicators of comparative advantage (Moenius, 2006). The latter reflects the productivity level of industries, which were frequently very low when waves of tariff reductions were phased in in transition economies. Essentially, they were unprepared to compete in foreign markets, and hence their value added has been negatively affected. Nevertheless, trade liberalization's effect on comparative advantage development might be driven by the success in attracting FDI and its sectoral destination (Barry and Hannan, 2001). Thus, trade liberalization, accompanied by knowledge-related spillovers from FDI, may enhance the industry's comparative advantage. This is particularly expected in case of efficiency-seeking FDI, which requires access to imports of intermediate goods and services and is thus dependent on an open trade regime (Lesher and Miroudot, 2008).

Earlier empirical analyses focused on the effects of trade liberalization on productivity, growth and employment in various countries and regions.[3] To the best of our knowledge, the literature has not

[2] Hilman (1980) discusses the relation between the "revealed comparative advantage" and "comparative advantage" and provides the conditions for correspondence. As Hinloopen and Van Marrewijk (2008) argue, violations of the Hillman condition are small as a share of the number of observations and occur rarely after 1985.
[3] For example, OECD (2011) on the impact of trade liberalization on jobs and growth in G20; Ernst (2005) on the effects of trade liberalization on export orientationand employment in Argentina, Braziland Mexico; Paus et al. (2003) on the relationship between trade liberalization and manufacturing productivity in Latin America; Aichele and Heiland (2014) on the impact of China's WTO entry on value chains; Amiti and Konings (2007) on the effects

considered the channels through which tariffs can affect industry value added in Central and Southeast Europe, the Commonwealth of Independent States, and the Middle East and North Africa in a comparative geographical context. This is where the paper makes a contribution to the current sparse of knowledge.

3. Some stylized facts

The manufacturing value added in transition economies has been in steady decline for the past two decades. The possibly oversized industrial sector at the beginning of the 1990s, the structural reforms (including the long and thorny process of privatization in many cases) and political challenges largely defined deindustrialization over the 1990s. Still, industry value added continued to decline over the 2000s as well, particularly in SEE and CIS. Slow structural reforms, absence of industrial policies, absence of or improper policies for attracting FDI (which largely populated the service sectors), improper education policies (favouring social sciences over exact sciences), and poor infrastructure, are among the reasons for the continuing deindustrialization.

SEE's deindustrialization has been more pronounced than that of other ex-socialist countries (Figure 1). Different patterns of (de)industrialization are observed in these countries: while the CIS suffered the same destiny as SEE, the CEEB countries saw a smaller decline in manufacturing value added, supported by its favourable geographical position, the relatively fast completion of the transition process and the associated structural reforms, which all led to quick acession to the EU. Finally, while deindustrialization is not observed in the MENA region, it is obvious that these countries have failed to industrialize over the past two decades, given their low level of initial industrialization.

Figure 1 – Manufacturing value added in a comparative context

While the patterns of (de)industrialization may have differed among regions and countries due to their internal structural and policy setup, a common feature across regions or countries is membership in the WTO and the commitment to trade liberalization. About two-thirds of the SEE countries have been WTO members since the early 2000s (with the exception of Montenegro, which joined in 2012), hence the region has been experiencing a decade-long bout of trade liberalization under the WTO rules. As **Table 1** suggests, WTO membership brought tariffs down by approximately 80 percent of the level prior to WTO accession, much more than the decline observed in the non-WTO SEE members during the same period. The SEE region is behind CEEB countries, who all joined WTO and also experienced significant tariff reductions. On the other hand, CIS and MENA lag behind, as about half their countries are WTO members. Still, even members there still face high tariff rates, despite the fact that significant

of trade liberalization on plant productivity in Indonesia; Harding and Rattso (2010) on the effects of tariffs on labour productivity in South Africa.

reduction has been observed after joining the WTO, while non-members experienced slower tariff declines.

Table 1 – Weighted tariff rates of the manufacturing products (regional simple averages, %)

So, the question that arises, then, is whether or not trade liberalization has a role to play for the (de)industrialization of the observed countries, given their initial levels of industrialization. The data (Figure 2, left) clearly suggests a positive link between initial industrialization and deindustrialization: the higher the initial position, the deeper the decline. Figure 2, right, relates the industry decline to trade liberalization. The data roughly suggest that fast trade liberalization (larger tariffs reduction) is related to growing manufacturing declines in regions with low initial industrialization, as the case of MENA suggests. On the contrary, smaller tariff declines (than in MENA) resulted in manufacturing 'savings' in the other three regions. These savings were smaller in CEEB than in SEE and CIS.

Figure 2 – Tariff reduction and deindustrialization by region

4. Methodology and data

4.1. Basic model

The model used in the analysis links developments in manufacturing value added in different industries with the tariff rate, only through the channel(s) through which the latter may influence the former. More precisely, the basic model is:

$$va_{ijt} = \rho \cdot va_{ijt-1} + \beta_1 \cdot X_{jt} + \gamma_1 \cdot channel_{ijt} + \alpha_{1i} + \alpha_{1j} + \alpha_{1t} + \varepsilon_{1ijt} \qquad (1)$$

$$channel_{ijt} = \beta_2 \cdot X_{jt} + \gamma_2 \cdot tariff_{ijt} + \alpha_{1i} + \alpha_{2j} + \alpha_{2t} + \varepsilon_{2ijt} \qquad (2)$$

where i indexes the industries, j the countries and t the time, va_{ijt} stands for the logarithm of the manufacturing value added, $tariff_{ijt}$ is the ad-valorem tariff rate imposed onto industry i in country j at time t; X is a vector of conventional explanatory variables, like road density, credit to GDP, foreign investment to GDP, log of GDP per capita, spending on education in GDP, market capitalization in GDP and trade to GDP; α_is are the industry fixed effects; α_js are the country fixed effects, while α_ts the time fixed effects; ε_{ijt}s are the error terms, which are assumed to be well-behaved (which is controlled for by reporting errors robust to heteroskedasticity and autocorrelation).

4.2. Tariffs' endogeneity

The econometric challenge in estimating (1) and (2) is that tariffs are almost always endogenous to the industry value added. The underlying premise of the endogenous tariff theory (Brock and Magee, 1978; Findlay and Wellisz, 1982) is that "political decisions on tariff rates are reflections of the selfish

economic interests of voters, lobbying groups, politicians, or other decision makers in trade policy matters" (Mayer, 1984, p.970), despite the post-WTO era reduction of the excessive use of trade policies.

One way to address tariffs' endogeneity is to include industry fixed effects at a higher level of aggregation compared to the level of aggregation of the value added itself. The idea behind this is that controlling for the industries' power at higher level of aggregation should capture their influence in interfering with the tariffs' dynamics. Hence, the endogeneity stemming from this source will be accounted for to some extent.

Another way to address tariffs' endogeneity is to find suitable instrument for them. This is a challenging task, since one needs to find a variable that is correlated with the tariffs, but is not correlated with industry value added (nor the channels), except through the tariffs. One candidate to be considered for instrument in this context is the bound tariff rate. The bound tariff rate is likely to be correlated with the tariff rate that countries charge, because it, in a certain way, represents a ceiling for the actual rates. It should be exogenous, too, because it is prescribed by the WTO. However, several arguments against a bound tariff with strict exogeneity with respect to industry value added may be raised. *Firstly*, countries may interfere with this process, i.e. the bound rate is usually determined in a negotiation process between the governments and the WTO, particularly when considering the level of development of the country. This would invalidate the instrument's strict exogeneity and may render our estimates biased. However, the bias may be considerably smaller for smaller countries, as the ones in our sample, because of their small bargaining power during the negotiations. *Secondly*, even if there is a correlation between a country's level of development and the level of bound tariffs, by considering industry-level data, we actually investigate how tariffs affect the dynamics of the industrial value added and not the growth of the entire economy or manufacturing sector. A *third* argument against our instrument is that bound tariffs may be affected by industry value added, if they are set taking into consideration the level of development of individual industries, or if bigger industries have more power to push for higher bound tariffs. To control for this possibility, in the robustness checks section, we add an additional stage in the estimation, in which the bound tariffs are modeled as a function of the average value added for each industry in each country. By considering the estimates with our baseline results, we would be able to judge the size of the potential bias stemming from the only plausible exogeneity of the instrument used.

A second candidate for instrumenting tariffs is their past value. Lagged tariffs are also likely to satisfy the two criteria for a good instrument: i) they are likely correlated with the tariffs of the next period (consider that, especially within the WTO, governments prevent large and unexpected changes in tariffs); and ii) it is unlikely that former tariffs are correlated with the current shocks on the value added.

In technical terms, to our system of equations (1) and (2), we need to add a third equation:

$$tariff_{ijt} = \psi \cdot instrument_{ijt} + \alpha_{3i} + \alpha_{3j} + \alpha_{3t} + \varepsilon_{3ijt} \qquad (3)$$

Whereby notations are self-explanatory.

4.3. Estimable model

The model that we estimate is given by the following four equations:

$$va_{ijt} = \rho \cdot va_{ijt-1} + \beta_1 \cdot X_{jt} + \gamma_1 \cdot imp_{ijt} + \gamma_2 \cdot exp_{ijt} + \gamma_3 \cdot rca_{ijt} + \alpha_{1i} + \alpha_{1j} + \alpha_{1t} + \varepsilon_{1ijt} \quad (4)$$

$$imp_{ijt} = \beta_2 \cdot X_{jt} + \varphi_2 \cdot tariff_{ijt} + \alpha_{2i} + \alpha_{2j} + \alpha_{2t} + \varepsilon_{2ijt} \quad (5)$$

$$exp_{ijt} = \beta_3 \cdot X_{jt} + \varphi_2 \cdot tariff_{ijt} + \alpha_{3i} + \alpha_{3j} + \alpha_{3t} + \varepsilon_{3ijt} \quad (6)$$

$$rca_{ijt} = \beta_4 \cdot X_{jt} + \varphi_2 \cdot tariff_{ijt} + \alpha_{4i} + \alpha_{4j} + \alpha_{4t} + \varepsilon_{4ijt} \quad (7)$$

And a fifth equation when we instrument the tariffs:

$$tariff_{ijt} = \beta_5 \cdot X_{jt} + \psi \cdot bound\_tariff_{ijt} + \alpha_{5i} + \alpha_{5j} + \alpha_{5t} + \varepsilon_{5ijt} \quad (8)$$

Whereby the notations are as before; imp_{ijt} is the log of the imports of industry i from country j at time t; exp_{ijt} is the log of exports respectively; rca_{ijt} is the revealed comparative advantage index calculated as the share of the country j's exports of industry i at time t in the total export of the same country, divided by the share of exports of the same industry at the same time of the sample countries in their total export. The vector of control variables includes the log of the GDP per capita, the share of foreign direct investment in GDP, the public spending on education in GDP, the market capitalization of the listed firms in GDP, trade openness, an indicator of public infrastructure and credits to GDP. They have the purpose of capturing various developments that may have affected (the speed of) industrialization in the countries investigated.

When we address endogeneity through industry fixed effects, the model also features industry-level dummies. When we address endogeneity by instrumental variables, industry fixed effects are not included (only country and time fixed effects are included), since the model would become bulky and would suffer from multicollinearity.

4.4. Estimation technique

Given that we need to estimate a system of five equations, we rely on Roodman's (2011) Conditional Mixed Process (CMP) estimator which allows mixing the standard limited dependent variable models in multi-equation systems. The CMP method is a parametric one, meaning that distributional assumptions are imposed on the model, which leads to higher efficiency. The standard IV approach, however, is not ; there is an implied trade-off between the two estimators. As our model is not recursive and fully articulated, i.e. equations for earlier stages include instruments to address endogeneity and omit some variables, the applied estimator is a limited-information (LIML) estimator.

4.5. Data

The empirical analysis is done at the industry level. The analysis focuses on manufacturing industries. In that way, the study can rule out factors that would keep manufacturing underdeveloped, as those factors should not affect the differences between manufacturing industries (Rajan and Subramanian, 2011, p. 100). The level of aggregation of the industries is at the 4-digit ISIC classification. Industry fixed effects, whenever used, are on a 1- or 2-digit level of aggregation (see section 4.2).

We use annual data. The sample is composed of 25 countries from the transition regions of CEEB, SEE and CIS and from the MENA region. These countries were chosen on the basis of the availability of industry-level data. The time period covers 1990-2010, but differs from country to country and depends on data availability. For most of the countries, the analysed period covers only the 2000s.

Data on industrial value added, imports and exports are from UNIDO. The data on tariffs are from TRAINS. The data on bound tariffs are from the WTO. The original data on tariffs are according to the Harmonized System (HS) of tariffs and are at the 9-digit level. To map the tariff data to the value-added data, they are transformed to 4-digit ISIC classification using concordance tables from the World Integrated Trade System (WITS) of the World Bank.

Data on the other variables used as controls are from the World Development Indicators from the World Bank. See Appendix 1 for further details.

5. Results and discussion

5.1. Tariffs' role for (de) industrialization: Endogeneity addressed through industry fixed effect

We start by observing the results when we use industry fixed effects (our model (4)-(7)). These are given in Table 2: the first four columns use 1-digit aggregation of industry fixed effects, while the last four columns use 2-digit aggregation.

Table 2– Results with industry fixed effects

The results suggest that an increase of the tariff by one percentage point results in a reduction of import by 0.4%, on average, ceteris paribus. Or, if one takes the interquartile range of the tariff rate as a measure of a normal change in tariffs (see Appendix 2 for the descriptive statistics of the variables), one can see that increase in tariffs by 11 percentage points reduces imports by roughly 4.4%. Similarly, an increase in tariffs by 11 percentage points. reduces exports by 1.1%. The export reduction magnitude is considerably smaller, which corroborates the notion of Lerner (1936) and Tokarick (2006) that tariffs may harm exports indirectly. Finally, the tariff is not significant for the RCA index.

The results in columns (4) and (8) suggest that both import and export are important for the value added of the industrial sector. The magnitudes, however, suggest that tariffs work predominantly through the

main channel of imports, while only indirectly and with lower magnitude through the export: a larger tariff reduces both import and export, which then feeds into lower value added.

To understand the magnitudes of the identified channel(s), one needs to consider the lagged value added in columns (4) and (8). It is significant and fairly large, suggesting that the value added is likely to follow a stochastic trend, which, if not properly modelled, may lead to incorrect inferences. Due to the presence of this lagged variable, the remaining coefficients are 'short-term' ones. We obtain the long-run coefficients by dividing the short-term ones by (1 – the coefficient on the lagged dependent variable). If import increases by 1%, manufacturing value added is predicted to increase by 0.15%. If export increases by 1%, manufacturing value added is predicted to increase by 0.5%. Hence, export plays stronger role for manufacturing production. Both export and import are determined by the tariff. Overall, under the case of trade liberalization, a reduction of the tariff rate by 11 percentage points (the interquartile range) will result in 1.2% higher value added. **This main finding suggests that in the overall sample, trade liberalization may have been timely, i.e. resulted in support of the industrialization processes mainly through the import channel, but also through the export channel.**

5.2. Tariffs' role for (de) industrialization: Endogeneity addressed through instrumentation

Before presenting the results when endogeneity is addressed through instrumentation, we provide some indicative tests on the instruments' validity. However, because we are dealing with a multi-equation system, we cannot provide the conventional instrument tests. Hence, we run a conventional Two Stage Least Squares model, whose first stage regresses tariffs on the two instruments, while the second stage regresses the log of the value added on tariffs and other variables (given the constraint to produce these tests for a multi-equation system). Four tests about instruments are reported in Table 3. The first three test the null hypothesis that the excluded instruments are weakly correlated with the endogenous regressor; the provided F-statistics are far above the rule of thumb of 10, providing evidence that both instruments are strong. The last one tests the null hypothesis that the excluded instruments are uncorrelated with the error term; the p-values provide sufficient evidence that the null cannot be rejected, at least at the 5% level, hence supporting our argument about the instruments' exogeneity with respect to the value added.

Table 3– Instruments' tests

Table 4 presents the results of our model with instrumentation (4)-(8). We now add a set of control variables, which inter alia serve as a robustness check. The left half of the table (columns 1-5) presents the model without control variables, while the right half (column 6-10), presents the model with them. Including control variables halves our sample, but coefficients remain highly robust. Hence, we interpret the results with the controls (columns 6-10). The coefficients do have the expected signs and

many of the coefficients of interest are significant. First, we document that we are dealing with strong instruments, as both the bound tariff and the lagged tariff are highly significant in the first-stage regression. The coefficients suggest that the lagged tariff is positively correlated with the current tariff, with a fairly large coefficient. This corroborates our earlier guess that governments would refrain from abrupt changes of tariffs, in order to comply with the requirements of WTO membership where applicable, but also to smooth traders' incentives. A bound tariff also positively affects the average tariff, although the coefficient is fairly low: average tariffs reduce with the reduction of bound tariffs, but the moves may be sluggish.

The results suggest that tariffs, then, affect import and revealed comparative advantage, but not export. An increase of the tariff by 11 p.p. (the interquartile range) reduces imports by roughly 15%. Tariff becomes insignificant for export, despite the fact that the coefficient remains the same as in Table 2. Finally, an increase of tariff by 11 p.p. is found to result in an increase of the RCA index by 0.55 index points, which is fairly small magnitude, and likely is a result of the fact that the majority of our sample are small economies. To comprehend the magnitude of this change, note that for a country to move from the first to the third quartile along the RCA distribution, an increase of tariffs by 130 percentage points would be needed. Indeed, this finding may explain the liberalization-productivity channel: declining tariffs resulted in lower comparative advantages of the countries, probably because their productivity levels were relatively low when liberalization started, and were insufficient to compete in foreign markets.

The results in column (10) suggest that only import and export are important for the value added of the industrial sector. This suggests that tariffs work only through the main channel of import: a larger tariff reduces import, which then feeds into lower value added. The tariff has not affected export, but export is found to have increased value added. Finally, although tariff affects competitiveness, it does not channel to manufacturing value added, as its comparative advantage is found to be insignificant. . Overall, in the case of trade liberalization, a reduction in the tariff rate by 11 p.p. (the interquartile range) will result in 15% higher imports and a 1.5% higher value added, the coefficient being very close to, but being slightly higher than, the one of 1.2% obtained from Table 2. **This main finding from the instrumentation exercise suggests that in the overall sample, trade liberalization may have been timely, i.e. it resulted in support of the industrialization processes. This is similar to the findings from the previous estimation, when endogeneity was addressed through inclusion of industry fixed effects. However, contrary to that case, trade liberalization in this case is found to have worked only through the import channel.**

Table 4 – Results with instrumentation

Turning the focus to the control variables, the first result to note is the unexpected coefficients on the infrastructure and credit indicators. Better roads seem to lower industry value added, as well to bring

about an additional percentage of bank credits into the economy. Under the assumption that roads are built by the government with public money, this finding may suggest a crowding out effect, especially if the road building has been financed with domestic debt. On the other hand, the negative effects of credits on value added may suggest a misallocation of bank money: they have likely supported sectors which were not growing; or simply favoured consumption loans. Contrary to this, FDIs supported industrialization, while trade openness reduced value added.

5.3. Is the effect due to cheaper inputs or due to competition?

The finding that trade liberalization increases imports and therefore production can be due to two underlying mechanisms. The first one is that liberalization results in imports of **inputs in the production process** which were either nonexistent or more expensive on the domestic market previously. The second mechanism is that lower tariffs result in cheaper imports of final goods, and hence in fiercer **competition** on the domestic market, which spurs innovation among domestic firms and increases production. One way to tell which of the two effects dominates is to observe if the relationship between the tariffs and the value added present in industries which produce inputs or final goods.[4]

Therefore, we have classified the industries into these two groups, in the following way. First, the ISIC codes were transformed to the Broad Economic Categories (BEC) classification, using concordance tables from WITS. Then, the following BEC categories were classified as final goods: 112 (Food and beverages, primary, mainly for household consumption), 122 (Food and beverages, processed, mainly for household consumption), 522 (Transport equipment, nonindustrial), 61 (Consumer goods not elsewhere specified, durable), 62 (Consumer goods not elsewhere specified, semi-durable), 63 (Consumer goods not elsewhere specified, nondurable). All remaining codes were treated as inputs, meaning that the inputs group contains both capital and intermediate goods.

Table 5 presents the results of the system (5)-(8), estimated on inputs and final goods industries. One can see that the results for the **inputs** are very similar to the baseline results, the only difference being that the imports are insignificant for the value added (but with a similar coefficient as in the baseline regression). Turning to the **final** goods, one can see that the results are slightly different here. Once again, higher tariffs result in lower imports and, through this, in lower value added; but, on the other hand, higher tariffs here result in higher exports and, through this, in higher value added, too. In total,

[4] One needs to be cautious with this interpretation, however, because the competition channel may be present for inputs, too.

Table 5

the exports channel prevails, meaning that for final goods, trade liberalization, i.e. lower tariffs, results in lower value added.

Therefore, it would seem that trade liberalization affects inputs and final goods differently. Lower tariffs on inputs lead to higher production of inputs, while lower tariffs on final goods lead to lower production of final goods. Because the results for the inputs are very similar to the results obtained from the whole sample of countries, it can be concluded that that the inputs channel dominates.

Table 5 – Inputs and final goods

5.4. Some robustness checks

We conduct three robustness checks of our results: first we use variables scaled to GDP instead of their logarithms; second, we augment the previous specification with two explanatory variables related to terms of trade and real effective exchange rate; and third, we control for the average value added in the baseline model.

First, we first draft **Table 6**, augmenting the model with additional explanatory variables to control for the real effective exchange rate and the terms of trade as channels through which tariff may affect the manufacturing value added is in line with the discussion in Tokarick (2006), which suggests that the general conclusions arising from the previous model estimates are remarkably confirmed. Both the import and export channels were supportive of industrialization in an environment of decreasing tariffs. The real effective exchange rate and the terms of trade are not statistically significant in the equations explaining the channels; nevertheless, their changes have positive and statistically significant effects on the value added of the industrial sector.

Table 6 – Relative values to GDP of the main variables used and two additional explanatory variables

As argued in Section 4.2, the results obtained in **Table 4** could be criticized for the possibility that the bound tariffs are set taking into consideration the level of development of individual industries, invalidating the tariffs' strict exogeneity. More precisely, bigger industries may be more able to push for higher bound tariffs, due to their power. To control for this possibility, we include additional stage in the estimation, in which the bound tariff is a function of the average value added of the respective industry in the respective country. These results are presented in **Table 7**. The average industry value added is a significant and positive determinant of the bound tariffs, suggesting that bigger industries may indeed push for higher bound tariffs. However, the results of the other five equations remain robust to this treatment, implying that our previous results are still likely to be valid.

Table 7 – Results when average VA is controlled for

6. Comparative analysis

6.1. Transition economies vs. MENA

Despite the unambiguous evidence that trade liberalization resulted in support of the industrialization process in the overall sample, we further investigate this issue in a comparative context across different groups of countries in the sample. Namely, there have been successes but also failures to industrialise in this sample of economies. As discussed previously, the initial substantial decline of the manufacturing value added share in the 1990's has been followed by significant industrialisation in CEEB. On the other hand, there are many examples of failed industrialisations in the SEE and CIS. In some other developing countries from the MENA region, a failure to industrialise can also be observed. Thus, a comparative analysis of the trade liberalisation effects on the (de)industrialization process among these groups of countries could prove to be more insightful for our study. .

Table 8 presents the estimates of the system of equations (4)-(8) separately for the different groups of countries. The findings for the overall sample that trade liberalization supported industrialization are confirmed for the CEEB and to some extent for the CIS, though with some important differences regarding the transmission channels. In the case of CEEB, the results suggest that tariffs affect both import and export, but not revealed comparative advantage. An increase of the tariff by one percentage point results in a reduction of import and export by 1.7% and 0.8%, respectively, on average, ceteris paribus. Although the effect on import is higher than that of the overall sample by 0.4 p.p., it is not transmitted to the value added since its coefficient is statistically insignificant at any conventional level of significance. On the other hand, export is important for the value added of the industrial sector. A lower tariff in the CEEB increases export, which then feeds into higher value added in the long run by 0.5%.Thus, the overall effect of the tariffs on the value added in CEEB is similar to that of the overall sample. In the case of CIS, the results suggest that tariffs affect only import: an increase of the tariff by one percentage point results in a reduction of import by 0.3%, which makes up around a quarter of the coefficient value estimated for the overall sample. Nevertheless, in the value-added equation, both import and export are important determinants, in line with the results for the overall sample. Thus, reducing the tariff in the CIS increases import, which then translates into higher value added in the long run by 0.1%, which is qualitatively similar to the effect for the whole sample. The positive effect of export on value added is found to be double that of the import, but this seems not to have been induced by the tariffs.

As for the SEE and MENA, the results suggest that trade liberalisation did not affect the industrialisation process via reducing the tariff level. In both cases, tariff affects import, but its effect is not transmitted to manufacturing value added. The latter is affected by export, but this is driven by factors other than the tariffs. The only difference between these two groups of countries – which simultaneously makes

the SEE distinct from the rest of the countries in the sample - is the statistically significant effect of tariff on revealed comparative advantage. Yet, this does not change the overall conclusion about the lack of influence of trade liberalisation on the industrialisation in the SEE.

In general, the main finding from the comparative analysis suggests that trade liberalization resulted in support of the industrialization processes in the CEEB and CIS, although via different trade channels; that is, via export for the CEEB, which transmits stronger effects to the value added than the import channel, as was the case for CIS. Conversely, the substantial tariff reduction in MENA and, in particular, in the SEE, played no role in industrialisation. This suggests that the relatively fast trade liberalisation might have been premature, since some other important factors for creating an industrialisation-supportive environment were not in place in the SEE and MENA, in contrast to the rest of the countries in the sample, and in particular to CEEB. The latter were likely to take advantage of the geographical proximity to the high-technology old-EU countries in accordance with the findings in Gamberoni et al. (2010) and Baldwin and Lopez-Gonzales (2014).

Table 8 – Transition countries vs. MENA

6.2. Mature vs. young industries

Finally, we evaluate whether the effects of tariffs on industry value added depend on the maturity of industries. As Shafaeddin (2006a,b) argues, trade liberalization has positive effects on industrialization only for industries which are mature or close to maturity. To investigate this hypothesis, we classify the industries into mature and young depending on their value added. More precisely, if an industry in a given year has a value added which is higher than the average value added for all the industries in that country, we classify it as a mature industry. Otherwise, we classify it as young. Although there is no clear definition in the literature on industry maturity, this definition in terms of the value added does not seem to be inappropriate. For instance, London Economics (2002) mentions value added as one of the criteria for industry maturity.

The results are presented in **Table 9**. As can be seen from the first panel, for mature industries, higher tariffs lead to lower imports, but not exports and comparative advantage. The effect is such that a one percentage point increase in the tariff rate reduces imports by 0.9 per cent. The value added, then, depends on the imports in a positive manner (higher imports = higher value added). Therefore, higher tariffs lead to lower value added, due to the lower imports, as in the overall sample. The size is such that this 0.9% lower imports results in a 0.05% lower value added in the long run.

Things are different for young industries. Here, higher tariffs lead to lower imports, and through this, to lower output, just as previously. A one percentage point increase in the tariff rate reduces imports by 2.9%, which then translates into 0.2% lower output. But higher tariffs here lead to higher exports, and

through this, to higher output, differently from the mature industry case. The effect is such that a one percentage point higher tariff raises exports by 0.7%, which then raises value added by 0.2%. In sum, the imports effect and the exports effect net each other out, as a result of which the overall effect of the tariffs on the value added is insignificant.

Therefore, to summarize the analysis for the different industries, we find some evidence that trade liberalization is beneficial only for mature industries, in accordance with Shafaeddin (2006a,b).

Table 9 – High value added industries vs. Low value added industries

7. Conclusion

In this paper, we evaluate if trade liberalization has been supporting the industrialization process in transition countries. More precisely, we investigate if tariffs affect industry value added in 25 countries from CEEB, SEE, CIS and MENA over the period 1990-2010. We identify and test three channels through which tariffs may affect industry value added: imports, exports and revealed comparative advantage. We utilize various fixed effects and an instrumental variable approach to address tariffs' endogeneity with respect to value added, using the bound tariffs and the lagged tariff as instruments for the actual tariff.

Our findings suggest that lower tariffs have likely resulted in higher value added, overall, and that this has occurred mainly through the higher imports. On the other hand, the export channel worked in the same fashion, but with quite a smaller magnitude and without robustness of the finding, while the revealed comparative advantage has not been supportive to the industrialization process.

We find that trade liberalization affects inputs and final goods differently. Lower tariffs on inputs lead to higher production of inputs, while lower tariffs on final goods lead to lower production of final goods. Due to the similarity with the results obtained from the whole sample of countries, we can say that the inputs channel dominates. Hence, it can be said that the underlying mechanism behind the imports' effect is that liberalization resulted in imports of inputs in the production process which were either inexistent or more expensive on the domestic market previously.

Differentiating between different geographical regions, our findings imply that lower tariffs likely resulted in higher value added in the CEEB and CIS countries. The export channel materialized as the significant channel in the CEEB, while the import channel was more important for supporting industrialization in CIS. On the other hand, tariffs played no role in industrialization in MENA and SEE, which may be explained by the possibly premature trade liberalization in these countries.

That this may indeed be the case can be inferred from our final analysis, which distinguishes between industries with different levels of maturity. More precisely, we find that more mature industries benefit from trade liberalization; that is, lower tariffs lead to higher value added, due to the higher imports. On

the other hand, younger industries do not benefit from the liberalization, since the overall effect of the tariffs on the value added is insignificant.

To summarize, our findings support trade liberalization, but only for mature industries. This could imply that protectionism may be beneficial for young industries, which is in accordance with some previous researches. Although the countries from CEEB, SEE, CIS and MENA have experienced significant tariff reductions during the last two decades, they could reconsider their trade policies for young industries in line with these findings.

8. References

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Appendix 1.Variable description

Value added: Log of value added in current US Dollars;

Import: Log of imports from world in current US Dollars;

Export: Log of exports to world in current US Dollars;

RCA: Revealed comparative advantage index as explained in details in section 4.3;

Tariff:Ad-valorem tariff rates of manufacturing products in %;

Bound tariff: Bound tariff rates of manufacturing products set by WTO in %;

Road density: km of road per 100 sq. km. of land area;

Credits: Domestic credit to private sector by banks (% of GDP);

FDI: Foreign direct investment, net inflows (% of GDP);

GDP per capita: Log of GDP per capita (constant 2005 US$);

Spending on education: Public spending on education, total (% of GDP);

Market capitalization:Market capitalization of listed companies (% of GDP);

Openness: Export and Import (% of GDP);

REER: Real effective exchange rate index (2007 = 100);

Terms of trade: Net barter terms of trade index is calculated as the percentage ratio of the export unit value indexes to the import unit value indexes, measured relative to the base year 2000. Unit value indexes are based on data reported by countries that demonstrate consistency under UNCTAD quality controls, supplemented by UNCTAD's estimates using the previous year's trade values at the Standard International Trade Classification.

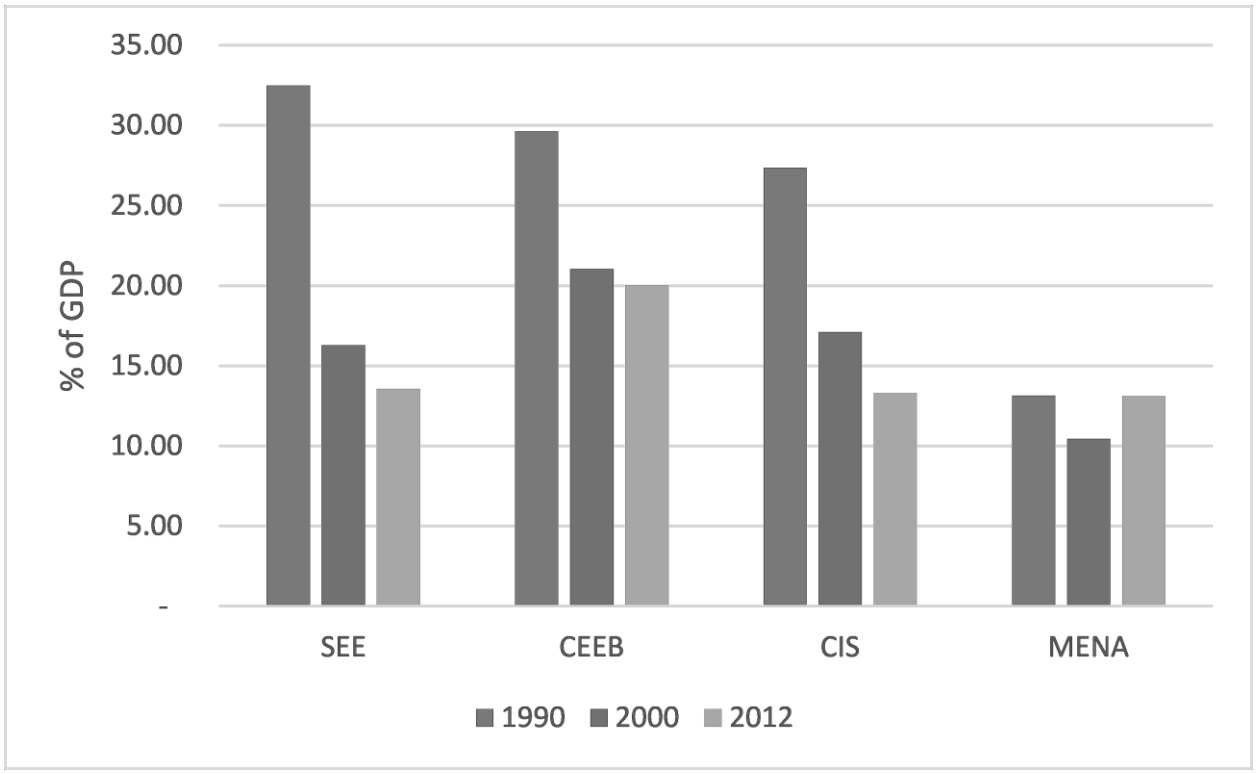
Appendix 2.Descriptive statistics of variables

Statistics

	Tariff rate	Bound tariff rate	Log of imports	Log of exports	RCA	Log of value added	Log GDP pc	Road density	Credit to GDP	FDI to GDP	Spending on education to GDP	Market capitalization to GDP	Trade to GDP	Number of non-tariff measures
Minimum	0	0	0	0	0	5.0	5.8	5	1.2	-16.2	0	0	26.3	0
25 percentile	3.6	8.1	8.8	6.7	0.00	15.2	7.6	17.2	18.0	0.8	3.8	7.5	63.3	0.53
Mean	13.8	26.0	10.1	8.6	0.09	16.6	8.4	69.1	40.4	4.3	4.7	30.1	88.8	0
50 percentile	7.5	15	10.2	8.9	0.02	16.9	8.4	44.5	32.5	2.7	4.7	18.2	88.9	0
75 percentile	14.8	34	11.6	10.9	0.07	18.3	9.2	121.5	50.8	5.8	5.5	35.8	110.1	0
Maximum	2314.3	100	17.6	18.2	34.27	24.6	11.0	214.5	283.5	51.0	14.2	299.0	172.9	119
Standard deviation	46.1	28.5	2.2	3.0	0.42	2.4	1.2	60.2	35.6	6.1	1.4	37.3	30.4	3.35
Number of observations	16122	26943	49574	38277	40174	26798	63881	31369	59817	60579	43688	51181	64389	70080

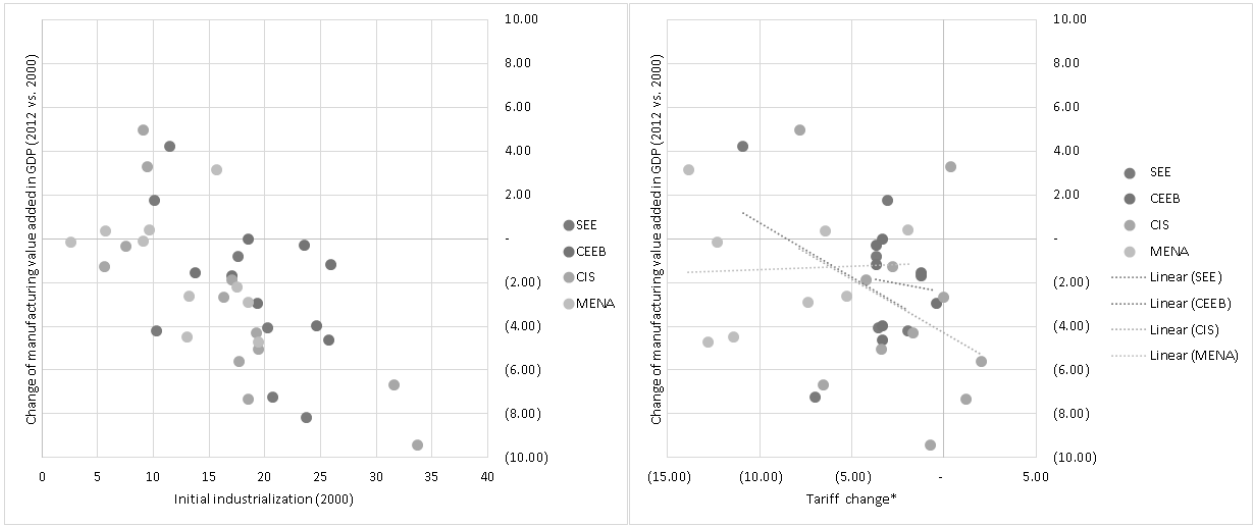
FIGURES

Figure 1 – Manufacturing value added in a comparative context



Source: World Development Indicators

Figure 2 – Tariff reduction and deindustrialization by region



Source: Authors' draft based on WDI data.
*Notes: * Tariff change refers to the absolute difference between the tariff level in 2012 and when the country joined WTO for member and in 2000 for non-members. Hence, a negative value of the x-axis on the right chart signifies a tariff reduction and vice versa.*

TABLES

Table 10 – Weighted tariff rates of the manufacturing products (regional simple averages, %)

		WTO members			Non-WTO members	
	% of countries members of WTO at end-2012	Tariff rate prior to WTO accession	Tariff rate three to five* years after WTO accession	Tariff rate in 2012**	Tariff rate in early 2000s***	Tariff rate in 2012**
SEE	67%	7.35	3.75	1.39	5.83	2.22
CEEB	100%	4.07	2.47	1.61	-	-
CIS	46%	6.10	4.25	2.93	6.25	5.16
MENA	55%	18.90	10.18	5.72	20.88	12.53

Source: World Development Indicators
*Notes: * depending on data availability; ** or the closest available figure; depending on data availability, the figure is for one of the years between 2000 and 2004.*

Table 11 – Results with industry fixed effects

	Industry fixed effects aggregated at 1-digit level				Industry fixed effects aggregated at 2-digit level			
Dependent variables:	Log of import	Log of export	RCA index	Log of value added	Log of import	Log of export	RCA index	Log of value added
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag of log VA				0.868***				0.849***
				(0.003)				(0.004)
Log of import				0.014***				0.020***
				(0.004)				(0.004)
Log of export				0.062***				0.072***
				(0.003)				(0.004)
RCA index				0.014				0.016
				(0.020)				(0.020)
Tariff rate	-0.004***	-0.001*	0.000		-0.004***	-0.001**	0.000	
	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	
Constant	9.554***	5.982***	0.172***	1.639***	9.540***	5.935***	0.188***	1.841***
	(0.112)	(0.158)	(0.029)	(0.054)	(0.097)	(0.149)	(0.029)	(0.058)
Observations	24,465	24,465	24,465	24,465	24,465	24,465	24,465	24,465

Source: Authors' calculations., ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. Standard errors given in parentheses. Country, industry and time fixed effects not reported due to space, but available on request.*

Table 12 – Instruments' tests

	Only tariffs	**Tariffs and channels**	**Tariffs, channels and controls**
Under identification test (Kleibergen-Paap rank LM statistic)	100.1	68.55	60.22
Weak identification test (Cragg-Donald Wald F statistic)	35282	23691	5060
Weak identification test (Kleibergen-Paap rank Wald F statistic)	2932	1808	615.7
Hansen J statistic (Over identification test of all instruments, p-value)	0.835	0.075	0.277
Source: Authors' calculations			

Table 13 – Results with instrumentation

	Baseline system					System including control variables				
Dependent variables:	Tariff	Log of import	Log of export	RCA index	Log of value added	Tariff	Log of import	Log of export	RCA index	Log of value added
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lag of log VA					0.870***					0.879***
					(0.003)					(0.004)
Log of import					0.013***					0.012***
					(0.003)					(0.005)
Log of export					0.061***					0.058***
					(0.003)					(0.005)
RCA index					0.012					0.013
					(0.020)					(0.020)
Tariff rate		-0.004***	-0.001	0.000*			-0.013***	0.001	0.000**	
		0.000	0.000	0.000			(0.001)	(0.002)	0.000	
Bound tariff	0.079***					0.079***				
	(0.005)					(0.008)				
Lag of tariff rate	0.936***					0.857***				
	(0.004)					(0.005)				
Road density						-1.996***	-0.007	-0.007	0	-0.010***
						(0.218)	(0.010)	(0.014)	(0.002)	(0.003)
Credit to GDP						0.123***	0.003	0.004	0	-0.001**
						(0.031)	(0.010)	(0.013)	(0.002)	(0.001)
FDI to GDP						0.355***	0.002	-0.016	-0.002	0.002**
						(0.070)	(0.013)	(0.018)	(0.003)	(0.001)
Log of GDP p/c						-30.108***	1.989	2.708	0.348	-0.111
						(1.250)	(1.324)	(1.831)	(0.275)	(0.101)
Spending for education to GDP						3.042***	0.162	0.034	0.035	0.005
						(0.536)	(0.126)	(0.171)	(0.026)	(0.019)
Market capitalization to GDP						0.070***	-0.002	0.003	0	-0.001**
						(0.010)	(0.004)	(0.005)	(0.001)	0.000
Trade to GDP						-0.074***	0.002	0.007	0.001	-0.004***
						(0.023)	(0.007)	(0.010)	(0.001)	(0.001)
Constant	-1.245***	9.790***	5.906***	0.117***	1.622***	345.345	-5.283	-12.46	-3.224	3.247***
	-0.252	-0.109	-0.155	-0.028	-0.054	-38.966	-12.006	-16.602	-2.497	-0.978
Observations	24,665	24,665	24,665	24,665	24,665	11,391	11,391	11,391	11,391	11,391

Source: Authors' calculations., ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. Standard errors given in parentheses. Country and time fixed effects not reported due to space, but available on request.*

Table 14 – Inputs and consumption goods

	Inputs					Consumption goods				
Dependent variables:	Tariff	Log of import	Log of export	RCA index	Log of value added	Tariff	Log of import	Log of export	RCA index	Log of value added
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lag of log VA					0.883***					0.873***
					(0.005)					(0.008)
Log of import					0.009					0.016**
					(0.006)					(0.008)
Log of export					0.056***					0.060***
					(0.006)					(0.008)
RCA index					0.008					0.043
					(0.022)					(0.059)
Tariff		-0.013***	-0.002	0.000*			-0.019***	0.037***	-0.000	
		(0.001)	(0.002)	(0.000)			(0.005)	(0.006)	(0.000)	
Bound tariff	0.083***					0.064***				
	(0.009)					(0.019)				
Lag of tariff	0.850***					0.934***				
	(0.005)					(0.009)				
Road density	-0.009	-0.006	-0.011	-0.001	-0.008**	0.068**	-0.007	-0.016	0.001	-0.017***
	(0.041)	(0.012)	(0.016)	(0.003)	(0.003)	(0.035)	(0.018)	(0.024)	(0.002)	(0.005)
Credit to GDP	-0.072	0.007	0.007	-0.001	-0.001*	-0.250***	-0.006	-0.008	0.002	-0.001
	(0.058)	(0.012)	(0.016)	(0.003)	(0.001)	(0.047)	(0.018)	(0.023)	(0.002)	(0.001)
FDI to GDP	0.071	0.001	-0.017	-0.002	0.002	0.148	0.006	-0.013	-0.001	0.003*
	(0.140)	(0.016)	(0.022)	(0.004)	(0.001)	(0.110)	(0.024)	(0.032)	(0.002)	(0.002)
Log of GDP p/c	1.261	1.534	1.788	0.472	-0.075	3.809***	2.500	3.345	0.143	-0.197
	(0.978)	(1.576)	(2.223)	(0.406)	(0.121)	(0.776)	(2.352)	(3.147)	(0.220)	(0.180)
Spending for education to GDP	1.424	0.161	0.053	0.051	-0.041*	4.736***	0.207	-0.059	0.004	0.100***
	(1.093)	(0.149)	(0.207)	(0.038)	(0.022)	(0.857)	(0.224)	(0.295)	(0.021)	(0.035)
Market capitalization to GDP	-0.003	-0.002	0.000	0.000	-0.001**	0.028	-0.002	0.006	0.001	-0.001
	(0.027)	(0.005)	(0.007)	(0.001)	(0.001)	(0.021)	(0.007)	(0.009)	(0.001)	(0.001)
Trade to GDP	-0.025	0.002	0.009	0.002	-0.005***	-0.085***	0.001	0.007	-0.000	-0.001
	(0.020)	(0.008)	(0.012)	(0.002)	(0.001)	(0.016)	(0.013)	(0.017)	(0.001)	(0.002)
Constant	-12.751	-6.410	-7.280	-5.090	4.490***	-41.297***	-16.134	-15.119	-1.643	6.448***
	(11.379)	(16.363)	(13.799)	(4.220)	(1.493)	(8.964)	(24.427)	(20.181)	(2.371)	(2.326)
Observations	7,481	7,481	7,481	7,481	7,481	3,920	3,920	3,920	3,920	3,920

*Source: Authors' calculations. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. Standard errors given in parentheses. Country and time fixed effects not reported due to space, but available on request.*

Table 15 – Relative values to GDP of the main variables used and two additional explanatory variables

Dependent variables:	Tariff	Import to GDP	Export to GDP	RCA index	Value added to GDP
	(1)	(2)	(3)	(4)	(5)
Lag of VA to GDP					0.848***
					(0.005)
Import to GDP					8.154**
					(3.649)
Export to GDP					42.805***
					(4.324)
RCA index					0.010
					(0.007)
Tariff rate		-0.000***	-0.000**	0.000**	
		(0.000)	(0.000)	(0.000)	
Bound tariff	0.082***				
	(0.007)				
Lag of tariff rate	0.857***				
	(0.004)				
Road density	-0.152	0.000	0.000	-0.000	-0.000
	(1.361)	(0.000)	(0.000)	(0.000)	(0.001)
Credit to GDP	-0.154*	-0.000	0.000	0.000	0.000
	(0.083)	(0.000)	(0.000)	(0.002)	(0.000)
FDI to GDP	-0.014	0.000	0.000	-0.001	0.000
	(0.209)	(0.000)	(0.000)	(0.003)	(0.000)
Log of GDP p/c	3.390	0.000	0.000	0.235	-0.042
	(20.447)	(0.000)	(0.000)	(0.302)	(0.028)
Spending for education to GDP	0.968	0.000	-0.000	0.026	0.001
	(0.857)	(0.000)	(0.000)	(0.033)	(0.005)
Market capitalization to GDP	-0.017	0.000	0.000	0.000	-0.000
	(0.065)	(0.000)	(0.000)	(0.001)	(0.000)
Trade to GDP	0.030	0.000	0.000	-0.000	0.000
	(0.051)	(0.000)	(0.000)	(0.002)	(0.000)
Terms of trade	0.000	-0.000	0.000	-0.001*	0.000***
	(0.046)	(0.000)	(0.000)	(0.001)	(0.000)
REER	0.049	0.000	0.000	0.001	0.000***
	(0.095)	(0.000)	(0.000)	(0.002)	(0.000)
Constant	-28.475	-0.000	-0.001	-2.102	0.282

	(220.303)	(0.004)	(0.003)	(2.686)	(0.282)
Observations	11,573	11,573	11,573	11,573	11,573

*Source: Authors' calculations. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. Standard errors given in parentheses. Country and time fixed effects not reported due to space, but available on request.*

Table 16 – Results when average VA is controlled for

Dependent variables:	Bound tariff	Tariff	Import to GDP	Export to GDP	RCA index	Value added to GDP
	(1)	(2)	(3)	(4)	(5)	(6)
Log of average industry VA	0.690***					
	(0.083)					
Lag of VA to GDP						0.760
						(0.007)
Import						0.013***
						(0.005)
Export						0.058***
						(0.005)
RCA index						0.013
						(0.020)
Tariff rate			-0.012***	0.002	0.000*	
			(0.001)	(0.002)	(0.000)	
Bound tariff		0.200***				
		(0.013)				
Lag of tariff rate		0.861***				
		(0.005)				
Road density	0.004	-0.057*	-0.007	-0.012	-0.000	-0.010***
	(0.143)	(0.030)	(0.010)	(0.014)	(0.002)	(0.003)
Credit to GDP	-0.011	-0.227***	0.002	0.002	0.000	-0.001**
	(0.099)	(0.042)	(0.010)	(0.013)	(0.002)	(0.001)
FDI to GDP	-0.006	0.086	0.003	-0.016	-0.002	0.002**
	(0.137)	(0.100)	(0.013)	(0.018)	(0.003)	(0.001)
Log of GDP p/c	0.353	2.354***	1.925	2.505	0.347	-0.110
	(4.488)	(0.696)	(1.323)	(1.831)	(0.275)	(0.101)
Spending for education to GDP	-0.075	2.257***	0.168	0.042	0.035	0.005
	(0.672)	(0.772)	(0.125)	(0.171)	(0.026)	(0.019)
Market capitalization to GDP	-0.003	0.001	-0.002	0.002	0.000	-0.001**
	(0.020)	(0.019)	(0.004)	(0.005)	(0.001)	(0.000)
Trade to GDP	-0.004	-0.050***	0.002	0.008	0.001	-0.004***
	(0.040)	(0.014)	(0.007)	(0.010)	(0.001)	(0.001)
Constant	3.633	-19.367**	-10.379	-10.617	-3.749	5.032***
	(49.542)	(8.080)	(13.733)	(12.104)	(2.973)	(1.260)
Observations	12,453	12,453	12,453	12,453	12,453	12,453

*Source: Authors' calculations. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. Standard errors are given in parentheses. Country and time fixed effects not reported due to space, but available on request.*

Table 17 – Transition countries vs. MENA

	CEEB					MENA				
Dependent variables:	Tariff	Log of import	Log of export	RCA index	Log of value added	Tariff	Log of import	Log of export	RCA index	Log of value added
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Lag of log VA					0.867***					0.891***
					(0.006)					(0.007)
Log of import					-0.002					0.011
					(0.007)					(0.008)
Log of export					0.081***					0.033***
					(0.007)					(0.008)
RCA index					0.009					0.008
					(0.036)					(0.070)
Tariff rate		-0.017***	-0.008***	-0.000			-0.004***	-0.001	0.000	
		(0.002)	(0.002)	0.000			0.001	0.001	0.000	
Bound tariff						0.109***				
						(0.001)				
Lag of tariff rate	0.942***					0.928***				
	(0.007)					(0.006)				
Constant	22.444	8.608***	6.695	-0.856**	2.954***	-71.415***	10.145***	10.293***	-0.792	1.541*
	15.033	4.129	5.272	0.347	0.535	22.765	4.501	6.281	0.622	0.846
Observations	5,158	5,158	5,158	5,158	5,158	4,749	4,749	4,749	4,749	4,749
			CIS					SEE		
Lag of log VA					0.836***					0.858***
					(0.013)					(0.010)
Log of import					0.034*					0.019
					(0.021)					(0.014)
Log of export					0.068***					0.058***
					(0.015)					(0.012)
RCA index					0.025					0.112
					(0.041)					(0.084)
Tariff rate		-0.003**	-0.001	0.000			-0.025***	0.006	0.003**	
		0.002	0.002	0.001			0.003	0.005	0.002	
Bound tariff	0.118***					0.336***				
	(0.010)					(0.013)				
Lag of tariff rate	0.909***					0.653***				
	(0.013)					(0.013)				
Constant	0.485	10.389***	9.659***	-0.792	4.484***	45.320	13.383***	11.819***	0.781***	1.429***
	2.896	1.588	2.369	0.622	1.017	42.947	0.564	0.877	0.266	0.346
Observations	2,752	2,752	2,752	2,752	2,752	3,062	3,062	3,062	3,062	3,062

*Source: Authors' calculations. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. Standard errors given in parentheses. Country and time fixed effects and control variables not reported due to space, but available on request.*

Table 18 – High value added industries vs. Low value added industries

	High value added					Low value added				
Dependent variables:	Tariff	Log of import	Log of export	RCA index	Log of value added	Tariff	Log of import	Log of export	RCA index	Log of value added
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Lag of log VA					0.761***					0.790***
					(0.009)					(0.007)
Log of import					0.014**					0.015**
					(0.006)					(0.006)
Log of export					0.035***					0.061***
					(0.006)					(0.007)
RCA index					0.007					0.078
					(0.016)					(0.076)
Road density	-0.223***	-0.014	-0.003	0.000	-0.003	0.039*	-0.006	-0.023	0.000	-0.013***
	(0.044)	(0.016)	(0.022)	(0.004)	(0.003)	(0.022)	(0.013)	(0.017)	(0.001)	(0.004)
Credit to GDP	0.037	-0.004	0.002	0.000	-0.001	-0.015	0.003	-0.005	0.001	-0.001
	(0.040)	(0.015)	(0.021)	(0.004)	(0.001)	(0.017)	(0.013)	(0.017)	(0.001)	(0.001)
FDI to GDP	-0.637**	-0.004	0.000	-0.001	0.001	0.094	0.010	-0.019	-0.001	0.002
	(0.250)	(0.020)	(0.027)	(0.005)	(0.001)	(0.114)	(0.019)	(0.025)	(0.001)	(0.002)
Log of GDP per capita	-0.667	3.473	1.002	0.192	-0.237*	1.247***	0.609	2.323	0.034	0.061
	(0.571)	(2.219)	(3.033)	(0.541)	(0.127)	(0.263)	(1.729)	(2.337)	(0.122)	(0.136)
Spending for education to GDP	-0.559	0.117	-0.269	0.030	-0.008	1.611***	0.243	0.264	0.002	-0.003
	(0.705)	(0.183)	(0.248)	(0.045)	(0.024)	(0.330)	(0.189)	(0.249)	(0.013)	(0.025)
Market capitalization to GDP	-0.101***	-0.007	-0.006	0.001	-0.000	-0.031***	0.003	0.009	-0.000	-0.001*
	(0.022)	(0.006)	(0.008)	(0.001)	(0.001)	(0.011)	(0.006)	(0.008)	(0.000)	(0.001)
Trade to GDP	-0.049**	0.023**	0.027*	0.001	-0.002*	-0.019**	-0.017	-0.014	0.000	-0.004***
	(0.020)	(0.010)	(0.014)	(0.003)	(0.001)	(0.008)	(0.011)	(0.015)	(0.001)	(0.001)
Bound tariff	0.091***					0.018*				
	(0.012)					(0.009)				
Tariff rate		-0.009***	-0.002	0.000			-0.029***	0.007**	0.000***	
		(0.001)	(0.002)	(0.000)			(0.002)	(0.003)	(0.000)	
Lag of tariff rate	0.829***					0.948***				
	(0.007)					(0.006)				
Constant	21.633***	-16.022	-3.202	-1.095	5.399***	-16.437***	5.453	-14.171	-0.397	2.872***
	(7.226)	(14.580)	(32.662)	(3.555)	(0.916)	(3.996)	(11.519)	(26.000)	(1.361)	(0.940)
Observations	5,074	5,074	5,074	5,074	5,074	6,317	6,317	6,317	6,317	6,317

*Source: Authors' calculations. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. Standard errors given in parentheses. Country and time fixed effects and control variables not reported due to space, but available on request.*